BIDDING DOCUMENT (SINGLE-STAGE)

Issued on: 19 Nov. 2018

S E C O N D C A L L

For the

Procurement of

Design, Supply, Installation, Integration, Testing, Commissioning & Maintenance of the Intelligent Transportation System for Chandigarh Transport Undertaking (CTU), Chandigarh, India through E-Procurement System

IFB No: CTU/ESCBS/03

Project: GEF-Efficient and Sustainable City Bus Services (ESCBS)

Purchaser: Chandigarh Transport Undertaking (CTU), Chandigarh, India

CONTENTS

Invitation for Bids (IFB)

19 Nov. 2018

India

Project Name: GEF-Efficient and Sustainable City Bus Services (ESCBS)

Design, Supply, Installation, Integration, Testing, Commissioning & Maintenance of the Intelligent Transportation System for Chandigarh Transport Undertaking (CTU), Chandigarh, India

Loan No.: TF018577

IFB Title: Turnkey services for CTU- ITS Project

IFB Number: CTU/ESCBS/03

1. This Invitation for Bids (IFB) follows the General Procurement Notice (GPN) for this project that appeared in UNDB online on or after 19 Nov. 2018**.**

2. The Government of India has received a grant from the Global Environment Facility (GEF) administered by World Bank toward the cost of GEF-Efficient and Sustainable City Bus Services (ESCBS), and it intends to apply part of the proceeds of this loan to payments under the agreement(s) resulting from this IFB: CTU/ESCBS/03.

3. The Director, Chandigarh Transport Undertaking (CTU) serves as the implementing agency for the project and now invites bids under e-procurement system (Two cover) from eligible Bidders for Design, Supply, Installation, Integration, Testing, Commissioning & Maintenance of the Intelligent Transportation System for Chandigarh Transport Undertaking (CTU), Chandigarh, India.

4. Bidding will be conducted using the International Competitive Bidding (ICB) procedures specified in the World Bank's Guidelines: Procurement under IBRD Loans and IDA Credits, 2011 edition, and is open to all Bidders eligible as defined in these Guidelines.

   The Bidder shall provide evidence to the effect of meeting the minimum qualification criteria as on the date of submission of this bid, by itself or by partner of the consortium as per the qualification criteria provided in ITB 6.1.

5. Interested eligible Bidders may submit their queries and obtain further information from Chandigarh Transport Undertaking (CTU), Mr. Vijay Kumar Vij, AO (CCBSS), email-directorctuchd@gmail.com and inspect the bidding documents at the address given below from 10:00 AM to 5:00 PM on all working days (Monday to Friday). A pre-bid meeting will be held on 29 Nov. 2018 at 11:30 AM, which potential bidders may attend at the location given below. Bidders are requested to post their queries if any by the pre-bid meeting date i.e. 29 Nov. 2018 up to 5:00 PM. Any queries received after stipulated date and time will not be entertained by purchaser.

6. A complete set of bidding documents in English language may be downloaded from Chandigarh e-procurement portal http://etenders.chd.nic.in and bids shall be submitted through e-portal only. Bids submitted in any other manner will be rejected.

(Bidders are required to obtain Digital Signature from designated firms and then register with the Chandigarh e-procurement platform and submit bids by using their user ID and Digital Signature). The downloadable version of the bidding documents, and any addenda to it, will be the binding one. Bid processing fee will be INR 10,000 (ten thousand only) and in the form of Demand Draft in favor of Director Transport cum Divisional Manager – Chandigarh Transport Undertaking, Chandigarh payable at Chandigarh, India.

7. Bids along with necessary enclosures (Signed & Scanned copies) must be uploaded to the website http://etenders.chd.nic.in before 18 Dec. 2018 up to 2:00 PM. The bid documents (except bid security and bid processing fee) are neither required to be submitted nor will be entertained in physical form. Bids need to be secured by a Bid security. The amount of Bid Security required is INR 5 Million (Five Million only) in the form of DD/Bank Guarantee (**in original and physical form**) should be submitted along with demand draft of bid processing fees at CTU office address given below before the date and time when the bid closes i.e. 18 Dec. 2018 up to 2:00 PM. Technical bids will be opened in the presence of Bidders' representatives who choose to attend at CTU office address mentioned below at 18 Dec. 2018 at 3:00 PM.

8. The attention of prospective Bidders is drawn to (i) the fact that they will be required to certify in their bids that all software is either covered by a valid license or was developed by the Bidder. and (ii) that Any violations are considered fraud, which can result in ineligibility to be awarded World Bank-financed contracts.

Address for Pre-Bid:

Conference Hall
UT Guest House
Uttar Marg, Sector 6,
Chandigarh-160019
India
Tel-0172-2679002, Fax-0172-2655970
directorctuchd@gmail.com
http://www.chdctu.gov.in

Address for Bid opening:

Director Transport cum Divisional Manager,
Chandigarh Transport Undertaking (CTU)
Plot No.701, Industrial Phase-1, Chandigarh-160002
India
Tel-0172-2679002, Fax-0172-2655970
directorctuchd@gmail.com
http://www.chdctu.gov.in

SECTION I. INSTRUCTIONS TO BIDDERS (ITB)

(Single-Stage Bidding)

Table of Clauses

Instructions to Bidders

A. General

1. Scope of Bid and Bidding Process

1.1 The Purchaser named in the BDS and the SCC for GCC Clause 1.1 (b) (i), or its duly authorized Purchasing Agent if so **specified in the BDS** (interchangeably referred to as "the Purchaser" in these Bidding Documents), invites bids for the supply and installation of the Information System (IS), as briefly **described in the BDS** and specified in greater detail in these Bidding Documents.

1.2 The title and identification number of the Invitation for Bids (IFB) and resulting Contract(s) are **provided in the BDS.**

1.3 Throughout the Bidding Documents, the term "in writing" means communicated in written form (e.g. by mail, e-mail, fax, telex) with proof of receipt, and the term "days" means calendar days unless a different meaning is evident from the context.

1.4 If the BDS so provides, alternative procedures forming part or all of what is commonly known as e-Tendering are available to the extent **specified in, or referred to by, the BDS.**

2. Source of Funds

2.1 The **Borrower named in the BDS** has applied for or received a loan or credit (as identified in the BDS, and called a "loan" in these Bidding Documents) from the International Bank for Reconstruction and Development or the International Development Association (called "the Bank" in these Bidding Documents) equivalent to the amount indicated in the BDS toward the cost of the Project specified in the BDS. The Borrower intends to apply a portion of the proceeds of this loan to eligible payments under the Contract for which these Bidding Documents are issued.

2.2 Payment by the Bank will be made only at the request of the Borrower, or the Borrower's executing agency, and upon approval by the Bank in accordance with the terms and conditions of the Loan Agreement, and will be subject in all respects to the terms and conditions of that agreement. The Loan Agreement prohibits a withdrawal from the loan account for the purpose of any payment to persons or entities, or for any import of goods, if such payment or import, to the knowledge of the Bank, is prohibited by a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations. No party other than the Borrower shall derive any rights from the Loan Agreement or have any claim to the

loan proceeds.

3. Fraud and Corruption

3.1 It is the Bank's policy to require that Borrowers (including beneficiaries of Bank loans), as well as bidders, suppliers, and contractors and their subcontractors under Bank-financed contracts, observe the highest standard of ethics during the procurement and execution of such contracts.[1] In pursuance of this policy, the Bank:

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) "corrupt practice"[2] is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice"[3] is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;

(iii) "collusive practice"[4] is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice"[5] is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to

---

1 In this context, any action taken by a bidder, supplier, contractor, or a sub-contractor to influence the procurement process or contract execution for undue advantage is improper.

2 "Another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

3 A "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

4 "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

5 A "party" refers to a participant in the procurement process or contract execution.

investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under sub-clause 3.1 (e) below.

(b) will reject a proposal for award if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

(c) will cancel the portion of the loan allocated to a contract if it determines at any time that representatives of the Borrower or of a beneficiary of the loan engaged in corrupt, fraudulent, collusive, or coercive practices during the procurement or the execution of that contract, without the Borrower having taken timely and appropriate action satisfactory to the Bank to address such practices when they occur;

(d) will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a Bank-financed contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a Bank-financed contract; and

(e) will have the right to require that a provision be included in bidding documents and in contracts financed by a Bank loan, requiring bidders, suppliers, and contractors and their sub-contractors to permit the Bank to inspect their accounts and records and other documents relating to the bid submission and contract performance and to have them audited by auditors appointed by the Bank.

3.2 Furthermore, Bidders shall be aware of the provision stated in Clause 9.8 and Clause 41.2 of the General Conditions of Contract.

3.3 Any communications between the Bidder and the Purchaser related to matters of alleged fraud or corruption must be made in

writing.

3.4 By signing the Bid Submission Form, the Bidder represents that it either is the owner of the Intellectual Property Rights in the hardware, software or materials offered, or that it has proper authorization and/or license to offer them from the owner of such rights. For the purpose of this Clause, Intellectual Property Rights shall be as defined in GCC Clause 1.1 (c) (xvii). Willful misrepresentation of these facts shall be considered a fraudulent practice subject to the provisions of Clauses 3.1 through 3.4 above, without prejudice of other remedies that the Purchaser may take.

4. Eligible Bidders

4.1 A Bidder, and all parties constituting the Bidder, may have the nationality of any country, subject to the restrictions specified in Section III, Eligible Countries. A Bidder shall be deemed to have the nationality of a country if the Bidder is a citizen or is constituted, incorporated, or registered and operates in conformity with the provisions of the laws of that country.

4.2 If a prequalification process has been undertaken for the Contract(s) for which these Bidding Documents have been issued, only those Bidders may participate that had been prequalified and continue to meet the eligibility criteria of this Clause. A prequalified Joint Venture may not change partners or its structure when submitting a bid.

4.3 A firm may be excluded from bidding if:

(a) it was engaged by the Purchaser to provide consulting services for the preparation of the design, specifications, or other documents to be used for the procurement of the Information System described in these Bidding Documents; or

(b) it is a government-owned enterprise in the Borrower's country, unless it can establish that it (i) is legally and financially autonomous and (ii) operates under commercial law. No dependent agency of the Borrower or Sub-Borrower shall be permitted to bid.

4.4 A firm that has been determined to be ineligible by the Bank in relation to the Bank Guidelines On Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants shall be not be eligible to be awarded a contract.

4.5 A firm or individual is or will be disqualified from participation

in this bidding if, at any time from advertisement of the bidding until and including contract award, the firm or individual is under:

(a) a suspension by the Purchaser agreed by the Bank as a result of execution of a Bid-Securing Declaration pursuant to ITB Clause 17.6 in another Bank-financed procurement, or under a suspension by the Purchaser for other reasons that have been agreed by the Bank; or

(b) a declaration of ineligibility by the Bank in accordance with ITB Clause 3.1 (d). The list of individuals and firms debarred from participating in World Bank projects is available at http://www.worldbank.org/debarr/, or

(c) a sanction imposed by the United Nations Security Council, as mentioned in ITB Clause 2.2.

4.6 A firm or other entity that is ineligible according to any of the above provisions of this Clause, may also not participate as a Joint Venture partner, or as Subcontractor for or supplier of goods, works or services. If a bid becomes materially incomplete after removing ineligible entities, the bid may be disqualified.

4.7 Bidders shall provide such evidence of their continued eligibility satisfactory to the Purchaser, as the Purchaser shall reasonably request.

5. Eligible Goods and Services

5.1 For the purposes of these Bidding Documents, the Information System means all:

(a) the required information technologies, including all information processing and communications-related hardware, software, supplies, and consumable items that the Supplier is required to supply and install under the Contract, plus all associated documentation, and all other materials and goods to be supplied, installed, integrated, and made operational (collectively called "the Goods" in some clauses of the ITB); and

(b) the related software development, transportation, insurance, installation, customization, integration, commissioning, training, technical support, maintenance, repair, and other services necessary for proper operation of the Information System to be provided by the selected Bidder and as specified in the Contract.

5.2 Funds from Bank loans are disbursed only for expenditures for

an Information System made up of goods and services provided by nationals of, and produced in or supplied from, eligible source countries as defined in Section III, Eligible Countries. An Information System is deemed to be produced in a certain country when, in the territory of that country, through software development, manufacturing, or substantial and major assembly or integration of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

5.3 For purposes of this clause, the nationality of the Bidder is distinct from the country in which the Information System and its goods components are produced or from which the related services are supplied.

6. Qualifications of the Bidder

6.1 By submission of documentary evidence in its bid, the Bidder must establish to the Purchaser's satisfaction:

(a) that it has the financial, technical, and production capability necessary to perform the Contract, meets the qualification criteria **specified in the BDS,** and has a successful performance history. If a prequalification process has been undertaken for the Contract(s) for which these Bidding Documents have been issued, the Bidder shall, as part of its bid, update any information submitted with its application for prequalification;

(For the purposes of establishing a Bidder's qualifications, and unless stated to the contrary in the BDS, the experience and / or resources of any Subcontractor will not contribute to the Bidder's qualifications; only those of a Joint Venture partner will be considered.)

(b) that, in the case of a Bidder offering to supply key goods components of the Information System, as **identified in the BDS,** that the Bidder does not itself produce, the Bidder is duly authorized by the producer to supply those components in the Purchaser's country under the Contract(s) that may result from this bidding; (This will be accomplished by including Manufacturer's Authorizations in the bid, based on the sample found in Section VII.)

(c) that, if a Bidder proposes Subcontractors for key services if and as **identified in the BDS,** these Subcontractors have agreed in writing to serve for the Bidder under the Contract(s) that may result from this bidding; and

(d) that, in the case of a Bidder not doing business within the

Purchaser's country, the Bidder is or will be (if awarded the Contract) represented by an Agent in that country who is equipped and able to carry out the Bidder's maintenance, technical support, training, and repair obligations prescribed in the General and Special Conditions of Contract, and/or Technical Requirements.

6.2 Bids submitted by a Joint Venture of two or more firms as partners shall also comply with the following requirements:

(a) the bid shall be signed so as to be legally binding on all partners;

(b) one of the partners shall be nominated as being in charge, and this nomination shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;

(c) the partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the Joint Venture, and the entire execution of the Contract, including payment, shall be done exclusively with the partner in charge;

(d) the partner or combination of partners that is responsible for a specific component of the Information System must meet the relevant minimum qualification criteria for that component;

(e) a firm may submit bids either as a single Bidder on its own, or as partner in one, and only one, Joint Venture. If, as a result of the bid opening pursuant to ITB Clause 24, this requirement is not met, all bids involving the firm as a single Bidder or Joint Venture partner will be disqualified;

(f) all partners of the Joint Venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a statement to this effect shall be included in the authorization mentioned under ITB Clause 6.2 (b) above, in the bid as well as in the Contract (in case of a successful bid).

6.3 If a Bidder intends to subcontract major items of supply or services, it shall include in the bid details of the name and nationality of the proposed Subcontractor for each of those items and shall be responsible for ensuring that any Subcontractor proposed complies with the requirements of ITB Clause 4, and that any Goods or Services components of the Information

System to be provided by the Subcontractor comply with the requirements of ITB Clause 5 and the related evidence required by ITB Clause 13.1 (e) (iii) is submitted. Bidders are free to list more than one Subcontractor against each item. Quoted rates and prices will be deemed to apply, whichever Subcontractor is appointed, and no adjustment of the rates or prices will be permitted. The Purchaser reserves the right to delete any proposed Subcontractor from the list. This shall be done prior to Contract signature, by deleting such unacceptable Subcontractors from Appendix 3 to the Contract Agreement, which shall list the approved Subcontractors for each item prior to Contract signature. Subsequent additions and deletions from the list of approved Subcontractors shall be performed in accordance with GCC Clause 20 (as revised in the SCC, if applicable) and Appendix 3 to the Contract Agreement.

For the purposes of these Bidding Documents, a Subcontractor is any vendor or service provider with whom the Bidder contracts for the supply or execution of any part of the Information System to be provided by the Bidder under the Contract (such as the supply of major hardware, software, or other components of the required Information Technologies specified, or the performance of related Services, e.g., software development, transportation, installation, customization, integration, commissioning, training, technical support, maintenance, repair, etc.).

6.4 A firm which is a Bidder, whether as a single Bidder or as a partner in a Joint Venture, cannot be a Subcontractor in other bids, except for the supply of commercially available hardware or software by the firm, as well as purely incidental services such as installation/configuration, routine training, and ongoing maintenance/support. If the BDS for ITB Clause 6.1 (a) allows the qualification of Subcontractors nominated for certain components to be taken into account in assessing the Bidder's overall qualifications, any Subcontractor so nominated by any Bidder is automatically disqualified from being a Bidder itself or a partner in a Joint Venture. The same will normally apply to firms that have provided Subcontractor agreements for certain services pursuant to ITB Clause 6.1 (c). Non-compliance may result in the rejection of all bids in which the affected firm participates as Bidder or as partner in a Joint Venture. As long as in compliance with these provisions, or as long as unaffected by them due to not participating as Bidder or as partner in a Joint Venture, a firm may be proposed as a Subcontractor in any number of bids. If the BDS for ITB 28.1 permits the submission of bids for Subsystems, lots, or slices, then the provisions of this

Clause 6.4 apply only to bids for the same Subsystem(s), lot(s), or slice(s);

7. Cost of Bidding

7.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Purchaser will in no case be responsible or liable for those costs.

8. Site Visit

8.1 The Bidder may wish to visit and examine the site or sites of the Information System and obtain for itself, at its own responsibility and risk, all information that may be necessary for preparing the bid and entering into the Contract. The costs of visiting the site or sites shall be at the Bidder's own expense.

8.2 The Purchaser will arrange for the Bidder and any of its personnel or agents to gain access to the relevant site or sites, provided that the Bidder gives the Purchaser adequate notice of a proposed visit of at least fourteen (14) days. Alternatively, the Purchaser may organize a site visit or visits concurrently with the pre-bid meeting, as specified in the BDS for ITB Clause 10.2. Failure of a Bidder to make a site visit will not be a cause for its disqualification.

8.3 No site visits shall be arranged or scheduled after the deadline for the submission of the Bids and prior to the award of Contract.

B. THE BIDDING DOCUMENTS

9. Content of Bidding Documents

9.1 The contents of the Bidding Documents are listed below and should be read in conjunction with any addenda issued in accordance with ITB Clause 11:

Section I	Instructions to Bidders (ITB)
Section II	Bid Data Sheet (BDS)
Section III	Eligible Countries for the Provision of Goods, Works, and Services in Bank-Financed Procurement
Section IV	General Conditions of Contract (GCC)
Section V	Special Conditions of Contract (SCC)
Section VI	Technical Requirements (including Implementation Schedule)
Section VII	Sample Forms

9.2 Bidders are expected to examine all instructions, forms, terms,

specifications, and other information in the Bidding Documents. Failure to furnish all information required by the Bidding Documents or to submit a bid not substantially responsive to the Bidding Documents in every respect will be at the Bidder's risk and may result in the rejection of its bid.

9.3 The Invitation for Bids is not formally part of the Bidding Documents and is included for reference only. In case of inconsistencies, the actual Bidding Documents shall prevail.

10. Clarification of Bidding Documents and Pre-bid Meeting

10.1 A prospective Bidder requiring any clarification of the Bidding Documents may notify the Purchaser in writing at the Purchaser's address and by one of the means **indicated in the BDS.** Similarly, if a Bidder feels that any important provision in the documents will be unacceptable, such an issue should be raised as soon as possible. The Purchaser will respond in writing to any request for clarification or modification of the Bidding Documents that it receives no later than twenty-one (21) days prior to the deadline for submission of bids prescribed by the Purchaser. Copies of the Purchaser's response (including an explanation of the query but not identifying its source) will be sent to all prospective Bidders that received the Bidding Documents from the Purchaser.

10.2 When **specified in the BDS,** the Purchaser will organize and Bidders are welcome to attend a pre-bid meeting at the time and place **indicated in the BDS**. The purpose of the meeting will be to clarify issues and answer questions on any matter that may be raised at this stage, with particular attention to issues related to the Technical Requirements. Bidders are requested to submit any questions in writing to reach the Purchaser not later than one week before the meeting. Questions and answers will be transmitted in accordance with ITB Clause 10.1. Minutes of the meeting, including the questions raised and responses given, together with any responses prepared after the meeting, will be transmitted without delay to all those that received the Bidding Documents from the Purchaser. Any modification to the Bidding Documents listed in ITB Clause 9.1, which may become necessary as a result of the pre-bid meeting, shall be made by the Purchaser exclusively by issuing an Addendum pursuant to ITB Clause 11 and not through the minutes of the pre-bid meeting.

11. Amendment of Bidding Documents

11.1 At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, amend the Bidding Documents. Later amendments on the same subject modify or replace earlier ones.

11.2 Amendments will be provided in the form of Addenda to the Bidding Documents, which will be sent in writing to all prospective Bidders that received the Bidding Documents from the Purchaser. Addenda will be binding on Bidders. Bidders are required to immediately acknowledge receipt of any such Addenda. It will be assumed that the amendments contained in such Addenda will have been taken into account by the Bidder in its bid.

11.3 In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bids, the Purchaser may, at its discretion, extend the deadline for the submission of bids, in which case, the Purchaser will notify all Bidders in writing of the extended deadline.

C. PREPARATION OF BIDS

12. Language of Bid

12.1 The bid prepared by the Bidder and all correspondence and documents related to the bid exchanged by the Bidder and the Purchaser shall be written in the **language specified in the BDS,** or, if the BDS so provides, in either one of two languages specified there. Any printed literature furnished by the Bidder as part of its bid may be in a language not specified in the BDS, as long as such literature is accompanied by a translation of its pertinent passages into the language of the bid, in which case, for purposes of interpretation of the bid, the translation shall govern.

13. Documents Comprising the Bid

13.1 The bid submitted by the Bidder shall comprise:

(a) Bid Submission Form completed and signed by a person or persons duly authorized to bind the Bidder to the Contract;

(b) all Price Schedules duly completed in accordance with ITB Clauses 14, 15, and 18 and signed by a person or persons duly authorized to bind the Bidder to the Contract;

(c) if required, Bid-securing Declaration or Bid Security furnished in accordance with ITB Clause 17;

(d) written confirmation authorizing the signatory of the bid to

commit the Bidder, in accordance with ITB Clause 19.2;

(e) Attachments:

(i) Attachment 1: Bidder's Eligibility

In the absence of prequalification, documents establishing to the Purchaser's satisfaction the Bidder's eligibility to bid, including but not limited to documentary evidence that the Bidder is legally incorporated in a territory of an eligible source country as defined under ITB Clause 4;

(ii) Attachment 2: Bidder's Qualifications

Documentary evidence establishing to the Purchaser's satisfaction, and in accordance with ITB Clause 6, that the Bidder is qualified to perform the Contract if its bid is accepted. In the case where prequalification of Bidders has been undertaken, and pursuant to ITB Clause 6.1 (a), the Bidder must provide evidence on any changes in the information submitted as the basis for prequalification or, if there has been no change at all in said information, a statement to this effect;

Any Manufacturer's Authorizations and Subcontractor agreements specified as required in the BDS for ITB Clauses 6.1 (b) and 6.1 (c);

(iii) Attachment 3: Eligibility of Goods and Services

Documents establishing, to the Purchaser's satisfaction, that the Goods and Services components of the Information System to be supplied, installed, and/or performed by the Bidder are eligible Goods and Services as defined under ITB Clause 5. If awarded the Contract, the Bidder shall submit for such components of the Information System evidence of eligibility, which shall be confirmed by a certificate of origin issued at the time of shipment;

(iv) Attachment 4: Conformity of the Information System to the Bidding Documents

Documentary evidence establishing to the Purchaser's satisfaction, and in accordance with ITB Clause 16, that the Goods and Services components of the Information System to be supplied, installed, and/or performed by the Bidder conform to the

Bidding Documents;

(v) Attachment 5: Proposed Subcontractors

A list of all major items of Goods or Services that the Bidder proposes to purchase or subcontract from others, and the name and nationality of the proposed Subcontractor, including vendors, for each of those items;

(vi) Attachment 6: Intellectual Property

A list of:

(1) all Software included in the Bidder's bid, assigning each item to one of the software categories defined in GCC Clause 1.1 (c):

(A) System, General Purpose, and Application Software; and

(B) Standard and Custom Software.

(2) all Custom Materials, as defined in GCC Clause 1.1 (c), included in the Bidder's bid.

All Materials not identified as Custom Materials shall be deemed Standard Materials, as defined in GCC Clause 1.1 (c).

Re-assignments among the Software and Materials categories, if necessary, will be made during the implementation of the Contract according to GCC Clause 39 (Changes to the System).

14. Bid Prices

14.1 All Goods and Services identified in the Supply and Installation Cost Sub-Table and the Recurrent Cost Sub-Table in Section VII (Forms 2.5 and 2.6), and all other Goods and Services proposed by the Bidder to fulfill the requirements of the Information System, must be priced separately in the format of the same tables and summarized in the corresponding Cost Summary Tables in the same Section. Prices must be quoted in accordance with the instructions provided in Section VII for the various cost tables, in the manner specified below.

14.2 The price of items that the Bidder has left blank in the cost tables provided in Section VII shall be assumed to be included in the price of other items. Items omitted altogether from the cost tables shall be assumed to be omitted from the bid and, provided that the bid is substantially responsive, an adjustment to the bid price will be made during evaluation in accordance with ITB Clause 28.6 (c) (iii).

14.3 Unit prices must be quoted at a level of detail appropriate for calculation of any partial deliveries or partial payments under the contract, in accordance with the Implementation Schedule in Section VI, and with GCC and SCC Clause 12 – Terms of Payment. Bidders may be required to provide a breakdown of any composite or lump-sum items included in the Cost Tables.

14.4 The prices for Goods components of the System are to be expressed and shall be defined and governed in accordance with the rules prescribed in the edition of Incoterms **specified in the BDS,** and quoted in the appropriate columns of the cost tables of Section VII as follows:

(a) Goods supplied from outside the Purchaser's country:

Unless otherwise **specified in the BDS**, the prices shall be quoted on a CIP (named place of destination) basis, exclusive of all taxes, stamps, duties, levies, and fees imposed in the Purchaser's country. The named place of destination and special instructions for the contract of carriage are as **specified in the BDS**. In quoting the price, the Bidder shall be free to use transportation through carriers registered in any eligible countries. Similarly, the Bidder may obtain insurance services from any eligible source country.

(b) Locally supplied Goods:

Unit prices of Goods offered from within the Purchaser's Country, shall be quoted on an EXW (ex factory, ex works, ex warehouse or off-the-shelf, as applicable) basis, including all customs duties, levies, fees, sales and other taxes incurred until delivery of the Goods, but excluding all VAT or sales and other taxes and duties/fees incurred for the Goods at the time of invoicing or sales transaction, if the Contract is awarded.

(c) Inland transportation:

Unless otherwise **stated in the BDS**, inland transportation, insurance and related local costs incidental to the delivery

of the Goods to the designated Project Sites must be quoted separately as a Service item in accordance with ITB Clause 14.5, whether the Goods are to be supplied locally or from outside the Purchaser's country, except when these costs are already included in the price of the Goods, as is, e.g., the case, when ITB Clause 14.4 (a) specifies CIP, and the named places of destination are the Project Sites.

14.5 The price of Services shall be quoted in total for each service (where appropriate, broken down into unit prices), separated into their local and foreign currency components. Prices must include all taxes, duties, levies and fees whatsoever, except only VAT or other indirect taxes, or stamp duties, that may be assessed and/or apply in the Purchaser's country on/to the price of the Services invoiced to the Purchaser, if the Contract is awarded. Unless otherwise **specified in the BDS,** the prices must include all costs incidental to the performance of the Services, as incurred by the Supplier, such as travel, subsistence, office support, communications, translation, printing of materials, etc. Costs incidental to the delivery of the Services but incurred by the Purchaser or its staff, or by third parties, must be included in the price only to the extent such obligations are made explicit in these Bidding Documents (as, e.g., a requirement for the Bidder to include the travel and subsistence costs of trainees).

14.6 Prices for Recurrent Costs beyond the scope of warranty services to be incurred during the Warranty Period, defined in SCC Clause 29.4 and prices for Recurrent Costs to be incurred during the Post-Warranty Period, defined in SCC Clause 1.1. (e) (xii), shall be quoted as Service prices in accordance with ITB Clause 14.5 on the Recurrent Cost Sub-Table in detail, and on the Recurrent Cost Summary Table in currency totals. Recurrent costs are all-inclusive of the costs of necessary Goods such as spare parts, software license renewals, labor, etc., needed for the continued and proper operation of the System and, if appropriate, of the Bidder's own allowance for price increases.

14.7 Unless otherwise **specified in the BDS,** prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to increases on any account. Bids submitted that are subject to price adjustment will be rejected.

15. Bid Currencies

15.1 Prices shall be quoted in the following currencies:

(a) The Bidder may quote its prices for all Information Technologies, associated Goods, and Services to be supplied from outside the Purchaser's Country in the currencies of countries eligible according to Section III. If the Bidder wishes to be paid in a combination of different currencies, it must quote unit prices accordingly, but no more than three foreign currencies may be used.

(b) Unless otherwise **specified in the BDS,** the Bidder shall express its prices for such Information Technologies, associated Goods, and Services to be supplied locally (i.e., from within the Purchaser's Country) in the currency of the Purchaser's Country.

16. Documents Establishing the Conformity of the Information System to the Bidding Documents

16.1 Pursuant to ITB Clause 13.1 (e) (iv), the Bidder shall furnish, as part of its bid, documents establishing the conformity to the Bidding Documents of the Information System that the Bidder proposes to supply and install under the Contract.

16.2 The documentary evidence of conformity of the Information System to the Bidding Documents shall be in the form of written descriptions, literature, diagrams, certifications, and client references, including:

(a) the Bidder's technical bid, i.e., a detailed description of the Bidder's proposed technical solution conforming in all material aspects with the Technical Requirements (Section VI) and other parts of these Bidding Documents, overall as well as in regard to the essential technical and performance characteristics of each component making up the proposed Information System;

(b) an item-by-item commentary on the Purchaser's Technical Requirements, demonstrating the substantial responsiveness of the Information System offered to those requirements. In demonstrating responsiveness, the commentary shall include explicit cross references to the relevant pages in the supporting materials included in the bid. Whenever a discrepancy arises between the item-by-item commentary and any catalogs, technical specifications, or other preprinted materials submitted with the bid, the item-by-item commentary shall prevail;

(c) a Preliminary Project Plan describing, among other things, the methods by which the Bidder will carry out its overall management and coordination responsibilities if awarded

the Contract, and the human and other resources the Bidder proposes to use. The Plan should include a detailed Contract Implementation Schedule in bar chart form, showing the estimated duration, sequence, and interrelationship of all key activities needed to complete the Contract. The Preliminary Project Plan must also address any other topics **specified in the BDS.** In addition, the Preliminary Project Plan should state the Bidder's assessment of what it expects the Purchaser and any other party involved in the implementation of the Information System to provide during implementation and how the Bidder proposes to coordinate the activities of all involved parties;

(d) a written confirmation that the Bidder accepts responsibility for the successful integration and inter-operability of all components of the Information System as required by the Bidding Documents.

16.3 For purposes of the commentary to be furnished pursuant to ITB Clause 16.2 (b), the Bidder shall note that references to brand names or model numbers or national or proprietary standards designated by the Purchaser in its Technical Requirements are intended to be descriptive and not restrictive. Except where explicitly **prohibited in the BDS** for specific items or standards, the Bidder may substitute alternative brand/model names or standards in its bid, provided that it demonstrates to the Purchaser's satisfaction that the use of the substitute(s) will result in the Information System being able to perform substantially equivalent to or better than that specified in the Technical Requirements.

17. Securing the Bid

17.1 The BDS for this Clause specifies whether bids must be secured, and if so, whether by a Bid-Securing Declaration or by a Bid Security. If a Bid Security is required or optional, the **BDS also specifies the amount.**

17.2 Securing the bids shall be substantially in accordance with the related sample forms included in Section VII or other forms approved by the Purchaser prior to bid submission. Bids must remain secured for a period of 28 days beyond the validity period of the bids, as extended, if applicable, in accordance with ITB Clause 18.2. In case of a Bid Security, it shall also:

(a) at the Bidder's option, be in the form of either a certified check, letter of credit, or a bank guarantee from a banking institution, or a bond issued by a surety;

(b) be issued by a reputable institution selected by the Bidder and located in any eligible country; if the institution issuing the security is located outside the Purchaser's Country, it shall have a correspondent financial institution located in the Purchaser's Country to make the security enforceable;

(c) be payable promptly upon written demand by the Purchaser in case any of the conditions listed in ITB Clause 17.6 is/are invoked;

(d) be submitted in its original form; copies will not be accepted.

17.3 The Bid-Securing Declaration or the Bid Security of a Joint Venture shall be issued in the name of the Joint Venture submitting the bid provided the Joint Venture has legally been constituted, or else it shall be issued in the name of all partners proposed for the Joint Venture in the bid. Sanctions due to a breach of the terms of a Bid-Securing Declaration pursuant to ITB Clause 17.6 will apply to all partners to the Joint Venture.

17.4 If a Bid-Securing Declaration or Bid Security is required in accordance with ITB Clause 17.1, any bid not accompanied by a substantially acceptable Bid-Securing Declaration or Bid Security in accordance with ITB Clauses 17.2 and 17.3, shall be rejected by the Purchaser as non-responsive.

17.5 Unless executed or forfeited pursuant to ITB Clause 17.6, Bid-Securing Declarations, if any, will expire for, or Bid Securities, if any, will be returned as promptly as possible to,

(a) all Bidders upon annulment of the bidding pursuant to ITB Clause 34;

(b) Bidders refusing a request to extend the period of validity of their bids pursuant to ITB Clause 18.2;

(c) the successful Bidder once it has signed the Contract Agreement and furnished a valid Performance Security as required;

(d) the unsuccessful Bidders at the same time as in (c), that is, when they are informed about the successful establishment of the contract with the successful Bidder.

17.6 The Bid-Securing Declaration, if any, may be executed, or the Bid Security, if any, may be forfeited:

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Bid Submission Form or any extension of validity the Bidder has agreed to pursuant to ITB Clause 18.2; or

(b) in the case of the successful Bidder, if the Bidder fails to:

(i) sign the Contract Agreement in accordance with ITB Clause 36; or

(ii) furnish the Performance Security in accordance with ITB Clause 37.

17.7 If a bid security is **not required in the BDS**, and

(a) if a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Letter of Bid Form, except as provided in ITB 18.2, or

(b) if the successful Bidder fails to: sign the Contract in accordance with ITB 36; or furnish a performance security in accordance with ITB 37;

the Borrower may**, if provided for in the BDS,** declare the Bidder disqualified to be awarded a contract by the Employer for a period of time **as stated in the BDS**.

18. Period of Validity of Bids

18.1 Bids shall remain valid, at a minimum, for the period **specified in the BDS** after the deadline date for bid submission prescribed by the Purchaser, pursuant to ITB Clause 21. A bid valid for a shorter period shall be rejected by the Purchaser as non-responsive. For the convenience of Bidders, the BDS spells out the minimal original expiration dates for the validity of the bid and, if applicable pursuant to ITB Clause 17.1, for securing the bid. However, Bidders are responsible for adjusting the dates in the BDS in accordance with any extensions to the deadline date of bid submission pursuant to ITB Clause 21.2.

18.2 In exceptional circumstances, prior to expiry of the bid validity period, the Purchaser may request that the Bidders extend the period of validity for a specified additional period. The request and the responses to the request shall be made in writing. A Bidder may refuse the request without risking execution of the Bid-Securing Declaration or forfeiting the Bid Security, but in this case the bid will be out of the competition for the award. Except as provided in ITB Clause 18.3, a Bidder agreeing to the

request will not be required or permitted to modify its bid, but will be required to ensure that the bid remains secured for a correspondingly longer period, pursuant to ITB Clause 17.2.

18.3 In the case of fixed price contracts, if the award is delayed by a period exceeding fifty-six (56) days beyond the expiry of the initial bid validity, the contract price will be adjusted as specified in the request for extension. Bid evaluation will be based on the bid prices without taking into consideration the above correction.

19. Format and Signing of Bid

19.1 The Bidder shall prepare an original and the number of copies/sets of the bid **specified in the BDS,** clearly marking each one as "ORIGINAL BID," "COPY NO. 1," "COPY NO. 2," etc., as appropriate. In the event of any discrepancy between them, the original shall govern.

19.2 The original and all copies of the bid, each consisting of the documents listed in ITB Clause 13.1, shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder. The authorization must be in writing and included in the bid pursuant to ITB Clause 13.1 (d). The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the bid, except for unamended printed literature, shall be initialed by the person or persons signing the bid.

19.3 The bid shall contain no interlineations, erasures, or overwriting, except to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

19.4 The Bidder shall furnish in the Bid Submission Form (a sample of which is provided in the Sample Forms Section of the Bidding Documents) information regarding commissions or gratuities, if any, paid or to be paid to agents relating to this procurement and to the execution of the Contract should the Bidder be successful.

D. SUBMISSION OF BIDS

20. Sealing and Marking of Bids

20.1 The Bidder shall seal the original and each copy of the bid in separate envelopes, duly marking the envelopes as "ORIGINAL BID" and "COPY NO. *[number]*." The envelopes shall then be sealed in an outer envelope.

20.2 The inner and outer envelopes shall

(a) be addressed to the Purchaser at the address **given in the BDS,** and

(b) bear the loan/Project name indicated in the BDS for ITB Clause 2.1, the Invitation for Bids title and number, and the Contract name(s), as indicated in the BDS for ITB Clause 1.2, and the statement "DO NOT OPEN BEFORE *[time and date]*," to be completed with the time and date specified in the BDS for ITB Clause 24.1.

20.3 The inner envelopes shall also indicate the name and address of the Bidder so that the bid can be returned unopened in case it is declared "late."

20.4 If the outer envelope is not sealed and marked as required by ITB Clause 20.2 above, the Purchaser will assume no responsibility for the bid's misplacement or premature opening. If the outer envelope discloses the Bidder's identity, the Purchaser will not guarantee the anonymity of the bid submission, but this disclosure will not constitute grounds for bid rejection.

21. Deadline for Submission of Bids

21.1 Bids must be received by the Purchaser at the address specified in the BDS for ITB Clause 20.2 no later than the time and date **stated in the BDS.**

21.2 The Purchaser may, at its discretion, extend this deadline for submission of bids by amending the Bidding Documents in accordance with ITB Clause 11.3, in which case all rights and obligations of the Purchaser and Bidders will thereafter be subject to the deadline as extended.

22. Late Bids

22.1 Any bid received by the Purchaser after the bid submission deadline prescribed by the Purchaser in the BDS for ITB Clause 21, will be rejected and returned unopened to the Bidder.

23. Withdrawal, Substitution, and Modification of Bids

23.1 The Bidder may withdraw, substitute, or modify its bid after submission, provided that written notice of the withdrawal, substitution, or modification is received by the Purchaser prior to the deadline prescribed for bid submission. All notices must be duly signed by an authorized representative and shall include a copy of the authorization (the power of attorney) in accordance with ITB Sub-Clause 19.2.

23.2 All notices of withdrawal, substitution, or modification shall

(a) be addressed to the Purchaser at the address named in the

BDS for ITB Clause 20.2 (a), and

(b) bear the Contract name, the IFB Title and IFB Number, and the words "BID WITHDRAWAL NOTICE", BID SUBSTITUTION NOTICE", or "BID MODIFICATION NOTICE".

23.3 A notice may also be sent by electronic means such as fax or e-mail, but in this case must include a scan of the mailing receipt showing both the sender's and receiver's addresses for the signed hardcopy of the notice, and a scan of the power of attorney.

23.4 Bids requested to be withdrawn in accordance with ITB 23.1 shall be returned unopened to the Bidders. Bid withdrawal notices received after the bid submission deadline will be ignored, and the submitted bid will be deemed to be a validly submitted bid.

23.5 The substitution or modification of the bid shall be prepared, sealed, marked, and dispatched as follows:

(a) The Bidders shall provide an original and the number of copies specified in the BDS for ITB Clause 19.1 of any substitution or modification to its bid, clearly identified as such, in two inner envelopes duly marked "BID SUBSTITUTION -- ORIGINAL" or "BID MODIFICATION -- ORIGINAL" and "BID SUBSTITUTION -- COPIES" or "BID MODIFICATION -- COPIES." The inner envelopes shall be sealed in an outer envelope, which shall be duly marked "BID SUBSTITUTION" or "BID MODIFICATION".

(b) Other provisions concerning the marking and dispatch of a bid substitution or modification shall be in accordance with ITB Clauses 20.2, 20.3, and 20.4.

23.6 No bid may be withdrawn, substituted, or modified in the interval between the bid submission deadline and the expiration of the bid validity period specified by the Bidder in the Bid Submission Form, or any extension thereof agreed to by the Bidder. Withdrawal of a bid during this interval may result in the execution of the Bid-Securing Declaration, if any, or forfeiture of the Bid Security, if any, pursuant to ITB Clause 17.6.

E. BID OPENING AND EVALUATION

24. Opening of Bids by

24.1 The Purchaser will open all bids, including withdrawals, substitutions, and modifications, in public, in the presence of

Purchaser Bidders' representatives who choose to attend, at the time, on the date and at the place **specified in the BDS**. Bidders' representatives shall sign a register as proof of their attendance.

24.2 First, envelopes marked "BID WITHDRAWAL NOTICE" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "BID SUBSTITUTION NOTICE" shall be opened and read out and exchanged with the corresponding bid being substituted, and the substituted bid shall not be opened, but returned to the Bidder. No bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "BID MODIFICATION NOTICE" shall be opened and read out with the corresponding bid. No bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at bid opening. Only bids that are opened and read out at bid opening shall be considered further.

24.3 Bids shall be opened one at a time, reading out: the name of the Bidder and whether there is a modification; the total bid price including any unconditional discounts, and, if applicable, the prices and unconditional discounts for Subsystems, lots, or slices; the presence or absence of a Bid-Securing Declaration or a Bid Security if one was required; any conditional discounts offered for the award of more than one Subsystem, lot, or slice, if the BDS for ITB Clause 28.1 permits such discounts to be considered in the bid evaluation; and any other such details as the Purchaser may consider appropriate.

24.4 Bids and modifications that are not opened and read out at bid opening shall not be considered for further evaluation, irrespective of the circumstances. These bids, including any bids validly withdrawn in accordance with ITB Clause 24.2, will promptly be returned, unopened, to their Bidders.

24.5 The Purchaser will prepare minutes of the bid opening, including the information disclosed to those present in accordance with ITB Clause 24.3. The minutes will promptly be distributed to all Bidders that met the deadline for submitting bids.

25. Clarification of Bids 25.1 During the bid evaluation, the Purchaser may, at its discretion, ask the Bidder for a clarification of its bid. The request for

clarification and the response shall be in writing, and no change in the price or substance of the bid shall be sought, offered, or permitted.

26. Preliminary Examination of Bids

26.1 The Purchaser will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the bids are generally in order. In the case where a prequalification process has been undertaken for the Contract(s) for which these Bidding Documents have been issued, the Purchaser will ensure that each bid is from a prequalified Bidder, and in the case of a Joint Venture, that partners and structure of the Joint Venture are unchanged from those in the prequalification.

26.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between added or subtracted subtotals and totals, the unit or subtotal price shall prevail and the total price shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit or subtotal prices, in which case the line item total as quoted shall govern and the unit price or sub-total shall be corrected. If there is a discrepancy between words and figures, the amount in words will prevail, unless the discrepancy is the result of a typo/error for which the correction is self-evident to the Purchaser. If the Bidder with the Lowest Evaluated Bid does not accept the correction of errors, the bid shall be rejected.

26.3 The Purchaser may waive any minor informality, nonconformity, or irregularity in a bid that does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder.

26.4 Prior to the detailed evaluation, the Purchaser will determine whether each bid is of acceptable quality, is complete, and is substantially responsive to the Bidding Documents. For purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions, and specifications of the Bidding Documents without material deviations, exceptions, objections, conditionality's, or reservations. A material deviation, exception, objection, conditionality, or reservation is one: (i) that limits in any substantial way the scope, quality, or performance of the Information System; or (ii) that limits, in any substantial way that is inconsistent with the Bidding Documents, the Purchaser's rights or the successful

Bidder's obligations under the Contract; or (iii) the acceptance of which would unfairly affect the competitive position of other Bidders who have submitted substantially responsive bids.

26.5 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Purchaser's determination of bid responsiveness will be based on the contents of the bid itself.

27. Conversion to Single Currency

27.1 For evaluation and comparison purposes, the Purchaser shall convert all bid prices expressed in various currencies and amounts into a single currency **specified in the BDS**, using the selling exchange rate established by the source and on the date also **specified in the BDS.**

28. Evaluation and Comparison of Bids

28.1 The Purchaser will evaluate and compare the bids that have been determined to be substantially responsive, pursuant to ITB Clause 26. The evaluation will be performed assuming either that:

(a) the Contract will be awarded to the lowest evaluated Bidder for the entire Information System; or

(b) if **specified in the BDS,** Contracts will be awarded to the Bidders for each individual Subsystem, lot, or slice defined in the Technical Requirements whose bids result in the lowest combined evaluated price for the entire System.

In the latter case, discounts that are conditional on the award of more than one Subsystem, lot, or slice may be offered in bids. However, such discounts will only be considered in the price evaluation if so **confirmed in the BDS.**

28.2 To be considered for Contract award, Bidders must have submitted bids

(a) for which detailed bid evaluation using the same standards for compliance determination as listed in ITB Clauses 26.3 and 26.4 confirms that the bids are commercially and technically responsive, and include the hardware, Software, related equipment, products, Materials, and other Goods and Services components of the Information System in, substantially, the full required quantities for the entire Information System or, if allowed in the BDS for ITB Clause 28.1, the individual Subsystem, lot or slice bid on; and

(b) that offer Information Technologies that are proven to

perform up to the standards promised in the bid by having successfully passed the performance, benchmark, and/or functionality tests the Purchaser may require, pursuant to ITB Clause 31.2.

28.3 The Purchaser's evaluation of a bid will be made on the basis of prices quoted in accordance with ITB Clause 14 (Bid Prices).

28.4 If **indicated by the BDS,** the Purchaser's evaluation of responsive bids will take into account technical factors, in addition to cost factors. An Evaluated Bid Score (B) will be calculated for each responsive bid using the following formula, which permits a comprehensive assessment of the bid price and the technical merits of each bid:

$$B \equiv \frac{C_{low}}{C} X + \frac{T}{T_{high}} (1 - X)$$

where

C = Evaluated Bid Price

C_{low} = the lowest of all Evaluated Bid Prices among responsive bids

T = the total Technical Score awarded to the bid

T_{high} = the Technical Score achieved by the bid that was scored highest among all responsive bids

X = weight for the Price as **specified in the BDS**

The bid with the highest Evaluated Bid Score (B) among responsive bids shall be termed the Lowest Evaluated Bid and is eligible for Contract award, provided the Bidder was prequalified and/or it was found to be qualified to perform the Contract in accordance with ITB Clause 31 (Postqualification).

28.5 If, in addition to the cost factors, the Purchaser has chosen to give weight to important technical factors (i.e., the price weight, X, is less than 1 in the evaluation), that cannot be reduced to life-cycle costs or pass/fail criteria, the Total Technical Points assigned to each bid in the Evaluated Bid Formula will be determined by adding and weighting the scores assigned by an evaluation committee to technical features of the bid in accordance with the criteria set forth below.

(a) The technical features to be evaluated are generally defined below and specifically **identified in the BDS:**

(i) Performance, capacity, or functionality features that either exceed levels specified as mandatory in the Technical Requirements; and/or influence the life-cycle cost and effectiveness of the Information System.

(ii) Usability features, such as ease of use, ease of administration, or ease of expansion, which influence the life-cycle cost and effectiveness of the Information System.

(iii) The quality of the Bidder's Preliminary Project Plan as evidenced by the thoroughness, reasonableness, and responsiveness of: (a) the task and resource schedules, both general and specific, and (b) the proposed arrangements for management and coordination, training, quality assurance, technical support, logistics, problem resolution, and transfer of knowledge, and other such activities as specified by the Purchaser in Section VI (Technical Requirements) or proposed by the Bidder based on the Bidder's experience.

(b) Feature scores will be grouped into a small number of evaluation categories, generally defined below and specifically **identified in the BDS**, namely:

(i) The technical features that reflect how well the Information System meets the Purchaser's Business Requirements (including quality assurance and risk-containment measures associated with the implementation of the Information System).

(ii) The technical features that reflect how well the Information System meets the System's Functional Performance Standards.

(iii) The technical features that reflect how well the Information System meets the General Technical Requirements for hardware, network and communications, Software, and Services.

(c) As **specified in the BDS,** each category will be given a weight and within each category each feature may also be given a weight.

(d) During the evaluation process, the evaluation committee will assign each desirable/preferred feature a whole

number score from 0 to 4, where 0 means that the feature is absent, and 1 to 4 either represent predefined values for desirable features amenable to an objective way of rating (as is the case for, e.g., extra memory, or extra mass storage capacity, etc., if these extras would be conducive for the utility of the system), or if the feature represents a desirable functionality (e.g., of a software package) or a quality improving the prospects for a successful implementation (such as the strengths of the proposed project staff, the methodology, the elaboration of the project plan, etc., in the bid), the scoring will be 1 for the feature being present but showing deficiencies; 2 for meeting the requirements; 3 for marginally exceeding the requirements; and 4 for significantly exceeding the requirements.

(e) The score for each feature (i) within a category (j) will be combined with the scores of features in the same category as a weighted sum to form the Category Technical Score using the following formula:

$$S_j \equiv \sum_{i=1}^{k} t_{ji} * w_{ji}$$

where:

t_{ji} = the technical score for feature "i" in category "j"

w_{ji} = the weight of feature "i" in category "j"

k = the number of scored features in category "j"

and $\sum_{i=1}^{k} w_{ji} = 1$

(f) The Category Technical Scores will be combined in a weighted sum to form the total Technical Bid Score using the following formula:

$$T \equiv \sum_{j=1}^{n} S_j * W_j$$

where:

S_j = the Category Technical Score of category "j"

W_j = the weight of category "j" as **specified in the BDS**

n = the number of categories

and $\sum_{j=1}^{n} W_j = 1$

28.6 The Evaluated Bid Price (C) for each responsive bid will be determined as the sum of the Adjusted Supply and Installation Costs (P) plus the Recurrent Costs (R);

where the Adjusted Supply and Installation Costs (P) are determined as:

(a) The price of the hardware, Software, related equipment, products, Materials and other Goods offered from within or from outside the Purchaser's Country, in accordance with ITB 14.4; plus

(b) The total price for all software development, transportation, insurance, installation, customization, integration, Commissioning, testing, training, technical support, repair, and other Services, in accordance with ITB 14.5;

(c) with adjustments for:

(i) Deviations proposed to the Implementation Schedule in the Technical Requirements resulting in delayed completion of the entire Information System, if **permitted in the BDS** and provided they do not exceed the maximum permissible delay period **specified in the BDS.** For evaluation purposes, a pro rata increase of the total Supply and Installation Costs will be added using the percentage(s) **specified in the BDS** for each week of delay. Bids offering deliveries beyond the maximum permissible delay specified may be rejected.

(ii) Deviations taken to the Contract payment schedule specified in the SCC. If deviations are **permitted in the BDS**, for evaluation purposes the total Supply and Installation Costs will be increased pro rata by the amount of interest that could otherwise be earned on the amount of any payments that would fall due under the proposed schedule earlier than the schedule stipulated in the SCC, at the interest rate **specified in the BDS.**

(iii) Goods and Services that are required for the Information System but have been left out or are necessary to correct minor deviations of the bid will

be added to the total Supply and Installation Costs using costs taken from the highest prices from other responsive bids for the same Goods and Services, or in the absence of such information, the cost will be estimated at prevailing list prices. If the missing Goods and Services are a scored technical feature, the relevant score will be set at zero.

(iv) Corrections to errors in arithmetic, in accordance with ITB Clause 26.2.

(v) Any discounts offered for the award of more than one Subsystem, lot, or slice, if the BDS for ITB Clause 28.1 permits the consideration of discounts in the price evaluation.

(d) The Recurrent Costs (R) are reduced to net present value and determined using the following formula:

$$R \equiv \sum_{x=1}^{N+M} \frac{R_x}{(1+I)^x}$$

where

N = number of years of the Warranty Period, defined in SCC Clause 29.4

M = number of years of the Post-Warranty Services Period, as defined in SCC Clause 1.1.(e) (xii)

x = an index number 1, 2, 3, ... N + M representing each year of the combined Warranty Service and Post-Warranty Service Periods.

R_x = total Recurrent Costs for year "x," as recorded in the Recurrent Cost Sub-Table.

I = discount rate to be used for the Net Present Value calculation, as **specified in the BDS.**

29. Domestic Preference

29.1 No margin of domestic preference will apply.

30. Contacting the Purchaser

30.1 From the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Purchaser on any matter related to the bid, it should do so in writing.

30.2 If a Bidder tries to directly influence the Purchaser or otherwise interfere in the bid evaluation process and the Contract award decision, its bid may be rejected.

F. POST QUALIFICATION AND AWARD OF CONTRACT

31. Post-qualification

31.1 The Purchaser will determine at its own cost and to its satisfaction whether the Bidder (including Joint Venture Partners, and any Subcontractors for which the BDS for ITB Clause 6.1 (a) permits that their qualifications count towards the required Bidder qualifications) that is selected as having submitted the Lowest Evaluated Bid is qualified to perform the Contract satisfactorily, in accordance with ITB Clause 6. If a prequalification process was undertaken for the Contract(s) for which these Bidding Documents were issued, the Purchaser will determine in the manner described above that no material changes have occurred after the prequalification that negatively affect the ability of the Bidder that has submitted the Lowest Evaluated Bid to perform the Contract.

31.2 Pursuant to ITB Clauses 6 and 16, and as additionally may be **specified in the BDS**, the determination will evaluate the Bidder's financial, technical, design, integration, customization, production, management, and support capabilities and will be based on an examination of the documentary evidence of the Bidder's qualifications, as well as other information the Purchaser deems necessary and appropriate. This determination may include visits or interviews with the Bidder's clients referenced in its bid, site inspections, and any other measures. If so **specified in the BDS,** at the time of post qualification the Purchaser may also carry out tests to determine that the performance or functionality of the Information System offered meets those stated in the Technical Requirements.

31.3 An affirmative post qualification determination will be a prerequisite for award of the Contract to the Lowest Evaluated Bidder. A negative determination will result in rejection of the Bidder's bid, in which event the Purchaser will proceed to the next lowest evaluated Bidder to make a similar determination of that Bidder's capabilities to perform satisfactorily.

32. Award Criteria

32.1 Subject to ITB Clause 34, the Purchaser will award the Contract to the Bidder whose bid has been determined to be substantially responsive and the Lowest Evaluated Bid, provided further that the Bidder has been determined to be qualified to perform the Contract satisfactorily, pursuant to ITB Clause 31.

33. Purchaser's Right to Vary Quantities at Time of Award

33.1 The Purchaser reserves the right at the time of Contract award to increase or decrease, by the percentage(s) **indicated in the BDS,** any of the following:

(a) the quantity of substantially identical Subsystems; or

(b) the quantity of individual hardware, Software, related equipment, Materials, products, and other Goods components of the Information System; or

(c) the quantity of Installation or other Services to be performed,

from that originally specified in the Technical Requirements (as amended by any Addenda issued pursuant to ITB Clause 11), without any change in unit prices or other terms and conditions.

34. Purchaser's Right to Accept Any Bid and to Reject Any or All Bids

34.1 The Purchaser reserves the right to accept or reject any bid or to annul the bidding process and reject all bids at any time prior to Contract award, without thereby incurring any liability to the Bidders.

35. Notification of Award

35.1 Prior to the expiration of the period of bid validity, the Purchaser shall notify the successful Bidder, in writing, that its bid has been accepted.

35.2 Until a formal Contract is prepared and executed, the notification of award shall constitute a binding Contract.

35.3 The Purchaser shall promptly publish in UNDB online and in dgMarket the results, identifying the bid and lot numbers and the following information: (i) name of each Bidder who submitted a bid; (ii) bid prices as read out at bid opening; (iii) name, evaluated price and, if the bidding conditions included scoring for technical quality, the technical score of each bid that was evaluated; (iv) name of Bidders whose bids were rejected and the reasons for their rejection; and (v) name of the winning Bidder, the price it offered, as well as the duration and summary scope of the contract awarded. After publication of the award, unsuccessful Bidders may make a request in writing to the Purchaser for a debriefing seeking explanations on the grounds on which their bids were not selected. The Purchaser shall promptly respond in writing to any unsuccessful Bidder who, after publication of contract award, requests a debriefing.

35.4 Upon the successful Bidder furnishing the signed Contract Agreement and the Performance Security pursuant to ITB Clause 37, the Purchaser will promptly notify each unsuccessful Bidder, and will discharge all remaining Bid Securities, if any, as provided in ITB Clause 17.5 (c) and (d).

36. Signing of Contract

36.1 At the same time as the Purchaser notifies the successful Bidder that its bid has been accepted, the Purchaser will send the Bidder the Contract Agreement provided in the Bidding Documents, incorporating all agreements between the parties.

36.2 As soon as practically possible, but no more than twenty-eight (28) days following receipt of the Contract Agreement, the successful Bidder shall sign and date it, and return it to the Purchaser.

37. Performance Security

37.1 As soon as practically possible, but no more than twenty-eight (28) days following receipt of notification of award from the Purchaser, the successful Bidder shall furnish the Performance Security in accordance with the GCC, using the Performance Security form provided in the Bidding Documents or another form acceptable to the Purchaser.

37.2 Failure of the successful Bidder to comply with the requirements of ITB Clause 36 or ITB Clause 37.1 shall constitute sufficient grounds for the annulment of the award and, if and as applicable, execution of the Bid-Securing Declaration or forfeiture of the Bid Security, in which event the Purchaser may make the award to the next lowest evaluated bid submitted by a qualified Bidder or call for new bids.

38. Adjudicator

38.1 Unless otherwise **stated in the BDS**, the Purchaser proposes that the person named in the BDS be appointed as Adjudicator under the Contract to assume the role of informal Contract dispute mediator, as described in GCC Clause 6. In this case, a résumé of the named person is **attached to the BDS.** The proposed hourly fee for the Adjudicator is **specified in the BDS.** The expenses that would be considered reimbursable to the Adjudicator are also **specified in the BDS.** If a Bidder does not accept the Adjudicator proposed by the Purchaser, it should state its non-acceptance in its Bid Submission Form and make a counterproposal of an Adjudicator and an hourly fee, attaching a résumé of the alternative. If the successful Bidder and the Adjudicator nominated in the BDS happen to be from the same country, and this is not the country of the Purchaser too, the Purchaser reserves the right to cancel the Adjudicator nominated in the BDS and propose a new one. If by the day the Contract is signed, the Purchaser and the successful Bidder have not agreed on the appointment of the Adjudicator, the Adjudicator shall be appointed, at the request of either party, by the Appointing Authority specified in the SCC clause relating to GCC Clause 6.1.4, or if no Appointing Authority is specified there, the Contract will be implemented without an Adjudicator.

SECTION II. BID DATA SHEET (BDS)

Bid Data Sheet

The following specific information relating to the System to be procured and the e-procurement procedures that will be used shall complement, supplement, or amend the provisions in the Instructions to Bidders (ITB). Whenever there is a conflict, the provisions in the Bid Data Sheet (BDS) shall prevail over those in the ITB.

A. GENERAL

ITB 1.1	Name of Purchaser: Chandigarh Transport Undertaking (CTU) or any other agency of Chandigarh Administration entrusted with the running of City Bus Operation in and around the city. Name of authorized Purchasing Agent: None Description of the System for which bids are invited: Design, Supply, Installation, Integration, Testing, Commissioning & Maintenance of the Intelligent Transportation System for Chandigarh Transport Undertaking (CTU), Chandigarh, India
ITB 1.2	Title of IFB: Turnkey Services for CTU-ITS Project Number of IFB: CTU/ESCBS/03 Name of resulting Contract(s): Design, Supply, Installation, Integration, Testing, Commissioning & Maintenance of the Intelligent Transportation System for Chandigarh Transport Undertaking (CTU), Chandigarh, India
ITB 1.4	E-Tendering procedures are available in this procurement.
ITB 2.1	Name of the Borrower: Government of India Loan or credit number: *TF018577* Loan or credit amount: *GEF Funded Project* Name of Project: *GEF-Efficient and Sustainable City Bus Services (ESCBS)*
ITB 6.1 (a)	Qualification requirements for Bidders are: i. Experience in Automatic Fare Collection System (AFCS): The bidder (or any one of the partners in case of JV/consortium) should have designed/implemented in last 7 (Seven) years, at least 2 (Two) qualifying AFCS projects of which 1 (One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year and maintained by the bidder (or the consortium partner) for

	at least 1 (One) year. A qualifying AFCS Project is defined as "An AFCS project consisting of a software application (Web/Mobile App/ POS enabled) for Fare Collection in public transit, integrated with minimum of 100 (One hundred) buses supporting RFID/NFC enabled smart card and use of electronic ticket machines/POS machine or flap gates." ii. Experience in Automatic Vehicle Location System (AVL) and Passenger Information System (PIS) monitored in Real Time through a Transit Management Centre (TMC): The bidder (or any one of the partners in case of JV/consortium) should have designed/implemented in last 7(Seven) years, at least 2(Two) qualifying AVL & PIS Projects of which 1(One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year) and maintained by the bidder (or the consortium partner) for at least 1 (One) year. A qualifying AVL & PIS Project is defined as: "An AVL project for a bus based public transit system on a fleet of at least 100(one hundred) buses wherein the bidder shall have provided AVL system software and hardware to monitor, manage and control transit operations. The bidder should have integrated the AVL system with the Passenger Information System (PIS) to provide real time information (such as ETA i.e. expected time of arrival, real time location of buses, journey planner etc.) disseminated through any of the public dissemination modes such as mobile app/ screen or display boards etc." iii. Experience in Scheduling and Roster: The bidder (or any one of the partners in case of JV/consortium) should have, by itself or by a way of procurement, designed/implemented in last 7(Seven) years, at least 2(Two) qualifying Scheduling and Roster Projects of which 1(One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1(One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. A qualifying Scheduling and Roster Project is defined as "A Scheduling and Roster project for public transit fleet of at least 100 (One hundred) Buses deploying scheduling software, time table and roster of buses and crew."

	iv. Experience in Transit Management System: The bidder (or any one of the partner in case of JV/consortium) should have, by itself or by a way of procurement, designed/implemented in last 7(Seven) years, at least 2(Two) qualifying TMS Projects of which 1(One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1(One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. A qualifying TMS project is defined as "A TMS project for public transit fleet of at least 100 (One hundred) buses where the bidder (or any one of the partners in case of JV/consortium) should have , by itself or by a way of procurement, implemented integrated solution comprising Depot Management System (including Workshop/ Store and Inventory management system) integrated with Scheduling and Roster system." v. Average annual turnover of minimum of INR 500 (Five Hundred) Million over the last 3(Three) year, as certified payments received for contracts in progress or completed, within the last 3(Three) financial years ending March 2018 or December 2017 as the case may be. vi. The Bidder shall demonstrate access to, or availability of, financial resources such as liquid assets, unencumbered real assets, lines of credit, and other financial means, except any contractual advance payments to meet a Net Worth requirement of INR 100 (One Hundred) Million. vii. In case of a Joint Venture JV)/Consortium, at least 40% (Forty) of the turnover and net-worth criteria shall be met by the lead partner and the remaining may be satisfied by other JV/Consortium partners with condition that each remaining partner shall meet at least 5% (Five) of the financial criteria. In ascertaining the turnover and the net-worth, the respective financial year applicable in the country of the JV/Consortium partner shall be used. None of the member of a given JV/Consortium can be a member of another JV/Consortium submitting the same bid otherwise all the bids comprising the same member shall stand disqualified. However, there is no bar for subcontractor to be a supplier for multiple teams. The Parent company of the participating firms /partners shall be considered for the purpose of experience or

	qualification only if it is part of the JV/Consortium itself. Bids from JV/Consortium having maximum up to 4 (four) members shall only be accepted, provided the JV/Consortium as a whole meets the criteria mentioned above. **Note:** Bidders are advised to submit only those Certificates in support of technical and financial eligibility, for which they have original copies. The burden of proof and liability to produce the original certificates shall be on the bidder and not on the client or certificate issuing authority. In the event of non-production of original Certificates in case asked for, such Certificates shall be ignored outrightly for the purpose of evaluation. Work completion certificate and the scope of work as mentioned in Award letter of Work/MoU/MoA should be in consonance with each other.
ITB 6.1 (b)	Manufacturer's Authorizations in the form of certificates for Information Technologies - except for those technologies which the Bidder itself manufactures - are required for all the hardware and software equipment to be used for this project
ITB 6.1 (c)	If the Bidder proposes to use Subcontractors for the provision of certain key services/supplies, written agreements by the proposed firms to provide these services/supplies in case of contract(s) resulting from this bidding are required.
ITB 7	The Bid processing fees is INR 10,000 (ten thousand only) in form of demand draft in favor of Director, Chandigarh Transport Undertaking

B. THE BIDDING DOCUMENTS

ITB 10.1	Purchaser's address: *Director Transport cum Divisional Manager,* *Chandigarh Transport Undertaking (CTU)* *Plot No.701, Industrial Phase-1, Chandigarh-160002* *India* *Tel-0172-2679002, Fax-0172-2655970* *directorctuchd@gmail.com* *http://www.chdctu.gov.in*
ITB 10.2	Date, time, and place for the pre-bid meeting: *Date : 29 Nov 2018* *Time : 11:30 AM*

	Place : *Conference Hall* *UT Guest House* *Uttar Marg, Sector 6,* *Chandigarh-160019* *India* *Tel-0172-2679002, Fax-0172-2655970* *directorctuchd@gmail.com* *http://www.chdctu.gov.in*
ITB 11	The addendum if any for the bid shall be uploaded in this website http://etenders.chd.nic.in

C. PREPARATION OF BIDS

ITB 12.1	The language of the bid and of all correspondence and documents related to it is: English
ITB 14.1	Recurrent cost items are required and are specified in Recurrent Cost Section VII-Sample Forms-Table 2.6.
ITB 14.4	The latest edition of Incoterms.
ITB 14.4 (a)	For foreign goods priced on a CIP (named place of destination) basis: (i) The contract of carriage shall include the cost of unloading the goods at destination, as well as payment by the Supplier of the cost of custom formalities, duties, taxes or other charges payable on the foreign Goods for their transit through any country other than the Purchaser's country. (ii) The named place of destination shall be the **Project Sites/ ((Chandigarh Transport Undertaking (CTU) office address in Chandigarh mention earlier)**.
ITB 14.4 (c)	The bid shall be quoted as inclusive of transportation of goods, services and related incidental costs such as Insurance etc.
ITB 14.5	None
ITB 14.7	Prices quoted by the Bidder shall be fixed.
ITB 15.1 (b)	The Bidder may quote in following currencies: (i) Indian Rupee (INR) (ii) United States Dollar (USD)

	(iii) Japanese Yen (JPY) (iv) Euro (EUR)
ITB 16.2 (c)	In addition to the topics described in ITB Clause 16.2 (c), the Preliminary Project Plan must address the following topics: Detailed project schedule covering the procurement of hardware components, setting up network connectivity, installing the components, configuring and customizing them, testing, pilot and rollout; profile of the Project manager, profiles of key technical personnel for the different subsystems of ITS, risk management and methods to mitigate the risks, maintenance plan, mechanisms to comply with the service level metrics and agreement, and any other items considered relevant to the project.
ITB 16.3	None
ITB 17.1	Bids need to be secured by a Bid Security. The amount of Bid Security required is: INR 5 Million (Five Million only) in form of DD/Bank Guarantee.
ITB 17.7	Not Applicable
ITB 18.1	The bid validity period shall be up to 120 days after the deadline for bid submission.
ITB 19.1	The bidding under this contract shall be electronic bid submission through website http://etenders.chd.nic.in. Detailed guidelines for viewing bids and submission of online bids are given on the website. The Invitation for Bids under e- procurement is published on above mentioned website. Any citizen or prospective bidder can logon to this website and view the Invitation for Bids and can view the detail of works for which bids are invited. The DSC can be obtained from any authorized certifying agencies. The bidder should register in the web site http://etenders.chd.nic.in using the relevant option available. Then the Digital Signature registration is done with the e-token, after logging into the site. After this, the bidder can login the site through the secured login by entering the password of the e-token & the user id/password chosen during registration. The bid complete in all respect should be uploaded on the website as mentioned above by way of e-tendering before the last date

	of bid submission.

D. SUBMISSION OF BIDS

ITB 20.1	The bid submission is Electronically by way of e-tendering only on web site http://etenders.chd.nic.in and can be uploaded using Digital Signature Certificate (DSC) only. All documents should be duly signed by authorized signatory before scanning and uploading.
ITB 20.2 (a)	The address for bid uploading is: http://etenders.chd.nic.in
ITB 21.1	Deadline for bid uploading on the e-procurement site is: 18 Dec. 2018 up to 2:00 PM

E. BID OPENING AND EVALUATION

ITB 24.1	Time, date, and place for Technical bid opening are: *Date : 18 Dec. 2018* *Time : 3:00 PM* *Place :* *Director,* *Chandigarh Transport Undertaking (CTU)* *Plot No.701, Industrial Phase-1, Chandigarh-160002* *India* *Tel-0172-2679002, Fax-0172-2655970* *directorctuchd@gmail.com* The bids will be opened on the date & time mentioned in the tender document floated or such date as modified for bid opening through any of the subsequent corrigendum(s). The Officers/officials (minimum two) designated to encrypt e-tender shall open/decrypt bids received for both technical parts first. On the specified date and time of opening of bid, only technical bids will be opened using above said method. The participating bidders or their authorized representatives may attend the proceedings of opening of the bid. The technical bids shall be evaluated by the committee constituted for the purpose. The firms which are found to be technically qualified shall only be eligible for financial bid opening. The date and time for opening of such financial bids shall be intimated to all

<table>
<tr><td></td><td>bidders who are successful in the technical round.

The financial bids shall be opened on the specified date and time. Change in schedule, if any shall be intimated to bidders apriori. The bidders present may note down the figures quoted by other bidders whose financial bids have been opened.

The print-outs of the bid sheet may be circulated for signatures of all participating bidders at the time of opening of financial bids.</td></tr>
<tr><td>ITB 27.1</td><td>The currency chosen for the purpose of converting to a common currency is: INR

The source of exchange rate is: Reserve Bank of India exchange rate

The date of exchange rate determination is: Technical Bid opening date as mentioned in ITB 24.1.</td></tr>
<tr><td>ITB 28.1</td><td>Bids for Subsystems, lots, or slices of the overall Information System will not be accepted.</td></tr>
<tr><td>ITB 28.4</td><td>The bid evaluation will take into account technical factors in addition to the cost factors.

Weight of the Price (X) = 30%</td></tr>
<tr><td>ITB 28.5</td><td>
<table>
<tr><td>The technical quality evaluation categories and the features to be evaluated within each category are as follows: Factor</td><td>Criteria</td></tr>
<tr><td>28.5.1 Specific Experience - Automatic Fare Collection System (AFCS) Experience - 18 Marks</td><td>1. Minimum 2 (Two) qualifying AFCS projects in last 7 (Seven) years of which 1 (One) project should be necessarily in urban public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. - 12(twelve) marks

2. Successful completion of additional qualifying AFCS projects over and above the two projects required for eligibility; (2(two) marks per project with a maximum of 2(two)</td></tr>
</table>
</td></tr>
</table>

		projects) – Maximum 4(four) marks 3. Additional marks for successfully completing qualifying AFCS project comprising more than 200(two hundred) buses; (2(two) marks per project with a maximum of 1(one) project. – Maximum 2(two) marks
	28.5.2 Specific Experience - Automatic Vehicle Location (AVL) and Passenger Information System (PIS) Projects Experience - 12 Marks	1. Minimum 2 (Two) qualifying AVL & PIS projects in last 7 (Seven) years of which 1 (One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. – 8 (eight) marks 2. Successful completion of additional qualifying AVL & PIS projects over and above the two projects required for eligibility; (1(one) marks per project with a maximum of 2(two) projects) – Maximum 2(two) marks 3. Additional marks for successfully completing qualifying AVL & PIS project comprising more than 200(two hundred) buses; (2(two) marks per project with a maximum of 1(one) project. – Maximum 2(two) marks
	28.5.3 Specific Experience - Transit Management System Projects Experience - 12 Marks	1. Minimum 2 (Two) qualifying TMS projects in last 7 (Seven) years of which 1 (One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. – 8 (eight) marks 2. Successful completion of additional qualifying TMS projects over and above the two projects required for eligibility; (1(one) marks per project with a maximum of 2(two) projects) – Maximum 2(two) marks 3. Additional marks for successfully completing qualifying TMS project comprising more than 200(two hundred) buses; (2(two) marks per project with a maximum of 1(one) project. –

		Maximum 2(two) marks
	28.5.4 Specific Experience - Scheduling & Roster - 8 Marks	1. Minimum 2 (Two) qualifying Scheduling and Roster projects in last 7 (Seven) years of which 1 (One) project should be necessarily in **urban** public transit. Atleast 1 (One) of the projects should be in commercial operation for 1 (One) year and maintained by the bidder (or the consortium partner) for at least 1 (One) year. – 4 (four) marks 2. Successful completion of additional qualifying Scheduling and Roster projects over and above the two projects required for eligibility; (1(one) marks per project with a maximum of 2(two) projects) – Maximum 2(two) marks 3. Additional marks for successfully completing qualifying Scheduling and Roster project comprising more than 200(two hundred) buses; (2(two) marks per project with a maximum of 1(one) project. – Maximum 2(two) marks
	28.5.5 Specific Experience - Domain Experts - 25 Marks	1. Project Manager: Management Professional with Computer Science/ Electronics (4(four) years regular) Engineering Degree and Masters in Business Administration (2(two) years regular) having at least 10(ten) years of relevant project management experiences. He / she should have handled at least two ITS projects as project manager. Should have excellent project management skills and should be able to communicate effectively in English and Hindi. - Maximum 8(eight) marks 2. AFCS Expert: Engineering Graduate with Computer Science/ Electronics (4(four) years regular) at least 8(eight) years of experience in designing and implementing AFCS systems for Public transit. Experience in working on any of the qualifying AFCS project as an AFCS Expert would be preferable. - Maximum 5(five) marks 3. AVL Expert: Engineering Graduate with Computer Science/ Electronics (4(four) years regular) at least 8(eight) years of experience in designing and implementing AVL systems for Public transit. Experience in working on any of

		the qualifying AVL project as an AVL Expert would be preferable. - Maximum 5(five) marks 4. TMS Expert: Engineering Graduate with Computer Science/ Electronics (4(four) years regular) at least 5(five) years of experience in designing and implementing TMS for Public transit. Experience in working on any of the qualifying TMS project as a TMS Expert would be preferable. - Maximum 2(two) marks 5. Maintenance Team: Engineering Graduate with Computer Science/ Electronics (4(four) years regular) at least 5 years of experience in ITS system maintenance activities and performance monitoring in public transport domain. - Maximum 5(five) marks
	28.5.6 Proposed Solution - 15 Marks	1. Proposed Solution for AFCS System; 1(one) marks if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2(two) marks 2. Proposed Solution for AVL and PIS Systems; 1(one) marks if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2 (two) marks 3. Proposed Solution for Scheduling and Roster Systems; 1(one) mark if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2(two) marks 4. Proposed Solution for Transit Management System (TMS); 1(one) mark if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and

		HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2(two) marks 5. Proposed Solution for Communications Systems; 1(one) mark if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2(two) marks 6. Innovation in Technology, Design and overall Technical Proposal – 2(two) marks 7. Implementation Plan Relation of internal and external dependences and Critical Path identification: 1(one) mark; Improvement of final deadline of submission within 1(one) month: 1(one) mark; Detailed explanations of the implementation plan and consistency of the duration and sequence of the tasks: 1(one) marks
	28.5.7 Maintenance and Quality Assurance - 10 Marks	1. Scope of maintenance service adequacy (2(two) marks if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 3(three) marks 2. Response time adequacy (1(one) mark if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 2(two) marks

	3. Human and Material Resources adequacy (2(two) marks if the proposed solution provides detailed descriptions of the SW functionalities, proposed data models and HW specifications to be implemented; 1(one) mark if the proposed solution significantly improves the requirements and meets international standards recommended in ToR– maximum 3(three) marks 4. Quality Assurance Plan – maximum 2(two) marks (1(one) mark if at least one of the partners complies ISO 9001-2015; 1(one) additional mark if all the partners comply ISO 9001-2015. In case of single entity, 2(two) marks if ISO 9001-2015 compliance A minimum of 70% (seventy) marks are required for the bid to be technically qualified.
ITB 28.6 (c) (i)	The Purchaser will not accept deviations in the schedule of installation and commissioning specified in the Implementation Schedule.
ITB 28.6 (c) (ii)	Not Applicable
ITB 28.6 (d)	Discount Rate (I) for net present value calculations of recurrent costs = 7.5 percent. For the purpose of calculating Present Value (PV) and bid evaluation, all the payments made in a particular financial year in purchaser country ie.1st April to 31st March, the payment shall be reflected to last day of financial year.

F. POST QUALIFICATION AND AWARD OF CONTRACT

ITB 31.2	As additional post-qualification measures, the Information System (or components/parts of it) offered by the Highest Ranked Bidder may be subjected to the verification of Quality certifications.
ITB 33.1	Percentage for quantity increase or decrease: 15 %(Fifteen)
ITB 38.1	The proposed Adjudicator is Shri. Arun Saxena , (IRSSE-1978), Ex. Advisor (Signal), Railway Board. The Adjudicator shall be paid hourly fee at the rate of INR 3,000 (Three thousand only) plus expenditure incurred for travel and boarding/lodging as per entitlement of Class I officer (Above Super-time scale)

SECTION III. ELIGIBLE COUNTRIES FOR THE PROVISION OF GOODS, WORKS, AND SERVICES IN BANK-FINANCED PROCUREMENT

Eligible Countries for the Provision of Goods, Works, and Services in Bank-Financed Procurement

As of September 2007

All countries are eligible

SECTION IV. GENERAL CONDITIONS OF CONTRACT

Table of Clauses

General Conditions of Contract

A. CONTRACT AND INTERPRETATION

1. Definitions

1.1 In this Contract, the following terms shall be interpreted as indicated below.

(a) contract elements

(i) "Contract" means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein. The Contract Agreement and the Contract Documents shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

(ii) "Contract Documents" means the documents specified in Article 1.1 (Contract Documents) of the Contract Agreement (including any amendments to these Documents).

(iii) "Contract Agreement" means the agreement entered into between the Purchaser and the Supplier using the form of Contract Agreement contained in the Sample Forms Section of the Bidding Documents and any modifications to this form agreed to by the Purchaser and the Supplier. The date of the Contract Agreement shall be recorded in the signed form.

(iv) "GCC" means the General Conditions of Contract.

(v) "SCC" means the Special Conditions of Contract.

(vi) "Technical Requirements" means the Technical Requirements Section of the Bidding Documents.

(vii) "Implementation Schedule" means the Implementation Schedule Sub-section of the Technical Requirements.

viii) "Contract Price" means the price or prices defined in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

(ix) "Procurement Guidelines" refers to the edition **specified in the SCC** of the World Bank Guidelines: Procurement under IBRD Loans and IDA Credits.

(x) "Bidding Documents" refers to the collection of documents issued by the Purchaser to instruct and inform potential suppliers of the processes for bidding, selection of the winning bid, and Contract formation, as well as the contractual conditions governing the relationship between the Purchaser and the Supplier. The General and Special Conditions of Contract, the Technical Requirements, and all other documents included in the Bidding Documents reflect the Procurement Guidelines that the Purchaser is obligated to follow during procurement and administration of this Contract.

(b) entities

(i) "Purchaser" means the entity purchasing the Information System, as **specified in the SCC.**

(ii) "Project Manager" means the person **named as such in the SCC** or otherwise appointed by the Purchaser in the manner provided in GCC Clause 18.1 (Project Manager) to perform the duties delegated by the Purchaser.

(iii) "Supplier" means the firm or Joint Venture whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.

(iv) "Supplier's Representative" means any person nominated by the Supplier and named as such in the Contract Agreement or otherwise approved by the Purchaser in the manner provided in GCC Clause 18.2 (Supplier's Representative) to perform the duties delegated by the Supplier.

(v) "Subcontractor" means any firm to whom any of the obligations of the Supplier, including preparation of any design or supply of any Information Technologies or other Goods or Services, is subcontracted directly or indirectly

by the Supplier.

(vi) "Adjudicator" means the person named in Appendix 2 of the Contract Agreement, appointed by agreement between the Purchaser and the Supplier to make a decision on or to settle any dispute between the Purchaser and the Supplier referred to him or her by the parties, pursuant to GCC Clause 6.1 (Adjudication).

(vii) "The World Bank" (also called "The Bank") means the International Bank for Reconstruction and Development (IBRD) or the International Development Association (IDA).

(c) scope

(i) "Information System," also called "the System," means all the Information Technologies, Materials, and other Goods to be supplied, installed, integrated, and made operational (exclusive of the Supplier's Equipment), together with the Services to be carried out by the Supplier under the Contract.

(ii) "Subsystem" means any subset of the System identified as such in the Contract that may be supplied, installed, tested, and commissioned individually before Commissioning of the entire System.

(iii) "Information Technologies" means all information processing and communications-related hardware, Software, supplies, and consumable items that the Supplier is required to supply and install under the Contract.

(iv) "Goods" means all equipment, machinery, furnishings, Materials, and other tangible items that the Supplier is required to supply or supply and install under the Contract, including, without limitation, the Information Technologies and Materials, but excluding the Supplier's Equipment.

(v) "Services" means all technical, logistical, management, and any other Services to be provided by the Supplier under the Contract to

supply, install, customize, integrate, and make operational the System. Such Services may include, but are not restricted to, activity management and quality assurance, design, development, customization, documentation, transportation, insurance, inspection, expediting, site preparation, installation, integration, training, data migration, Pre-commissioning, Commissioning, maintenance, and technical support.

(vi) "The Project Plan" means the document to be developed by the Supplier and approved by the Purchaser, pursuant to GCC Clause 19, based on the requirements of the Contract and the Preliminary Project Plan included in the Supplier's bid. The "Agreed and Finalized Project Plan" is the version of the Project Plan approved by the Purchaser, in accordance with GCC Clause 19.2. Should the Project Plan conflict with the Contract in any way, the relevant provisions of the Contract, including any amendments, shall prevail.

(vii) "Software" means that part of the System which are instructions that cause information processing Subsystems to perform in a specific manner or execute specific operations.

(viii) "System Software" means Software that provides the operating and management instructions for the underlying hardware and other components, and is identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Systems Software. Such System Software includes, but is not restricted to, micro-code embedded in hardware (i.e., "firmware"), operating systems, communications, system and network management, and utility software.

(ix) "General-Purpose Software" means Software that supports general-purpose office and software development activities and is identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be General-

Purpose Software. Such General-Purpose Software may include, but is not restricted to, word processing, spreadsheet, generic database management, and application development software.

(x) "Application Software" means Software formulated to perform specific business or technical functions and interface with the business or technical users of the System and is identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Application Software.

(xi) "Standard Software" means Software identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Standard Software.

(xii) "Custom Software" means Software identified as such in Appendix 4 of the Contract Agreement and such other Software as the parties may agree in writing to be Custom Software.

(xiii) "Source Code" means the database structures, dictionaries, definitions, program source files, and any other symbolic representations necessary for the compilation, execution, and subsequent maintenance of the Software (typically, but not exclusively, required for Custom Software).

(xiv) "Materials" means all documentation in printed or printable form and all instructional and informational aides in any form (including audio, video, and text) and on any medium, provided to the Purchaser under the Contract.

(xv) "Standard Materials" means all Materials not specified as Custom Materials.

(xvi) "Custom Materials" means Materials developed by the Supplier at the Purchaser's expense under the Contract and identified as such in Appendix 5 of the Contract Agreement and such other Materials as the parties may agree in writing to be

Custom Materials. Custom Materials includes Materials created from Standard Materials.

(xvii) "Intellectual Property Rights" means any and all copyright, moral rights, trademark, patent, and other intellectual and proprietary rights, title and interests worldwide, whether vested, contingent, or future, including without limitation all economic rights and all exclusive rights to reproduce, fix, adapt, modify, translate, create derivative works from, extract or re-utilize data from, manufacture, introduce into circulation, publish, distribute, sell, license, sublicense, transfer, rent, lease, transmit or provide access electronically, broadcast, display, enter into computer memory, or otherwise use any portion or copy, in whole or in part, in any form, directly or indirectly, or to authorize or assign others to do so.

(xviii) "Supplier's Equipment" means all equipment, tools, apparatus, or things of every kind required in or for installation, completion and maintenance of the System that are to be provided by the Supplier, but excluding the Information Technologies, or other items forming part of the System.

(d) activities

(i) "Delivery" means the transfer of the Goods from the Supplier to the Purchaser in accordance with the current edition Incoterms specified in the Contract.

(ii) "Installation" means that the System or a Subsystem as specified in the Contract is ready for Commissioning as provided in GCC Clause 26 (Installation).

(iii) "Pre-commissioning" means the testing, checking, and any other required activity that may be specified in the Technical Requirements that are to be carried out by the Supplier in preparation for Commissioning of the System as provided in GCC Clause 26 (Installation).

(iv) "Commissioning" means operation of the

System or any Subsystem by the Supplier following Installation, which operation is to be carried out by the Supplier as provided in GCC Clause 27.1 (Commissioning), for the purpose of carrying out Operational Acceptance Test(s).

(v) "Operational Acceptance Tests" means the tests specified in the Technical Requirements and Agreed and Finalized Project Plan to be carried out to ascertain whether the System, or a specified Subsystem, is able to attain the functional and performance requirements specified in the Technical Requirements and Agreed and Finalized Project Plan, in accordance with the provisions of GCC Clause 27.2 (Operational Acceptance Test).

(vi) "Operational Acceptance" means the acceptance by the Purchaser of the System (or any Subsystem(s) where the Contract provides for acceptance of the System in parts), in accordance with GCC Clause 27.3 (Operational Acceptance).

(e) place and time

(i) "Purchaser's Country" is the **country named in the SCC.**

(ii) "Supplier's Country" is the country in which the Supplier is legally organized, as named in the Contract Agreement.

(iii) "Project Site(s)" means the place(s) **specified in the SCC** for the supply and installation of the System.

(iv) "Eligible Country" means the countries and territories eligible for participation in procurements financed by the World Bank as defined in the Procurement Guidelines. (**Note:** The World Bank maintains a list of countries from which Bidders, Goods, and Services are not eligible to participate in procurement financed by the Bank. The list is regularly updated and can be obtained from the Public Information Center of the Bank or its web site on procurement. A copy of the list is contained

in the Section of the Bidding Documents entitled "Eligible Countries for the Provision of Goods, Works, and Services in Bank-Financed Procurement").

(v) "Day" means calendar day of the Gregorian Calendar.

(vi) "Week" means seven (7) consecutive Days, beginning the day of the week as is customary in the Purchaser's Country.

(vii) "Month" means calendar month of the Gregorian Calendar.

(viii) "Year" means twelve (12) consecutive Months.

(ix) "Effective Date" means the date of fulfillment of all conditions specified in Article 3 (Effective Date for Determining Time for Achieving Operational Acceptance) of the Contract Agreement, for the purpose of determining the Delivery, Installation, and Operational Acceptance dates for the System or Subsystem(s).

(x) "Contract Period" is the time period during which this Contract governs the relations and obligations of the Purchaser and Supplier in relation to the System, as **specified in the SCC.**

(xi) "Defect Liability Period" (also referred to as the "Warranty Period") means the period of validity of the warranties given by the Supplier commencing at date of the Operational Acceptance Certificate of the System or Subsystem(s), during which the Supplier is responsible for defects with respect to the System (or the relevant Subsystem[s]) as provided in GCC Clause 29 (Defect Liability).

(xii) "The Post-Warranty Services Period" means the number of years **defined in the SCC** (if any), following the expiration of the Warranty Period during which the Supplier may be obligated to provide Software licenses, maintenance, and/or technical support services for the System, either under this Contract or under separate contract(s).

(xiii) "The Coverage Period" means the Days of the Week and the hours of those Days during which maintenance, operational, and/or technical support services (if any) must be available.

2. Contract Documents

2.1 Subject to Article 1.2 (Order of Precedence) of the Contract Agreement, all documents forming part of the Contract (and all parts of these documents) are intended to be correlative, complementary, and mutually explanatory. The Contract shall be read as a whole.

3. Interpretation

3.1 Governing Language

3.1.1 All Contract Documents and related correspondence exchanged between Purchaser and Supplier shall be written in the language **specified in the SCC,** and the Contract shall be construed and interpreted in accordance with that language.

3.1.2 If any of the Contract Documents or related correspondence are prepared in a language other than the governing language under GCC Clause 3.1.1 above, the translation of such documents into the governing language shall prevail in matters of interpretation. The originating party, with respect to such documents shall bear the costs and risks of such translation.

3.2 Singular and Plural

The singular shall include the plural and the plural the singular, except where the context otherwise requires.

3.3 Headings

The headings and marginal notes in the GCC are included for ease of reference and shall neither constitute a part of the Contract nor affect its interpretation.

3.4 Persons

Words importing persons or parties shall include firms, corporations, and government entities.

3.5 Incoterms

Unless inconsistent with any provision of the Contract, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by the current Incoterms ("Incoterms 2000" or a more recent version if

and as published). Incoterms are the international rules for interpreting trade terms published by the International Chamber of Commerce, 38 Cours Albert 1er, 75008 Paris, France.

3.6 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and Supplier with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect to the subject matter of the Contract made prior to the date of Contract.

3.7 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party to the Contract.

3.8 Independent Supplier

The Supplier shall be an independent contractor performing the Contract. The Contract does not create any agency, partnership, joint venture, or other joint relationship between the parties to the Contract.

Subject to the provisions of the Contract, the Supplier shall be solely responsible for the manner in which the Contract is performed. All employees, representatives, or Subcontractors engaged by the Supplier in connection with the performance of the Contract shall be under the complete control of the Supplier and shall not be deemed to be employees of the Purchaser, and nothing contained in the Contract or in any subcontract awarded by the Supplier shall be construed to create any contractual relationship between any such employees, representatives, or Subcontractors and the Purchaser.

3.9 Joint Venture

If the Supplier is a Joint Venture of two or more firms, all such firms shall be jointly and severally bound to the Purchaser for the fulfillment of the provisions of the Contract and shall designate one of such firms to act as a leader with authority to bind the Joint Venture. The composition or constitution of the Joint Venture shall not be

altered without the prior consent of the Purchaser.

3.10 Nonwaiver

3.10.1 Subject to GCC Clause 3.10.2 below, no relaxation, forbearance, delay, or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect, or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

3.10.2 Any waiver of a party's rights, powers, or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

3.11 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable, such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

3.12 Country of Origin

"Origin" means the place where the Information Technologies, Materials, and other Goods for the System were produced or from which the Services are supplied. Goods are produced when, through manufacturing, processing, Software development, or substantial and major assembly or integration of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components. The Origin of Goods and Services is distinct from the nationality of the Supplier and may be different.

4. Notices

4.1 Unless otherwise stated in the Contract, all notices to be given under the Contract shall be in writing and shall be sent, pursuant to GCC Clause 4.3 below, by personal delivery, airmail post, special courier, cable, telegraph, telex, facsimile, electronic mail, or Electronic Data Interchange (EDI), with the following provisions.

4.1.1 Any notice sent by cable, telegraph, telex, facsimile,

electronic mail, or EDI shall be confirmed within two (2) days after dispatch by notice sent by airmail post or special courier, except as otherwise specified in the Contract.

4.1.2 Any notice sent by airmail post or special courier shall be deemed (in the absence of evidence of earlier receipt) to have been delivered ten (10) days after dispatch. In proving the fact of dispatch, it shall be sufficient to show that the envelope containing such notice was properly addressed, stamped, and conveyed to the postal authorities or courier service for transmission by airmail or special courier.

4.1.3 Any notice delivered personally or sent by cable, telegraph, telex, facsimile, electronic mail, or EDI shall be deemed to have been delivered on the date of its dispatch.

4.1.4 Either party may change its postal, cable, telex, facsimile, electronic mail, or EDI addresses for receipt of such notices by ten (10) days' notice to the other party in writing.

4.2 Notices shall be deemed to include any approvals, consents, instructions, orders, certificates, information and other communication to be given under the Contract.

4.3 Pursuant to GCC Clause 18, notices from/to the Purchaser are normally given by, or addressed to, the Project Manager, while notices from/to the Supplier are normally given by, or addressed to, the Supplier's Representative, or in its absence its deputy if any. If there is no appointed Project Manager or Supplier's Representative (or deputy), or if their related authority is limited by the SCC for GCC Clauses 18.1 or 18.2.2, or for any other reason, the Purchaser or Supplier may give and receive notices at their fallback addresses. The address of the Project Manager and the fallback address of the Purchaser are as **specified in the SCC** or as subsequently established/amended. The address of the Supplier's Representative and the fallback address of the Supplier are as specified in Appendix 1 of the Contract Agreement or as subsequently established/amended.

5. Governing Law

5.1 The Contract shall be governed by and interpreted in accordance with the laws of the country specified in the SCC.

6. Settlement of Disputes

6.1 Adjudication

6.1.1 If any dispute of any kind whatsoever shall arise between the Purchaser and the Supplier in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity, or termination, or the operation of the System (whether during the progress of implementation or after its achieving Operational Acceptance and whether before or after the termination, abandonment, or breach of the Contract), the parties shall seek to resolve any such dispute by mutual consultation. If the parties fail to resolve such a dispute by mutual consultation within fourteen (14) days after one party has notified the other in writing of the dispute, then, if the Contract Agreement in Appendix 2 includes and names an Adjudicator, the dispute shall, within another fourteen (14) days, be referred in writing by either party to the Adjudicator, with a copy to the other party. If there is no Adjudicator specified in the Contract Agreement, the mutual consultation period stated above shall last twenty-eight (28) days (instead of fourteen), upon expiry of which either party may move to the notification of arbitration pursuant to GCC Clause 6.2.1.

6.1.2 The Adjudicator shall give his or her decision in writing to both parties within twenty-eight (28) days of the dispute being referred to the Adjudicator. If the Adjudicator has done so, and no notice of intention to commence arbitration has been given by either the Purchaser or the Supplier within fifty-six (56) days of such reference, the decision shall become final and binding upon the Purchaser and the Supplier. Any decision that has become final and binding shall be implemented by the parties forthwith.

6.1.3 The Adjudicator shall be paid an hourly fee at the rate specified in the Contract Agreement plus reasonable expenditures incurred in the execution of duties as Adjudicator, and these costs shall be divided equally between the Purchaser and the Supplier.

6.1.4 Should the Adjudicator resign or die, or should the Purchaser and the Supplier agree that the Adjudicator is not fulfilling his or her functions in accordance with

the provisions of the Contract, a new Adjudicator shall be jointly appointed by the Purchaser and the Supplier. Failing agreement between the two within twenty-eight (28) days, the new Adjudicator shall be appointed at the request of either party by the Appointing Authority **specified in the SCC,** or, if no Appointing Authority is **specified in SCC,** the Contract shall, from this point onward and until the parties may otherwise agree on an Adjudicator or an Appointing Authority, be implemented as if there is no Adjudicator.

6.2 Arbitration

6.2.1 If

(a) the Purchaser or the Supplier is dissatisfied with the Adjudicator's decision and acts before this decision has become final and binding pursuant to GCC Clause 6.1.2, or

(b) the Adjudicator fails to give a decision within the allotted time from referral of the dispute pursuant to GCC Clause 6.1.2, and the Purchaser or the Supplier acts within the following fourteen (14) days, or

(c) in the absence of an Adjudicator from the Contract Agreement, the mutual consultation pursuant to GCC Clause 6.1.1 expires without resolution of the dispute and the Purchaser or the Supplier acts within the following fourteen (14) days,

then either the Purchaser or the Supplier may act to give notice to the other party, with a copy for information to the Adjudicator in case an Adjudicator had been involved, of its intention to commence arbitration, as provided below, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given.

6.2.2 Any dispute in respect of which a notice of intention to commence arbitration has been given, in accordance with GCC Clause 6.2.1, shall be finally settled by arbitration. Arbitration may be commenced prior to or after Installation of the Information System.

6.2.3 Arbitration proceedings shall be conducted in accordance with the rules of procedure **specified in the SCC.**

6.3 Notwithstanding any reference to the Adjudicator or arbitration in this clause,

(a) the parties shall continue to perform their respective obligations under the Contract unless they otherwise agree;

(b) the Purchaser shall pay the Supplier any monies due the Supplier.

B. SUBJECT MATTER OF CONTRACT

7. Scope of the System

7.1 Unless otherwise expressly **limited in the SCC** or Technical Requirements, the Supplier's obligations cover the provision of all Information Technologies, Materials and other Goods as well as the performance of all Services required for the design, development, and implementation (including procurement, quality assurance, assembly, associated site preparation, Delivery, Pre-commissioning, Installation, Testing, and Commissioning) of the System, in accordance with the plans, procedures, specifications, drawings, codes, and any other documents specified in the Contract and the Agreed and Finalized Project Plan.

7.2 The Supplier shall, unless specifically excluded in the Contract, perform all such work and / or supply all such items and Materials not specifically mentioned in the Contract but that can be reasonably inferred from the Contract as being required for attaining Operational Acceptance of the System as if such work and / or items and Materials were expressly mentioned in the Contract.

7.3 The Supplier's obligations (if any) to provide Goods and Services as implied by the Recurrent Cost tables of the Supplier's bid, such as consumables, spare parts, and technical services (e.g., maintenance, technical assistance, and operational support), are as **specified in the SCC,** including the relevant terms, characteristics, and timings.

8. Time for Commencement and Operational Acceptance

8.1 The Supplier shall commence work on the System within the period **specified in the SCC,** and without prejudice to GCC Clause 28.2, the Supplier shall thereafter proceed with the System in accordance with the time schedule specified in the

Implementation Schedule in the Technical Requirements Section and any refinements made in the Agreed and Finalized Project Plan.

8.2 The Supplier shall achieve Operational Acceptance of the System (or Subsystem(s) where a separate time for Operational Acceptance of such Subsystem(s) is specified in the Contract) within the time **specified in the SCC** and in accordance with the time schedule specified in the Implementation Schedule in the Technical Requirements Section and any refinements made in the Agreed and Finalized Project Plan, or within such extended time to which the Supplier shall be entitled under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

9. Supplier's Responsibilities

9.1 The Supplier shall conduct all activities with due care and diligence, in accordance with the Contract and with the skill and care expected of a competent provider of information technologies, information systems, support, maintenance, training, and other related services, or in accordance with best industry practices. In particular, the Supplier shall provide and employ only technical personnel who are skilled and experienced in their respective callings and supervisory staff who are competent to adequately supervise the work at hand.

9.2 The Supplier confirms that it has entered into this Contract on the basis of a proper examination of the data relating to the System provided by the Purchaser and on the basis of information that the Supplier could have obtained from a visual inspection of the site (if access to the site was available) and of other data readily available to the Supplier relating to the System as at the date twenty-eight (28) days prior to bid submission. The Supplier acknowledges that any failure to acquaint itself with all such data and information shall not relieve its responsibility for properly estimating the difficulty or cost of successfully performing the Contract.

9.3 The Supplier shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach a mutually Agreed and Finalized Project Plan (pursuant to GCC Clause 19.2) within the time schedule specified in the Implementation Schedule in the Technical Requirements Section. Failure to provide such resources, information, and decision making may constitute grounds for termination pursuant to GCC Clause 41.2.

9.4 The Supplier shall acquire in its name all permits, approvals, and/or licenses from all local, state, or national government authorities or public service undertakings in the Purchaser's Country that are necessary for the performance of the Contract, including, without limitation, visas for the Supplier's and Subcontractor's personnel and entry permits for all imported Supplier's Equipment. The Supplier shall acquire all other permits, approvals, and/or licenses that are not the responsibility of the Purchaser under GCC Clause 10.4 and that are necessary for the performance of the Contract.

9.5 The Supplier shall comply with all laws in force in the Purchaser's Country. The laws will include all national, provincial, municipal, or other laws that affect the performance of the Contract and are binding upon the Supplier. The Supplier shall indemnify and hold harmless the Purchaser from and against any and all liabilities, damages, claims, fines, penalties, and expenses of whatever nature arising or resulting from the violation of such laws by the Supplier or its personnel, including the Subcontractors and their personnel, but without prejudice to GCC Clause 10.1. The Supplier shall not indemnify the Purchaser to the extent that such liability, damage, claims, fines, penalties, and expenses were caused or contributed to by a fault of the Purchaser.

9.6 The Supplier shall, in all dealings with its labor and the labor of its Subcontractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs, and all local laws and regulations pertaining to the employment of labor.

9.7 Any Information Technologies or other Goods and Services that will be incorporated in or be required for the System and other supplies shall have their Origin, as defined in GCC Clause 3.12, in a country that shall be an Eligible Country, as defined in GCC Clause 1.1 (e) (iv).

9.8 The Supplier shall permit the Bank and/or persons appointed by the Bank to inspect the Supplier's offices and/or the accounts and records of the Supplier and its sub-contractors relating to the performance of the Contract, and to have such accounts and records audited by auditors appointed by the Bank if required by the Bank. The Supplier's attention is drawn to Sub-Clause 41.2.1(c), which provides, inter alia, that acts intended to materially impede the exercise of the

Bank's inspection and audit rights provided for under Sub-Clause 9.8 constitute a prohibited practice subject to contract termination (as well as to a determination of ineligibility under the Procurement Guidelines)

9.9 Other Supplier responsibilities, if any, are as **stated in the SCC.**

10. Purchaser's Responsibilities

10.1 The Purchaser shall ensure the accuracy of all information and/or data to be supplied by the Purchaser to the Supplier, except when otherwise expressly stated in the Contract.

10.2 The Purchaser shall be responsible for timely provision of all resources, information, and decision making under its control that are necessary to reach an Agreed and Finalized Project Plan (pursuant to GCC Clause 19.2) within the time schedule specified in the Implementation Schedule in the Technical Requirements Section. Failure to provide such resources, information, and decision making may constitute grounds for Termination pursuant to GCC Clause 41.3.1 (b).

10.3 The Purchaser shall be responsible for acquiring and providing legal and physical possession of the site and access to it, and for providing possession of and access to all other areas reasonably required for the proper execution of the Contract.

10.4 If requested by the Supplier, the Purchaser shall use its best endeavors to assist the Supplier in obtaining in a timely and expeditious manner all permits, approvals, and/or licenses necessary for the execution of the Contract from all local, state, or national government authorities or public service undertakings that such authorities or undertakings require the Supplier or Subcontractors or the personnel of the Supplier or Subcontractors, as the case may be, to obtain.

10.5 In such cases where the responsibilities of specifying and acquiring or upgrading telecommunications and/or electric power services falls to the Supplier, as specified in the Technical Requirements, SCC, Agreed and Finalized Project Plan, or other parts of the Contract, the Purchaser shall use its best endeavors to assist the Supplier in obtaining such services in a timely and expeditious manner.

10.6 The Purchaser shall be responsible for timely provision of all resources, access, and information necessary for the Installation and Operational Acceptance of the System (including, but not limited to, any required telecommunications or electric power services), as identified

in the Agreed and Finalized Project Plan, except where provision of such items is explicitly identified in the Contract as being the responsibility of the Supplier. Delay by the Purchaser may result in an appropriate extension of the Time for Operational Acceptance, at the Supplier's discretion.

10.7 Unless otherwise specified in the Contract or agreed upon by the Purchaser and the Supplier, the Purchaser shall provide sufficient, properly qualified operating and technical personnel, as required by the Supplier to properly carry out Delivery, Pre-commissioning, Installation, Commissioning, and Operational Acceptance, at or before the time specified in the Technical Requirements Section's Implementation Schedule and the Agreed and Finalized Project Plan.

10.8 The Purchaser will designate appropriate staff for the training courses to be given by the Supplier and shall make all appropriate logistical arrangements for such training as specified in the Technical Requirements, SCC, the Agreed and Finalized Project Plan, or other parts of the Contract.

10.9 The Purchaser assumes primary responsibility for the Operational Acceptance Test(s) for the System, in accordance with GCC Clause 27.2, and shall be responsible for the continued operation of the System after Operational Acceptance. However, this shall not limit in any way the Supplier's responsibilities after the date of Operational Acceptance otherwise specified in the Contract.

10.10 The Purchaser is responsible for performing and safely storing timely and regular backups of its data and Software in accordance with accepted data management principles, except where such responsibility is clearly assigned to the Supplier elsewhere in the Contract.

10.11 All costs and expenses involved in the performance of the obligations under this GCC Clause 10 shall be the responsibility of the Purchaser, save those to be incurred by the Supplier with respect to the performance of the Operational Acceptance Test(s), in accordance with GCC Clause 27.2.

10.12 Other Purchaser responsibilities, if any, are **as stated in the SCC.**

C. PAYMENT

11. Contract Price

11.1 The Contract Price shall be as specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement.

11.2 The Contract Price shall be a firm lump sum not subject to any alteration, except:

(a) in the event of a Change in the System pursuant to GCC Clause 39 or to other clauses in the Contract;

(b) in accordance with the price adjustment formula (if any) **specified in the SCC.**

11.3 The Supplier shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall, except as otherwise provided for in the Contract, cover all its obligations under the Contract.

12. Terms of Payment

12.1 The Supplier's request for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the System or Subsystem(s), Delivered, Pre-commissioned, Installed, and Operationally Accepted, and by documents submitted pursuant to GCC Clause 22.5 and upon fulfillment of other obligations stipulated in the Contract.

The Contract Price shall be paid as **specified in the SCC.**

12.2 No payment made by the Purchaser herein shall be deemed to constitute acceptance by the Purchaser of the System or any Subsystem(s).

12.3 Payments shall be made promptly by the Purchaser, but in no case later than forty five (45) days after submission of a valid invoice by the Supplier. In the event that the Purchaser fails to make any payment by its respective due date or within the period set forth in the Contract, the Purchaser shall pay to the Supplier interest on the amount of such delayed payment at the rate(s) **specified in the SCC** for the period of delay until payment has been made in full, whether before or after judgment or arbitration award.

12.4 All payments shall be made in the currency(ies) specified in the Contract Agreement, pursuant to GCC Clause 11. For Goods and Services supplied locally, payments shall be made in the currency of the Purchaser's Country, unless

otherwise **specified in the SCC.**

12.5 Unless otherwise **specified in the SCC,** payment of the foreign currency portion of the Contract Price for Goods supplied from outside the Purchaser's Country shall be made to the Supplier through an irrevocable letter of credit opened by an authorized bank in the Supplier's Country and will be payable on presentation of the appropriate documents. It is agreed that the letter of credit will be subject to Article 10 of the latest revision of Uniform Customs and Practice for Documentary Credits, published by the International Chamber of Commerce, Paris.

13. Securities

13.1 Issuance of Securities

The Supplier shall provide the securities specified below in favor of the Purchaser at the times and in the amount, manner, and form specified below.

13.2 Advance Payment Security

13.2.1 As **specified in the SCC,** the Supplier shall provide a security equal in amount and currency to the advance payment, and valid until the System is Operationally Accepted.

13.2.2 The security shall be in the form provided in the Bidding Documents or in another form acceptable to the Purchaser. The amount of the security shall be reduced in proportion to the value of the System executed by and paid to the Supplier from time to time and shall automatically become null and void when the full amount of the advance payment has been recovered by the Purchaser. The way the value of the security is deemed to become reduced and, eventually, voided is as **specified in the SCC.** The security shall be returned to the Supplier immediately after its expiration.

13.3 Performance Security

13.3.1 The Supplier shall, within twenty-eight (28) days of the notification of Contract award, provide a security for the due performance of the Contract in the amount and currency **specified in the SCC.**

13.3.2 The security shall be a bank guarantee in the form provided in the Sample Forms Section of the Bidding Documents, or it shall be in another form acceptable

to the Purchaser.

13.3.3 The security shall automatically become null and void once all the obligations of the Supplier under the Contract have been fulfilled, including, but not limited to, any obligations during the Warranty Period and any extensions to the period. The security shall be returned to the Supplier no later than twenty-eight (28) days after its expiration.

13.3.4 Upon Operational Acceptance of the entire System, the security shall be reduced to the amount **specified in the SCC,** on the date of such Operational Acceptance, so that the reduced security would only cover the remaining warranty obligations of the Supplier.

14. Taxes and Duties

14.1 For Goods or Services supplied from outside the Purchaser's country, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the Purchaser's country. Any duties, such as importation or customs duties, and taxes and other levies, payable in the Purchaser's country for the supply of Goods and Services from outside the Purchaser's country are the responsibility of the Purchaser unless these duties or taxes have been made part of the Contract Price in Article 2 of the Contract Agreement and the Price Schedule it refers to, in which case the duties and taxes will be the Supplier's responsibility.

14.2 For Goods or Services supplied locally, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted Goods or Services to the Purchaser. The only exception are taxes or duties, such as value-added or sales tax or stamp duty as apply to, or are clearly identifiable, on the invoices and provided they apply in the Purchaser's country, and only if these taxes, levies and/or duties are also excluded from the Contract Price in Article 2 of the Contract Agreement and the Price Schedule it refers to.

14.3 If any tax exemptions, reductions, allowances, or privileges may be available to the Supplier in the Purchaser's Country, the Purchaser shall use its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

14.4 For the purpose of the Contract, it is agreed that the Contract

Price specified in Article 2 (Contract Price and Terms of Payment) of the Contract Agreement is based on the taxes, duties, levies, and charges prevailing at the date twenty-eight (28) days prior to the date of bid submission in the Purchaser's Country (also called "Tax" in this GCC Clause 14.4). If any Tax rates are increased or decreased, a new Tax is introduced, an existing Tax is abolished, or any change in interpretation or application of any Tax occurs in the course of the performance of the Contract, which was or will be assessed on the Supplier, its Subcontractors, or their employees in connection with performance of the Contract, an equitable adjustment to the Contract Price shall be made to fully take into account any such change by addition to or reduction from the Contract Price, as the case may be.

D. INTELLECTUAL PROPERTY

15. Copyright

15.1 The Intellectual Property Rights in all Standard Software and Standard Materials shall remain vested in the owner of such rights.

15.2 The Purchaser agrees to restrict use, copying, or duplication of the Standard Software and Standard Materials in accordance with GCC Clause 16, except that additional copies of Standard Materials may be made by the Purchaser for use within the scope of the project of which the System is a part, in the event that the Supplier does not deliver copies within thirty (30) days from receipt of a request for such Standard Materials.

15.3 The Purchaser's contractual rights to use the Standard Software or elements of the Standard Software may not be assigned, licensed, or otherwise transferred voluntarily except in accordance with the relevant license agreement or as may be otherwise **specified in the SCC.**

15.4 As applicable, the Purchaser's and Supplier's rights and obligations with respect to Custom Software or elements of the Custom Software, including any license agreements, and with respect to Custom Materials or elements of the Custom Materials, are specified in the SCC. **Subject to the SCC,** the Intellectual Property Rights in all Custom Software and Custom Materials specified in Appendices 4 and 5 of the Contract Agreement (if any) shall, at the date of this Contract or on creation of the rights (if later than the date of this Contract), vest in the Purchaser. The Supplier shall do

and execute or arrange for the doing and executing of each necessary act, document, and thing that the Purchaser may consider necessary or desirable to perfect the right, title, and interest of the Purchaser in and to those rights. In respect of such Custom Software and Custom Materials, the Supplier shall ensure that the holder of a moral right in such an item does not assert it, and the Supplier shall, if requested to do so by the Purchaser and where permitted by applicable law, ensure that the holder of such a moral right waives it.

15.5 The parties shall enter into such (if any) escrow arrangements in relation to the Source Code to some or all of the Software as are **specified in the SCC** and in **accordance with the SCC.**

16. Software License Agreements

16.1 Except to the extent that the Intellectual Property Rights in the Software vest in the Purchaser, the Supplier hereby grants to the Purchaser license to access and use the Software, including all inventions, designs, and marks embodied in the Software.

Such license to access and use the Software shall:

(a) be:

(i) nonexclusive;

(ii) fully paid up and irrevocable (except that it shall terminate if the Contract terminates under GCC Clauses 41.1 or 41.3);

(iii) valid throughout the territory of the Purchaser's Country (or such other territory as **specified in the SCC);** and

(iv) subject to additional restrictions (if any) as **specified in the SCC.**

(b) permit the Software to be:

(i) used or copied for use on or with the computer(s) for which it was acquired (if specified in the Technical Requirements and/or the Supplier's bid), plus a backup computer(s) of the same or similar capacity, if the primary is(are) inoperative, and during a reasonable transitional period when use is being transferred between primary and backup;

(ii) as **specified in the SCC,** used or copied for use on or transferred to a replacement computer(s), (and use on the original and replacement computer(s) may be simultaneous during a reasonable transitional period) provided that, if the Technical Requirements and/or the Supplier's bid specifies a class of computer to which the license is restricted and unless the Supplier agrees otherwise in writing, the replacement computer(s) is(are) within that class;

(iii) if the nature of the System is such as to permit such access, accessed from other computers connected to the primary and/or backup computer(s) by means of a local or wide-area network or similar arrangement, and used on or copied for use on those other computers to the extent necessary to that access;

(iv) reproduced for safekeeping or backup purposes;

(v) customized, adapted, or combined with other computer software for use by the Purchaser, provided that derivative software incorporating any substantial part of the delivered, restricted Software shall be subject to same restrictions as are set forth in this Contract;

(vi) as **specified in the SCC,** disclosed to, and reproduced for use by, support service suppliers and their subcontractors, (and the Purchaser may sublicense such persons to use and copy for use the Software) to the extent reasonably necessary to the performance of their support service contracts, subject to the same restrictions as are set forth in this Contract; and

(vii) disclosed to, and reproduced for use by, the Purchaser and by such other persons as are **specified in the SCC** (and the Purchaser may sublicense such persons to use and copy for use the Software), subject to the same restrictions as are set forth in this Contract.

16.2 The Standard Software may be subject to audit by the Supplier, in accordance with the terms **specified in the SCC,** to verify compliance with the above license agreements.

17. Confidential Information

17.1 Except if otherwise **specified in the SCC,** the "Receiving Party" (either the Purchaser or the Supplier) shall keep confidential and shall not, without the written consent of the other party to this Contract ("the Disclosing Party"), divulge to any third party any documents, data, or other information of a confidential nature ("Confidential Information") connected with this Contract, and furnished directly or indirectly by the Disclosing Party prior to or during performance, or following termination, of this Contract.

17.2 For the purposes of GCC Clause 17.1, the Supplier is also deemed to be the Receiving Party of Confidential Information generated by the Supplier itself in the course of the performance of its obligations under the Contract and relating to the businesses, finances, suppliers, employees, or other contacts of the Purchaser or the Purchaser's use of the System.

17.3 Notwithstanding GCC Clauses 17.1 and 17.2:

(a) the Supplier may furnish to its Subcontractor Confidential Information of the Purchaser to the extent reasonably required for the Subcontractor to perform its work under the Contract; and

(b) the Purchaser may furnish Confidential Information of the Supplier: (i) to its support service suppliers and their subcontractors to the extent reasonably required for them to perform their work under their support service contracts; and (ii) to its affiliates and subsidiaries,

in which event the Receiving Party shall ensure that the person to whom it furnishes Confidential Information of the Disclosing Party is aware of and abides by the Receiving Party's obligations under this GCC Clause 17 as if that person were party to the Contract in place of the Receiving Party.

17.4 The Purchaser shall not, without the Supplier's prior written consent, use any Confidential Information received from the Supplier for any purpose other than the operation, maintenance and further development of the System. Similarly, the Supplier shall not, without the Purchaser's prior written consent, use any Confidential Information received from the Purchaser for any purpose other than those that are required for the performance of the Contract.

17.5 The obligation of a party under GCC Clauses 17.1 through 17.4 above, however, shall not apply to that information which:

(a) now or hereafter enters the public domain through no fault of the Receiving Party;

(b) can be proven to have been possessed by the Receiving Party at the time of disclosure and that was not previously obtained, directly or indirectly, from the Disclosing Party;

(c) otherwise lawfully becomes available to the Receiving Party from a third party that has no obligation of confidentiality.

17.6 The above provisions of this GCC Clause 17 shall not in any way modify any undertaking of confidentiality given by either of the parties to this Contract prior to the date of the Contract in respect of the System or any part thereof.

17.7 The provisions of this GCC Clause 17 shall survive the termination, for whatever reason, of the Contract for three (3) years or such longer period as may be **specified in the SCC.**

E. SUPPLY, INSTALLATION, TESTING, COMMISSIONING, AND ACCEPTANCE OF THE SYSTEM

18. Representatives 18.1 Project Manager

If the Project Manager is not named in the Contract, then within fourteen (14) days of the Effective Date, the Purchaser shall appoint and notify the Supplier in writing of the name of the Project Manager. The Purchaser may from time to time appoint some other person as the Project Manager in place of the person previously so appointed and shall give a notice of the name of such other person to the Supplier without delay. No such appointment shall be made at such a time or in such a manner as to impede the progress of work on the System. Such appointment shall take effect only upon receipt of such notice by the Supplier. Subject to the extensions and/or limitations **specified in the SCC** (if any), the Project Manager shall have the authority to represent the Purchaser on all day-to-day matters relating to the System or arising from the Contract, and shall normally be the person giving or receiving notices on behalf of the

Purchaser pursuant to GCC Clause 4.

18.2 Supplier's Representative

18.2.1 If the Supplier's Representative is not named in the Contract, then within fourteen (14) days of the Effective Date, the Supplier shall appoint the Supplier's Representative and shall request the Purchaser in writing to approve the person so appointed. The request must be accompanied by a detailed curriculum vitae for the nominee, as well as a description of any other System or non-System responsibilities the nominee would retain while performing the duties of the Supplier's Representative. If the Purchaser does not object to the appointment within fourteen (14) days, the Supplier's Representative shall be deemed to have been approved. If the Purchaser objects to the appointment within fourteen (14) days giving the reason therefore, then the Supplier shall appoint a replacement within fourteen (14) days of such objection in accordance with this GCC Clause 18.2.1.

18.2.2 Subject to the extensions and/or limitations **specified in the SCC** (if any), the Supplier's Representative shall have the authority to represent the Supplier on all day-to-day matters relating to the System or arising from the Contract, and shall normally be the person giving or receiving notices on behalf of the Supplier pursuant to GCC Clause 4.

18.2.3 The Supplier shall not revoke the appointment of the Supplier's Representative without the Purchaser's prior written consent, which shall not be unreasonably withheld. If the Purchaser consents to such an action, the Supplier shall appoint another person of equal or superior qualifications as the Supplier's Representative, pursuant to the procedure set out in GCC Clause 18.2.1.

18.2.4 The Supplier's Representative and staff are obliged to work closely with the Purchaser's Project Manager and staff, act within their own authority, and abide by directives issued by the Purchaser that are consistent with the terms of the Contract. The Supplier's Representative is responsible for managing the activities of its personnel and any subcontracted

personnel.

18.2.5 The Supplier's Representative may, subject to the approval of the Purchaser (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions, and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Supplier's Representative and shall specify the powers, functions, and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until the notice of it has been delivered.

18.2.6 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with GCC Clause 18.2.5 shall be deemed to be an act or exercise by the Supplier's Representative.

18.3 Objections and Removals

18.3.1 The Purchaser may by notice to the Supplier object to any representative or person employed by the Supplier in the execution of the Contract who, in the reasonable opinion of the Purchaser, may have behaved inappropriately, be incompetent, or be negligent. The Purchaser shall provide evidence of the same, whereupon the Supplier shall remove such person from work on the System.

18.3.2 If any representative or person employed by the Supplier is removed in accordance with GCC Clause 18.3.1, the Supplier shall, where required, promptly appoint a replacement.

19. Project Plan

19.1 In close cooperation with the Purchaser and based on the Preliminary Project Plan included in the Supplier's bid, the Supplier shall develop a Project Plan encompassing the activities specified in the Contract. The contents of the Project Plan shall be as **specified in the SCC** and/or Technical Requirements.

19.2 The Supplier shall formally present to the Purchaser the Project Plan in accordance with the procedure specified in the SCC.

19.3 If required, the impact on the Implementation Schedule of modifications agreed during finalization of the Agreed and Finalized Project Plan shall be incorporated in the Contract by amendment, in accordance with GCC Clauses 39 and 40.

19.4 The Supplier shall undertake to supply, install, test, and commission the System in accordance with the Agreed and Finalized Project Plan and the Contract.

19.5 The Progress and other reports **specified in the SCC** shall be prepared by the Supplier and submitted to the Purchaser in the format and frequency specified in the Technical Requirements.

20. Subcontracting

20.1 Appendix 3 (List of Approved Subcontractors) to the Contract Agreement specifies critical items of supply or services and a list of Subcontractors for each item that are considered acceptable by the Purchaser. If no Subcontractors are listed for an item, the Supplier shall prepare a list of Subcontractors it considers qualified and wishes to be added to the list for such items. The Supplier may from time to time propose additions to or deletions from any such list. The Supplier shall submit any such list or any modification to the list to the Purchaser for its approval in sufficient time so as not to impede the progress of work on the System. The Purchaser shall not withhold such approval unreasonably. Such approval by the Purchaser of a Subcontractor(s) shall not relieve the Supplier from any of its obligations, duties, or responsibilities under the Contract.

20.2 The Supplier may, at its discretion, select and employ Subcontractors for such critical items from those Subcontractors listed pursuant to GCC Clause 20.1. If the Supplier wishes to employ a Subcontractor not so listed, or subcontract an item not so listed, it must seek the Purchaser's prior approval under GCC Clause 20.3.

20.3 For items for which pre-approved Subcontractor lists have not been specified in Appendix 3 to the Contract Agreement, the Supplier may employ such Subcontractors as it may select, provided: (i) the Supplier notifies the Purchaser in writing at least twenty-eight (28) days prior to the proposed mobilization date for such Subcontractor; and (ii) by the end of this period either the Purchaser has granted its approval in writing or fails to respond. The Supplier shall not engage any Subcontractor to which the Purchaser has objected in writing prior to the end of the notice period. The absence of a written objection by the Purchaser during the above

specified period shall constitute formal acceptance of the proposed Subcontractor. Except to the extent that it permits the deemed approval of the Purchaser of Subcontractors not listed in the Contract Agreement, nothing in this Clause, however, shall limit the rights and obligations of either the Purchaser or Supplier as they are specified in GCC Clauses 20.1 and 20.2, in the SCC, or in Appendix 3 of the Contract Agreement.

21. Design and Engineering

21.1 Technical Specifications and Drawings

21.1.1 The Supplier shall execute the basic and detailed design and the implementation activities necessary for successful installation of the System in compliance with the provisions of the Contract or, where not so specified, in accordance with good industry practice.

The Supplier shall be responsible for any discrepancies, errors or omissions in the specifications, drawings, and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Manager or not, provided that such discrepancies, errors, or omissions are not because of inaccurate information furnished in writing to the Supplier by or on behalf of the Purchaser.

21.1.2 The Supplier shall be entitled to disclaim responsibility for any design, data, drawing, specification, or other document, or any modification of such design, drawings, specification, or other documents provided or designated by or on behalf of the Purchaser, by giving a notice of such disclaimer to the Project Manager.

21.2 Codes and Standards

Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date twenty-eight (28) days prior to date of bid submission shall apply unless otherwise **specified in the SCC.** During Contract execution, any changes in such codes and standards shall be applied after approval by the Purchaser and shall be treated in accordance with GCC Clause 39.3.

21.3 Approval/Review of Technical Documents by the Project Manager

21.3.1 The Supplier shall prepare and furnish to the Project Manager the documents as **specified in the SCC** for the Project Manager's approval or review.

Any part of the System covered by or related to the documents to be approved by the Project Manager shall be executed only after the Project Manager's approval of these documents.

GCC Clauses 21.3.2 through 21.3.7 shall apply to those documents requiring the Project Manager's approval, but not to those furnished to the Project Manager for its review only.

21.3.2 Within fourteen (14) days after receipt by the Project Manager of any document requiring the Project Manager's approval in accordance with GCC Clause 21.3.1, the Project Manager shall either return one copy of the document to the Supplier with its approval endorsed on the document or shall notify the Supplier in writing of its disapproval of the document and the reasons for disapproval and the modifications that the Project Manager proposes. If the Project Manager fails to take such action within the fourteen (14) days, then the document shall be deemed to have been approved by the Project Manager.

21.3.3 The Project Manager shall not disapprove any document except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good industry practice.

21.3.4 If the Project Manager disapproves the document, the Supplier shall modify the document and resubmit it for the Project Manager's approval in accordance with GCC Clause 21.3.2. If the Project Manager approves the document subject to modification(s), the Supplier shall make the required modification(s), and the document shall then be deemed to have been approved, subject to GCC Clause 21.3.5. The procedure set out in GCC Clauses 21.3.2 through 21.3.4 shall be repeated, as appropriate, until the Project Manager approves such documents.

21.3.5 If any dispute occurs between the Purchaser and the Supplier in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) to a document that cannot be settled between the parties within a reasonable period, then, in case the Contract Agreement includes and names an Adjudicator, such dispute may be referred to the Adjudicator for determination in accordance with GCC Clause 6.1 (Adjudicator). If such dispute is referred to an Adjudicator, the Project Manager shall give instructions as to whether and if so, how, performance of the Contract is to proceed. The Supplier shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Adjudicator upholds the Supplier's view on the dispute and if the Purchaser has not given notice under GCC Clause 6.1.2, then the Supplier shall be reimbursed by the Purchaser for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Adjudicator shall decide, and the Time for Achieving Operational Acceptance shall be extended accordingly.

21.3.6 The Project Manager's approval, with or without modification of the document furnished by the Supplier, shall not relieve the Supplier of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager or inaccurate information furnished in writing to the Supplier by or on behalf of the Purchaser.

21.3.7 The Supplier shall not depart from any approved document unless the Supplier has first submitted to the Project Manager an amended document and obtained the Project Manager's approval of the document, pursuant to the provisions of this GCC Clause 21.3. If the Project Manager requests any change in any already approved document and/or in any document based on such an approved document, the provisions of GCC Clause 39 (Changes to the System) shall apply to such request.

22. Procurement, Delivery, and Transport

22.1 Subject to related Purchaser's responsibilities pursuant to GCC Clauses 10 and 14, the Supplier shall manufacture or procure and transport all the Information Technologies, Materials, and other Goods in an expeditious and orderly manner to the Project Site.

22.2 Delivery of the Information Technologies, Materials, and other Goods shall be made by the Supplier in accordance with the Technical Requirements.

22.3 Early or partial deliveries require the explicit written consent of the Purchaser, which consent shall not be unreasonably withheld.

22.4 Transportation

22.4.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during shipment. The packing, marking, and documentation within and outside the packages shall comply strictly with the Purchaser's instructions to the Supplier.

22.4.2 The Supplier will bear responsibility for and cost of transport to the Project Sites in accordance with the terms and conditions used in the specification of prices in the Price Schedules, including the terms and conditions of the associated Incoterms.

22.4.3 Unless otherwise **specified in the SCC,** the Supplier shall be free to use transportation through carriers registered in any eligible country and to obtain insurance from any eligible source country.

22.5 Unless otherwise **specified in the SCC,** the Supplier will provide the Purchaser with shipping and other documents, as specified below:

22.5.1 For Goods supplied from outside the Purchaser's Country:

Upon shipment, the Supplier shall notify the Purchaser and the insurance company contracted by the Supplier to provide cargo insurance by telex, cable, facsimile, electronic mail, or EDI with the full details of the shipment. The Supplier shall promptly send the following documents to the Purchaser by mail or courier, as appropriate, with a copy to the cargo

insurance company:

(a) two copies of the Supplier's invoice showing the description of the Goods, quantity, unit price, and total amount;

(b) usual transportation documents;

(c) insurance certificate;

(d) certificate(s) of origin; and

(e) estimated time and point of arrival in the Purchaser's Country and at the site.

22.5.2 For Goods supplied locally (i.e., from within the Purchaser's country):

Upon shipment, the Supplier shall notify the Purchaser by telex, cable, facsimile, electronic mail, or EDI with the full details of the shipment. The Supplier shall promptly send the following documents to the Purchaser by mail or courier, as appropriate:

(a) two copies of the Supplier's invoice showing the Goods' description, quantity, unit price, and total amount;

(b) delivery note, railway receipt, or truck receipt;

(c) certificate of insurance;

(d) certificate(s) of origin; and

(e) estimated time of arrival at the site.

22.6 Customs Clearance

(a) The Purchaser will bear responsibility for, and cost of, customs clearance into the Purchaser's country in accordance the particular Incoterm(s) used for Goods supplied from outside the Purchaser's country in the Price Schedules referred to by Article 2 of the Contract Agreement.

(b) At the request of the Purchaser, the Supplier will make available a representative or agent during the process of customs clearance in the Purchaser's country for goods supplied from outside the Purchaser's country. In the event of delays in customs clearance that are not the

fault of the Supplier:

(i) the Supplier shall be entitled to an extension in the Time for Achieving Operational Acceptance, pursuant to GCC Clause 40;

(ii) the Contract Price shall be adjusted to compensate the Supplier for any additional storage charges that the Supplier may incur as a result of the delay.

23. Product Upgrades

23.1 At any point during performance of the Contract, should technological advances be introduced by the Supplier for Information Technologies originally offered by the Supplier in its bid and still to be delivered, the Supplier shall be obligated to offer to the Purchaser the latest versions of the available Information Technologies having equal or better performance or functionality at the same or lesser unit prices, pursuant to GCC Clause 39 (Changes to the System).

23.2 At any point during performance of the Contract, for Information Technologies still to be delivered, the Supplier will also pass on to the Purchaser any cost reductions and additional and/or improved support and facilities that it offers to other clients of the Supplier in the Purchaser's Country, pursuant to GCC Clause 39 (Changes to the System).

23.3 During performance of the Contract, the Supplier shall offer to the Purchaser all new versions, releases, and updates of Standard Software, as well as related documentation and technical support services, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in the Purchaser's Country, and no later than twelve (12) months after they are released in the country of origin. In no case will the prices for these Software exceed those quoted by the Supplier in the Recurrent Costs tables in its bid.

23.4 During the Warranty Period, unless otherwise **specified in the SCC,** the Supplier will provide at no additional cost to the Purchaser all new versions, releases, and updates for all Standard Software that are used in the System, within thirty (30) days of their availability from the Supplier to other clients of the Supplier in the Purchaser's country, and no later than twelve (12) months after they are released in the country of origin of the Software.

23.5 The Purchaser shall introduce all new versions, releases or

updates of the Software within eighteen (18) months of receipt of a production-ready copy of the new version, release, or update, provided that the new version, release, or update does not adversely affect System operation or performance or require extensive reworking of the System. In cases where the new version, release, or update adversely affects System operation or performance, or requires extensive reworking of the System, the Supplier shall continue to support and maintain the version or release previously in operation for as long as necessary to allow introduction of the new version, release, or update. In no case shall the Supplier stop supporting or maintaining a version or release of the Software less than twenty four (24) months after the Purchaser receives a production-ready copy of a subsequent version, release, or update. The Purchaser shall use all reasonable endeavors to implement any new version, release, or update as soon as practicable, subject to the twenty-four-month-long stop date.

24. Implementation, Installation, and Other Services

24.1 The Supplier shall provide all Services specified in the Contract and Agreed and Finalized Project Plan in accordance with the highest standards of professional competence and integrity.

24.2 Prices charged by the Supplier for Services, if not included in the Contract, shall be agreed upon in advance by the parties (including, but not restricted to, any prices submitted by the Supplier in the Recurrent Cost Schedules of its Bid) and shall not exceed the prevailing rates charged by the Supplier to other purchasers in the Purchaser's Country for similar services.

25. Inspections and Tests

25.1 The Purchaser or its representative shall have the right to inspect and/or test any components of the System, as specified in the Technical Requirements, to confirm their good working order and/or conformity to the Contract at the point of delivery and/or at the Project Site.

25.2 The Purchaser or its representative shall be entitled to attend any such inspections and/or tests of the components, provided that the Purchaser shall bear all costs and expenses incurred in connection with such attendance, including but not limited to all inspection agent fees, travel, and related expenses.

25.3 Should the inspected or tested components fail to conform to the Contract, the Purchaser may reject the component(s), and the Supplier shall either replace the rejected component(s),

or make alterations as necessary so that it meets the Contract requirements free of cost to the Purchaser.

25.4 The Project Manager may require the Supplier to carry out any inspection and/or test not specified in the Contract, provided that the Supplier's reasonable costs and expenses incurred in the carrying out of such inspection and/or test shall be added to the Contract Price. Further, if such inspection and/or test impedes the progress of work on the System and/or the Supplier's performance of its other obligations under the Contract, due allowance will be made in respect of the Time for Achieving Operational Acceptance and the other obligations so affected.

25.5 If any dispute shall arise between the parties in connection with or caused by an inspection and/or with regard to any component to be incorporated in the System that cannot be settled amicably between the parties within a reasonable period of time, either party may invoke the process pursuant to GCC Clause 6 (Settlement of Disputes), starting with referral of the matter to the Adjudicator in case an Adjudicator is included and named in the Contract Agreement.

26. Installation of the System

26.1 As soon as the System, or any Subsystem, has, in the opinion of the Supplier, been delivered, Pre-commissioned, and made ready for Commissioning and Operational Acceptance Testing in accordance with the Technical Requirements, the SCC and the Agreed and Finalized Project Plan, the Supplier shall so notify the Purchaser in writing.

26.2 The Project Manager shall, within fourteen (14) days after receipt of the Supplier's notice under GCC Clause 26.1, either issue an Installation Certificate in the form specified in the Sample Forms Section in the Bidding Documents, stating that the System, or major component or Subsystem (if Acceptance by major component or Subsystem is specified pursuant to the SCC for GCC Clause 27.2.1), has achieved Installation by the date of the Supplier's notice under GCC Clause 26.1, or notify the Supplier in writing of any defects and/or deficiencies, including, but not limited to, defects or deficiencies in the interoperability or integration of the various components and/or Subsystems making up the System. The Supplier shall use all reasonable endeavors to promptly remedy any defect and/or deficiencies that the Project Manager has notified the Supplier of. The Supplier shall then promptly carry out retesting of the System or

Subsystem and, when in the Supplier's opinion the System or Subsystem is ready for Commissioning and Operational Acceptance Testing, notify the Purchaser in writing, in accordance with GCC Clause 26.1. The procedure set out in this GCC Clause 26.2 shall be repeated, as necessary, until an Installation Certificate is issued.

26.3 If the Project Manager fails to issue the Installation Certificate and fails to inform the Supplier of any defects and/or deficiencies within fourteen (14) days after receipt of the Supplier's notice under GCC Clause 26.1, or if the Purchaser puts the System or a Subsystem into production operation, then the System (or Subsystem) shall be deemed to have achieved successful Installation as of the date of the Supplier's notice or repeated notice, or when the Purchaser put the System into production operation, as the case may be.

27. Commissioning and Operational Acceptance

27.1 Commissioning

27.1.1 Commissioning of the System (or Subsystem if specified pursuant to the SCC for GCC Clause 27.2.1) shall be commenced by the Supplier:

(a) immediately after the Installation Certificate is issued by the Project Manager, pursuant to GCC Clause 26.2; or

(b) as otherwise specified in the Technical Requirement or the Agreed and Finalized Project Plan; or

(c) immediately after Installation is deemed to have occurred, under GCC Clause 26.3.

27.1.2 The Purchaser shall supply the operating and technical personnel and all materials and information reasonably required to enable the Supplier to carry out its obligations with respect to Commissioning.

Production use of the System or Subsystem(s) shall not commence prior to the start of formal Operational Acceptance Testing.

27.2 Operational Acceptance Tests

27.2.1 The Operational Acceptance Tests (and repeats of such tests) shall be the primary responsibility of the Purchaser (in accordance with GCC Clause 10.9), but shall be conducted with the full cooperation of the

Supplier during Commissioning of the System (or major components or Subsystem[s] if **specified in the SCC** and supported by the Technical Requirements), to ascertain whether the System (or major component or Subsystem[s]) conforms to the Technical Requirements and meets the standard of performance quoted in the Supplier's bid, including, but not restricted to, the functional and technical performance requirements. The Operational Acceptance Tests during Commissioning will be conducted as **specified in the SCC,** the Technical Requirements and/or the Agreed and Finalized Project Plan.

At the Purchaser's discretion, Operational Acceptance Tests may also be performed on replacement Goods, upgrades and new version releases, and Goods that are added or field-modified after Operational Acceptance of the System.

27.2.2 If for reasons attributable to the Purchaser, the Operational Acceptance Test of the System (or Subsystem[s] or major components, pursuant to the SCC for GCC Clause 27.2.1) cannot be successfully completed within the period **specified in the SCC,** from the date of Installation or any other period agreed upon in writing by the Purchaser and the Supplier, the Supplier shall be deemed to have fulfilled its obligations with respect to the technical and functional aspects of the Technical Specifications, SCC and/or the Agreed and Finalized Project Plan, and GCC Clause 28.2 and 28.3 shall not apply.

27.3 Operational Acceptance

27.3.1 Subject to GCC Clause 27.4 (Partial Acceptance) below, Operational Acceptance shall occur in respect of the System, when

(a) the Operational Acceptance Tests, as specified in the Technical Requirements, and/or SCC and/or the Agreed and Finalized Project Plan have been successfully completed; or

(b) the Operational Acceptance Tests have not been successfully completed or have not been carried out for reasons that are attributable to the Purchaser within the period from the date of Installation or any other agreed-upon period as

specified in GCC Clause 27.2.2 above; or

(c) the Purchaser has put the System into production or use for sixty (60) consecutive days. If the System is put into production or use in this manner, the Supplier shall notify the Purchaser and document such use.

27.3.2 At any time after any of the events set out in GCC Clause 27.3.1 have occurred, the Supplier may give a notice to the Project Manager requesting the issue of an Operational Acceptance Certificate.

27.3.3 After consultation with the Purchaser, and within fourteen (14) days after receipt of the Supplier's notice, the Project Manager shall:

(a) issue an Operational Acceptance Certificate; or

(b) notify the Supplier in writing of any defect or deficiencies or other reason for the failure of the Operational Acceptance Tests; or

(c) issue the Operational Acceptance Certificate, if the situation covered by GCC Clause 27.3.1 (b) arises.

27.3.4 The Supplier shall use all reasonable endeavors to promptly remedy any defect and/or deficiencies and/or other reasons for the failure of the Operational Acceptance Test that the Project Manager has notified the Supplier of. Once such remedies have been made by the Supplier, the Supplier shall notify the Purchaser, and the Purchaser, with the full cooperation of the Supplier, shall use all reasonable endeavors to promptly carry out retesting of the System or Subsystem. Upon the successful conclusion of the Operational Acceptance Tests, the Supplier shall notify the Purchaser of its request for Operational Acceptance Certification, in accordance with GCC Clause 27.3.3. The Purchaser shall then issue to the Supplier the Operational Acceptance Certification in accordance with GCC Clause 27.3.3 (a), or shall notify the Supplier of further defects, deficiencies, or other reasons for the failure of the Operational Acceptance Test. The procedure set out in this GCC Clause 27.3.4 shall be repeated, as necessary, until an

Operational Acceptance Certificate is issued.

27.3.5 If the System or Subsystem fails to pass the Operational Acceptance Test(s) in accordance with GCC Clause 27.2, then either:

(a) the Purchaser may consider terminating the Contract, pursuant to GCC Clause 41.2.2;

or

(b) if the failure to achieve Operational Acceptance within the specified time period is a result of the failure of the Purchaser to fulfill its obligations under the Contract, then the Supplier shall be deemed to have fulfilled its obligations with respect to the relevant technical and functional aspects of the Contract, and GCC Clauses 30.3 and 30.4 shall not apply.

27.3.6 If within fourteen (14) days after receipt of the Supplier's notice the Project Manager fails to issue the Operational Acceptance Certificate or fails to inform the Supplier in writing of the justifiable reasons why the Project Manager has not issued the Operational Acceptance Certificate, the System or Subsystem shall be deemed to have been accepted as of the date of the Supplier's said notice.

27.4 Partial Acceptance

27.4.1 If so specified in the SCC for GCC Clause 27.2.1, Installation and Commissioning shall be carried out individually for each identified major component or Subsystem(s) of the System. In this event, the provisions in the Contract relating to Installation and Commissioning, including the Operational Acceptance Test, shall apply to each such major component or Subsystem individually, and Operational Acceptance Certificate(s) shall be issued accordingly for each such major component or Subsystem of the System, subject to the limitations contained in GCC Clause 27.4.2.

27.4.2 The issuance of Operational Acceptance Certificates for individual major components or Subsystems pursuant to GCC Clause 27.4.1 shall not relieve the Supplier of its obligation to obtain an Operational Acceptance Certificate for the System as an integrated whole (if so specified in the SCC for GCC Clauses 12.1 and 27.2.1)

once all major components and Subsystems have been supplied, installed, tested, and commissioned.

27.4.3 In the case of minor components for the System that by their nature do not require Commissioning or an Operational Acceptance Test (e.g., minor fittings, furnishings or site works, etc.), the Project Manager shall issue an Operational Acceptance Certificate within fourteen (14) days after the fittings and/or furnishings have been delivered and/or installed or the site works have been completed. The Supplier shall, however, use all reasonable endeavors to promptly remedy any defects or deficiencies in such minor components detected by the Purchaser or Supplier.

F. GUARANTEES AND LIABILITIES

28. Operational Acceptance Time Guarantee

28.1 The Supplier guarantees that it shall complete the supply, Installation, Commissioning, and achieve Operational Acceptance of the System (or Subsystems, pursuant to the SCC for GCC Clause 27.2.1) within the time periods specified in the Implementation Schedule in the Technical Requirements Section and/or the Agreed and Finalized Project Plan pursuant to GCC Clause 8.2, or within such extended time to which the Supplier shall be entitled under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

28.2 If the Supplier fails to supply, install, commission, and achieve Operational Acceptance of the System (or Subsystems pursuant to the SCC for GCC Clause 27.2.1) within the time for achieving Operational Acceptance specified in the Implementation Schedule in the Technical Requirement or the Agreed and Finalized Project Plan, or any extension of the time for achieving Operational Acceptance previously granted under GCC Clause 40 (Extension of Time for Achieving Operational Acceptance), the Supplier shall pay to the Purchaser liquidated damages at the rate **specified in the SCC** as a percentage of the Contract Price, or the relevant part of the Contract Price if a Subsystem has not achieved Operational Acceptance. The aggregate amount of such liquidated damages shall in no event exceed the amount specified in the SCC ("the Maximum"). Once the Maximum is reached, the Purchaser may consider termination of the Contract, pursuant to GCC Clause 41.2.2.

28.3 Unless otherwise **specified in the SCC,** liquidated damages

payable under GCC Clause 28.2 shall apply only to the failure to achieve Operational Acceptance of the System (and Subsystems) as specified in the Implementation Schedule in the Technical Requirements and/or Agreed and Finalized Project Plan. This Clause 28.3 shall not limit, however, any other rights or remedies the Purchaser may have under the Contract for other delays.

28.4 If liquidated damages are claimed by the Purchaser for the System (or Subsystem), the Supplier shall have no further liability whatsoever to the Purchaser in respect to the Operational Acceptance time guarantee for the System (or Subsystem). However, the payment of liquidated damages shall not in any way relieve the Supplier from any of its obligations to complete the System or from any other of its obligations and liabilities under the Contract.

29. Defect Liability

29.1 The Supplier warrants that the System, including all Information Technologies, Materials, and other Goods supplied and Services provided, shall be free from defects in the design, engineering, Materials, and workmanship that prevent the System and/or any of its components from fulfilling the Technical Requirements or that limit in a material fashion the performance, reliability, or extensibility of the System and/or Subsystems. Exceptions and/or limitations, if any, to this warranty with respect to Software (or categories of Software), shall be as **specified in the SCC.** Commercial warranty provisions of products supplied under the Contract shall apply to the extent that they do not conflict with the provisions of this Contract.

29.2 The Supplier also warrants that the Information Technologies, Materials, and other Goods supplied under the Contract are new, unused, and incorporate all recent improvements in design that materially affect the System's or Subsystem's ability to fulfill the Technical Requirements.

29.3 In addition, the Supplier warrants that: (i) all Goods components to be incorporated into the System form part of the Supplier's and/or Subcontractor's current product lines, (ii) they have been previously released to the market, and (iii) those specific items **identified in the SCC** (if any) have been in the market for at least the minimum periods **specified in the SCC.**

29.4 The Warranty Period shall commence from the date of Operational Acceptance of the System (or of any major component or Subsystem for which separate Operational

Acceptance is provided for in the Contract) and shall extend for the length of time **specified in the SCC.**

29.5 If during the Warranty Period any defect as described in GCC Clause 29.1 should be found in the design, engineering, Materials, and workmanship of the Information Technologies and other Goods supplied or of the Services provided by the Supplier, the Supplier shall promptly, in consultation and agreement with the Purchaser regarding appropriate remedying of the defects, and at its sole cost, repair, replace, or otherwise make good (as the Supplier shall, at its discretion, determine) such defect as well as any damage to the System caused by such defect. Any defective Information Technologies or other Goods that have been replaced by the Supplier shall remain the property of the Supplier.

29.6 The Supplier shall not be responsible for the repair, replacement, or making good of any defect or of any damage to the System arising out of or resulting from any of the following causes:

(a) improper operation or maintenance of the System by the Purchaser;

(b) normal wear and tear;

(c) use of the System with items not supplied by the Supplier, unless otherwise identified in the Technical Requirements, or approved by the Supplier; or

(d) modifications made to the System by the Purchaser, or a third party, not approved by the Supplier.

29.7 The Supplier's obligations under this GCC Clause 29 shall not apply to:

(a) any materials that are normally consumed in operation or have a normal life shorter than the Warranty Period; or

(b) any designs, specifications, or other data designed, supplied, or specified by or on behalf of the Purchaser or any matters for which the Supplier has disclaimed responsibility, in accordance with GCC Clause 21.1.2.

29.8 The Purchaser shall give the Supplier a notice promptly following the discovery of such defect, stating the nature of any such defect together with all available evidence. The Purchaser shall afford all reasonable opportunity for the

Supplier to inspect any such defect. The Purchaser shall afford the Supplier all necessary access to the System and the site to enable the Supplier to perform its obligations under this GCC Clause 29.

29.9 The Supplier may, with the consent of the Purchaser, remove from the site any Information Technologies and other Goods that are defective, if the nature of the defect, and/or any damage to the System caused by the defect, is such that repairs cannot be expeditiously carried out at the site. If the repair, replacement, or making good is of such a character that it may affect the efficiency of the System, the Purchaser may give the Supplier notice requiring that tests of the defective part be made by the Supplier immediately upon completion of such remedial work, whereupon the Supplier shall carry out such tests.

If such part fails the tests, the Supplier shall carry out further repair, replacement, or making good (as the case may be) until that part of the System passes such tests. The tests shall be agreed upon by the Purchaser and the Supplier.

29.10 If the Supplier fails to commence the work necessary to remedy such defect or any damage to the System caused by such defect within the time period **specified in the SCC,** the Purchaser may, following notice to the Supplier, proceed to do such work or contract a third party (or parties) to do such work, and the reasonable costs incurred by the Purchaser in connection with such work shall be paid to the Purchaser by the Supplier or may be deducted by the Purchaser from any monies due the Supplier or claimed under the Performance Security.

29.11 If the System or Subsystem cannot be used by reason of such defect and/or making good of such defect, the Warranty Period for the System shall be extended by a period equal to the period during which the System or Subsystem could not be used by the Purchaser because of such defect and/or making good of such defect.

29.12 Items substituted for defective parts of the System during the Warranty Period shall be covered by the Defect Liability Warranty for the remainder of the Warranty Period applicable for the part replaced or three (3) months, whichever is greater.

29.13 At the request of the Purchaser and without prejudice to any other rights and remedies that the Purchaser may have

against the Supplier under the Contract, the Supplier will offer all possible assistance to the Purchaser to seek warranty services or remedial action from any subcontracted third-party producers or licensor of Goods included in the System, including without limitation assignment or transfer in favor of the Purchaser of the benefit of any warranties given by such producers or licensors to the Supplier.

30. Functional Guarantees

30.1 The Supplier guarantees that, once the Operational Acceptance Certificate(s) has been issued, the System represents a complete, integrated solution to the Purchaser's requirements set forth in the Technical Requirements and it conforms to all other aspects of the Contract. The Supplier acknowledges that GCC Clause 27 regarding Commissioning and Operational Acceptance governs how technical conformance of the System to the Contract requirements will be determined.

30.2 If, for reasons attributable to the Supplier, the System does not conform to the Technical Requirements or does not conform to all other aspects of the Contract, the Supplier shall at its cost and expense make such changes, modifications, and/or additions to the System as may be necessary to conform to the Technical Requirements and meet all functional and performance standards. The Supplier shall notify the Purchaser upon completion of the necessary changes, modifications, and/or additions and shall request the Purchaser to repeat the Operational Acceptance Tests until the System achieves Operational Acceptance.

30.3 If the System (or Subsystem[s]) fails to achieve Operational Acceptance, the Purchaser may consider termination of the Contract, pursuant to GCC Clause 41.2.2, and forfeiture of the Supplier's Performance Security in accordance with GCC Clause 13.3 in compensation for the extra costs and delays likely to result from this failure.

31. Intellectual Property Rights Warranty

31.1 The Supplier hereby represents and warrants that:

(a) the System as supplied, installed, tested, and accepted;

(b) use of the System in accordance with the Contract; and

(c) copying of the Software and Materials provided to the Purchaser in accordance with the Contract

do not and will not infringe any Intellectual Property Rights held by any third party and that it has all necessary rights or

at its sole expense shall have secured in writing all transfers of rights and other consents necessary to make the assignments, licenses, and other transfers of Intellectual Property Rights and the warranties set forth in the Contract, and for the Purchaser to own or exercise all Intellectual Property Rights as provided in the Contract. Without limitation, the Supplier shall secure all necessary written agreements, consents, and transfers of rights from its employees and other persons or entities whose services are used for development of the System.

32. Intellectual Property Rights Indemnity

32.1 The Supplier shall indemnify and hold harmless the Purchaser and its employees and officers from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability), that the Purchaser or its employees or officers may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights by reason of:

(a) installation of the System by the Supplier or the use of the System, including the Materials, in the country where the site is located;

(b) copying of the Software and Materials provided the Supplier in accordance with the Agreement; and

(c) sale of the products produced by the System in any country, except to the extent that such losses, liabilities, and costs arise as a result of the Purchaser's breach of GCC Clause 32.2.

32.2 Such indemnity shall not cover any use of the System, including the Materials, other than for the purpose indicated by or to be reasonably inferred from the Contract, any infringement resulting from the use of the System, or any products of the System produced thereby in association or combination with any other goods or services not supplied by the Supplier, where the infringement arises because of such association or combination and not because of use of the System in its own right.

32.3 Such indemnities shall also not apply if any claim of infringement:

(a) is asserted by a parent, subsidiary, or affiliate of the Purchaser's organization;

(b) is a direct result of a design mandated by the Purchaser's Technical Requirements and the possibility of such infringement was duly noted in the Supplier's Bid; or

(c) results from the alteration of the System, including the Materials, by the Purchaser or any persons other than the Supplier or a person authorized by the Supplier.

32.4 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Clause 32.1, the Purchaser shall promptly give the Supplier notice of such proceedings or claims, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf. Unless the Supplier has so failed to notify the Purchaser within the twenty-eight (28) days, the Purchaser shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

32.5 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Supplier or its employees, officers, or Subcontractors may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided to the Supplier in connection with this Contract by the Purchaser or any persons (other than the Supplier) contracted by the Purchaser, except to the extent that such losses, liabilities, and costs arise as a result of the Supplier's breach of GCC Clause 32.8.

32.6 Such indemnity shall not cover

(a) any use of the design, data, drawing, specification, or other documents or materials, other than for the purpose indicated by or to be reasonably inferred from the Contract;

(b) any infringement resulting from the use of the design, data, drawing, specification, or other documents or materials, or any products produced thereby, in association or combination with any other Goods or Services not provided by the Purchaser or any other person contracted by the Purchaser, where the infringement arises because of such association or combination and not because of the use of the design, data, drawing, specification, or other documents or materials in its own right.

32.7 Such indemnities shall also not apply:

(a) if any claim of infringement is asserted by a parent, subsidiary, or affiliate of the Supplier's organization;

(b) to the extent that any claim of infringement is caused by the alteration, by the Supplier, or any persons contracted by the Supplier, of the design, data, drawing, specification, or other documents or materials provided to the Supplier by the Purchaser or any persons contracted by the Purchaser.

32.8 If any proceedings are brought or any claim is made against the Supplier arising out of the matters referred to in GCC Clause 32.5, the Supplier shall promptly give the Purchaser notice of such proceedings or claims, and the Purchaser may at its own expense and in the Supplier's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Purchaser fails to notify the Supplier within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Supplier shall be free to conduct the same on its own behalf. Unless the Purchaser has so failed to notify the Supplier within the twenty-eight (28) days, the Supplier shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Supplier shall, at the Purchaser's request, afford all available assistance to the Purchaser in conducting such proceedings or claim and shall be reimbursed by the Purchaser for all reasonable expenses incurred in so doing.

33. Limitation of Liability

33.1 Provided the following does not exclude or limit any liabilities of either party in ways not permitted by applicable law:

(a) the Supplier shall not be liable to the Purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser; and

(b) the aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Supplier to indemnify the Purchaser with respect to intellectual property rights infringement.

G. RISK DISTRIBUTION

34. Transfer of Ownership

34.1 With the exception of Software and Materials, the ownership of the Information Technologies and other Goods shall be transferred to the Purchaser at the time of Delivery or otherwise under terms that may be agreed upon and specified in the Contract Agreement.

34.2 Ownership and the terms of usage of the Software and Materials supplied under the Contract shall be governed by GCC Clause 15 (Copyright) and any elaboration in the Technical Requirements.

34.3 Ownership of the Supplier's Equipment used by the Supplier and its Subcontractors in connection with the Contract shall remain with the Supplier or its Subcontractors.

35. Care of the System

35.1 The Purchaser shall become responsible for the care and custody of the System or Subsystems upon their Delivery. The Purchaser shall make good at its own cost any loss or damage that may occur to the System or Subsystems from any cause from the date of Delivery until the date of Operational Acceptance of the System or Subsystems, pursuant to GCC Clause 27 (Commissioning and Operational Acceptance), excepting such loss or damage arising from acts or omissions of the Supplier, its employees, or subcontractors.

35.2 If any loss or damage occurs to the System or any part of the System by reason of:

(a) (insofar as they relate to the country where the Project Site is located) nuclear reaction, nuclear radiation, radioactive contamination, a pressure wave caused by aircraft or other aerial objects, or any other occurrences that an experienced contractor could not reasonably foresee, or if reasonably foreseeable could not reasonably make provision for or insure against, insofar as such risks are not normally insurable on the insurance market and are mentioned in the general exclusions of the policy of insurance taken out under GCC Clause 37;

(b) any use not in accordance with the Contract, by the Purchaser or any third party;

(c) any use of or reliance upon any design, data, or specification provided or designated by or on behalf of the Purchaser, or any such matter for which the Supplier has disclaimed responsibility in accordance with GCC Clause 21.1.2,

the Purchaser shall pay to the Supplier all sums payable in respect of the System or Subsystems that have achieved Operational Acceptance, notwithstanding that the same be lost, destroyed, or damaged. If the Purchaser requests the Supplier in writing to make good any loss or damage to the System thereby occasioned, the Supplier shall make good the same at the cost of the Purchaser in accordance with GCC Clause 39. If the Purchaser does not request the Supplier in writing to make good any loss or damage to the System thereby occasioned, the Purchaser shall either request a change in accordance with GCC Clause 39, excluding the performance of that part of the System thereby lost, destroyed, or damaged, or, where the loss or damage affects a substantial part of the System, the Purchaser shall terminate the Contract pursuant to GCC Clause 41.1.

35.3 The Purchaser shall be liable for any loss of or damage to any Supplier’s Equipment which the Purchaser has authorized to locate within the Purchaser's premises for use in fulfillment of Supplier's obligations under the Contract, except where such loss or damage arises from acts or omissions of the Supplier, its employees, or subcontractors.

36. Loss of or

36.1 The Supplier and each and every Subcontractor shall abide

by the job safety, insurance, customs, and immigration measures prevalent and laws in force in the Purchaser's Country.

Damage to Property; Accident or Injury to Workers; Indemnification

36.2 Subject to GCC Clause 36.3, the Supplier shall indemnify and hold harmless the Purchaser and its employees and officers from and against any and all losses, liabilities and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Purchaser or its employees or officers may suffer as a result of the death or injury of any person or loss of or damage to any property (other than the System, whether accepted or not) arising in connection with the supply, installation, testing, and Commissioning of the System and by reason of the negligence of the Supplier or its Subcontractors, or their employees, officers or agents, except any injury, death, or property damage caused by the negligence of the Purchaser, its contractors, employees, officers, or agents.

36.3 If any proceedings are brought or any claim is made against the Purchaser that might subject the Supplier to liability under GCC Clause 36.2, the Purchaser shall promptly give the Supplier notice of such proceedings or claims, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Supplier fails to notify the Purchaser within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Purchaser shall be free to conduct the same on its own behalf. Unless the Supplier has so failed to notify the Purchaser within the twenty-eight (28) day period, the Purchaser shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Purchaser shall, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing.

36.4 The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers, and Subcontractors from any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability) that the Supplier or its employees, officers, or Subcontractors may suffer as a result of the death or personal injury of any person or loss of or damage to property of the Purchaser, other than the System not yet

achieving Operational Acceptance, that is caused by fire, explosion, or any other perils, in excess of the amount recoverable from insurances procured under GCC Clause 37 (Insurances), provided that such fire, explosion, or other perils were not caused by any act or failure of the Supplier.

36.5 If any proceedings are brought or any claim is made against the Supplier that might subject the Purchaser to liability under GCC Clause 36.4, the Supplier shall promptly give the Purchaser notice of such proceedings or claims, and the Purchaser may at its own expense and in the Supplier's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Purchaser fails to notify the Supplier within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the Supplier shall be free to conduct the same on its own behalf. Unless the Purchaser has so failed to notify the Supplier within the twenty-eight (28) days, the Supplier shall make no admission that may be prejudicial to the defense of any such proceedings or claim. The Supplier shall, at the Purchaser's request, afford all available assistance to the Purchaser in conducting such proceedings or claim and shall be reimbursed by the Purchaser for all reasonable expenses incurred in so doing.

36.6 The party entitled to the benefit of an indemnity under this GCC Clause 36 shall take all reasonable measures to mitigate any loss or damage that has occurred. If the party fails to take such measures, the other party's liabilities shall be correspondingly reduced.

37. Insurances

37.1 The Supplier shall at its expense take out and maintain in effect, or cause to be taken out and maintained in effect, during the performance of the Contract, the insurance set forth below. The identity of the insurers and the form of the policies shall be subject to the approval of the Purchaser, who should not unreasonably withhold such approval.

(a) Cargo Insurance During Transport

as applicable, 110 percent of the price of the Information Technologies and other Goods in a freely convertible currency, covering the Goods from physical loss or damage during shipment through receipt at the Project Site.

(b) Installation "All Risks" Insurance

as applicable, 110 percent of the price of the Information Technologies and other Goods covering the Goods at the site from all risks of physical loss or damage (excluding only perils commonly excluded under "all risks" insurance policies of this type by reputable insurers) occurring prior to Operational Acceptance of the System.

(c) Third-Party Liability Insurance

On terms as **specified in the SCC,** covering bodily injury or death suffered by third parties (including the Purchaser's personnel) and loss of or damage to property (including the Purchaser's property and any Subsystems that have been accepted by the Purchaser) occurring in connection with the supply and installation of the Information System.

(d) Automobile Liability Insurance

In accordance with the statutory requirements prevailing in the Purchaser's Country, covering use of all vehicles used by the Supplier or its Subcontractors (whether or not owned by them) in connection with the execution of the Contract.

(e) Other Insurance (if any), as **specified in the SCC.**

37.2 The Purchaser shall be named as co-insured under all insurance policies taken out by the Supplier pursuant to GCC Clause 37.1, except for the Third-Party Liability, and the Supplier's Subcontractors shall be named as co-insured under all insurance policies taken out by the Supplier pursuant to GCC Clause 37.1 except for Cargo Insurance During Transport. All insurer's rights of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.

37.3 The Supplier shall deliver to the Purchaser certificates of insurance (or copies of the insurance policies) as evidence that the required policies are in full force and effect.

37.4 The Supplier shall ensure that, where applicable, its Subcontractor(s) shall take out and maintain in effect adequate insurance policies for their personnel and vehicles and for work executed by them under the Contract, unless

such Subcontractors are covered by the policies taken out by the Supplier.

37.5 If the Supplier fails to take out and/or maintain in effect the insurance referred to in GCC Clause 37.1, the Purchaser may take out and maintain in effect any such insurance and may from time to time deduct from any amount due the Supplier under the Contract any premium that the Purchaser shall have paid to the insurer or may otherwise recover such amount as a debt due from the Supplier.

37.6 Unless otherwise provided in the Contract, the Supplier shall prepare and conduct all and any claims made under the policies effected by it pursuant to this GCC Clause 37, and all monies payable by any insurers shall be paid to the Supplier. The Purchaser shall give to the Supplier all such reasonable assistance as may be required by the Supplier in connection with any claim under the relevant insurance policies. With respect to insurance claims in which the Purchaser's interest is involved, the Supplier shall not give any release or make any compromise with the insurer without the prior written consent of the Purchaser. With respect to insurance claims in which the Supplier's interest is involved, the Purchaser shall not give any release or make any compromise with the insurer without the prior written consent of the Supplier.

38. Force Majeure

38.1 "Force Majeure" shall mean any event beyond the reasonable control of the Purchaser or of the Supplier, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected and shall include, without limitation, the following:

(a) war, hostilities, or warlike operations (whether a state of war be declared or not), invasion, act of foreign enemy, and civil war;

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion, and terrorist acts;

(c) confiscation, nationalization, mobilization, commandeering or requisition by or under the order of any government or de jure or de facto authority or ruler, or any other act or failure to act of any local state or national government authority;

(d) strike, sabotage, lockout, embargo, import restriction,

port congestion, lack of usual means of public transportation and communication, industrial dispute, shipwreck, shortage or restriction of power supply, epidemics, quarantine, and plague;

(e) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves, or other natural or physical disaster;

(f) failure, by the Supplier, to obtain the necessary export permit(s) from the governments of the Country(s) of Origin of the Information Technologies or other Goods, or Supplier's Equipment provided that the Supplier has made all reasonable efforts to obtain the required export permit(s), including the exercise of due diligence in determining the eligibility of the System and all of its components for receipt of the necessary export permits.

38.2 If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances of the event of Force Majeure within fourteen (14) days after the occurrence of such event.

38.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered, or delayed. The Time for Achieving Operational Acceptance shall be extended in accordance with GCC Clause 40 (Extension of Time for Achieving Operational Acceptance).

38.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect of the event of Force Majeure upon its or their performance of the Contract and to fulfill its or their obligations under the Contract, but without prejudice to either party's right to terminate the Contract under GCC Clause 38.6.

38.5 No delay or nonperformance by either party to this Contract caused by the occurrence of any event of Force Majeure shall:

(a) constitute a default or breach of the Contract;

(b) (subject to GCC Clauses 35.2, 38.3, and 38.4) give rise to any claim for damages or additional cost or expense occasioned by the delay or nonperformance,

if, and to the extent that, such delay or nonperformance is caused by the occurrence of an event of Force Majeure.

38.6 If the performance of the Contract is substantially prevented, hindered, or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the time period covered by the Contract, the parties will attempt to develop a mutually satisfactory solution, failing which, either party may terminate the Contract by giving a notice to the other.

38.7 In the event of termination pursuant to GCC Clause 38.6, the rights and obligations of the Purchaser and the Supplier shall be as specified in GCC Clauses 41.1.2 and 41.1.3.

38.8 Notwithstanding GCC Clause 38.5, Force Majeure shall not apply to any obligation of the Purchaser to make payments to the Supplier under this Contract.

H. CHANGE IN CONTRACT ELEMENTS

39. Changes to the System

39.1 Introducing a Change

39.1.1 Subject to GCC Clauses 39.2.5 and 39.2.7, the Purchaser shall have the right to propose, and subsequently require, the Project Manager to order the Supplier from time to time during the performance of the Contract to make any change, modification, addition, or deletion to, in, or from the System (interchangeably called "Change"), provided that such Change falls within the general scope of the System, does not constitute unrelated work, and is technically practicable, taking into account both the state of advancement of the System and the technical compatibility of the Change envisaged with the nature of the System as originally specified in the Contract.

A Change may involve, but is not restricted to, the substitution of updated Information Technologies

and related Services in accordance with GCC Clause 23 (Product Upgrades).

39.1.2 The Supplier may from time to time during its performance of the Contract propose to the Purchaser (with a copy to the Project Manager) any Change that the Supplier considers necessary or desirable to improve the quality or efficiency of the System. The Purchaser may at its discretion approve or reject any Change proposed by the Supplier.

39.1.3 Notwithstanding GCC Clauses 39.1.1 and 39.1.2, no change made necessary because of any default of the Supplier in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Achieving Operational Acceptance.

39.1.4 The procedure on how to proceed with and execute Changes is specified in GCC Clauses 39.2 and 39.3, and further details and sample forms are provided in the Sample Forms Section in the Bidding Documents.

39.1.5 Moreover, the Purchaser and Supplier will agree, during development of the Project Plan, to a date prior to the scheduled date for Operational Acceptance, after which the Technical Requirements for the System shall be "frozen." Any Change initiated after this time will be dealt with after Operational Acceptance.

39.2 Changes Originating from Purchaser

39.2.1 If the Purchaser proposes a Change pursuant to GCC Clauses 39.1.1, it shall send to the Supplier a "Request for Change Proposal," requiring the Supplier to prepare and furnish to the Project Manager as soon as reasonably practicable a "Change Proposal," which shall include the following:

(a) brief description of the Change;

(b) impact on the Time for Achieving Operational Acceptance;

(c) detailed estimated cost of the Change;

(d) effect on Functional Guarantees (if any);

(e) effect on any other provisions of the Contract.

39.2.2 Prior to preparing and submitting the "Change Proposal," the Supplier shall submit to the Project Manager an "Change Estimate Proposal," which shall be an estimate of the cost of preparing the Change Proposal, plus a first approximation of the suggested approach and cost for implementing the changes. Upon receipt of the Supplier's Change Estimate Proposal, the Purchaser shall do one of the following:

(a) accept the Supplier's estimate with instructions to the Supplier to proceed with the preparation of the Change Proposal;

(b) advise the Supplier of any part of its Change Estimate Proposal that is unacceptable and request the Supplier to review its estimate;

(c) advise the Supplier that the Purchaser does not intend to proceed with the Change.

39.2.3 Upon receipt of the Purchaser's instruction to proceed under GCC Clause 39.2.2 (a), the Supplier shall, with proper expedition, proceed with the preparation of the Change Proposal, in accordance with GCC Clause 39.2.1. The Supplier, at its discretion, may specify a validity period for the Change Proposal, after which if the Purchaser and Supplier has not reached agreement in accordance with GCC Clause 39.2.6, then GCC Clause 39.2.7 shall apply.

39.2.4 The pricing of any Change shall, as far as practicable, be calculated in accordance with the rates and prices included in the Contract. If the nature of the Change is such that the Contract rates and prices are inequitable, the parties to the Contract shall agree on other specific rates to be used for valuing the Change.

39.2.5 If before or during the preparation of the Change Proposal it becomes apparent that the aggregate impact of compliance with the Request for Change

Proposal and with all other Change Orders that have already become binding upon the Supplier under this GCC Clause 39 would be to increase or decrease the Contract Price as originally set forth in Article 2 (Contract Price) of the Contract Agreement by more than fifteen (15) percent, the Supplier may give a written notice of objection to this Request for Change Proposal prior to furnishing the Change Proposal. If the Purchaser accepts the Supplier's objection, the Purchaser shall withdraw the proposed Change and shall notify the Supplier in writing of its acceptance.

The Supplier's failure to so object to a Request for Change Proposal shall neither affect its right to object to any subsequent requested Changes or Change Orders, nor affect its right to take into account, when making such subsequent objection, the percentage increase or decrease in the Contract Price that any Change not objected to by the Supplier represents.

39.2.6 Upon receipt of the Change Proposal, the Purchaser and the Supplier shall mutually agree upon all matters contained in the Change Proposal. Within fourteen (14) days after such agreement, the Purchaser shall, if it intends to proceed with the Change, issue the Supplier a Change Order. If the Purchaser is unable to reach a decision within fourteen (14) days, it shall notify the Supplier with details of when the Supplier can expect a decision. If the Purchaser decides not to proceed with the Change for whatever reason, it shall, within the said period of fourteen (14) days, notify the Supplier accordingly. Under such circumstances, the Supplier shall be entitled to reimbursement of all costs reasonably incurred by it in the preparation of the Change Proposal, provided that these do not exceed the amount given by the Supplier in its Change Estimate Proposal submitted in accordance with GCC Clause 39.2.2.

39.2.7 If the Purchaser and the Supplier cannot reach agreement on the price for the Change, an equitable adjustment to the Time for Achieving Operational Acceptance, or any other matters identified in the Change Proposal, the Change will not be

implemented. However, this provision does not limit the rights of either party under GCC Clause 6 (Settlement of Disputes).

39.3 Changes Originating from Supplier

If the Supplier proposes a Change pursuant to GCC Clause 39.1.2, the Supplier shall submit to the Project Manager a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in GCC Clause 39.2.1. Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in GCC Clauses 39.2.6 and 39.2.7. However, should the Purchaser choose not to proceed or the Purchaser and the Supplier cannot come to agreement on the change during any validity period that the Supplier may specify in its Application for Change Proposal, the Supplier shall not be entitled to recover the costs of preparing the Application for Change Proposal, unless subject to an agreement between the Purchaser and the Supplier to the contrary.

40. Extension of Time for Achieving Operational Acceptance

40.1 The time(s) for achieving Operational Acceptance specified in the Schedule of Implementation shall be extended if the Supplier is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) any Change in the System as provided in GCC Clause 39 (Change in the Information System);

(b) any occurrence of Force Majeure as provided in GCC Clause 38 (Force Majeure);

(c) default of the Purchaser; or

(d) any other matter specifically mentioned in the Contract;

by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Supplier.

40.2 Except where otherwise specifically provided in the Contract, the Supplier shall submit to the Project Manager a notice of a claim for an extension of the time for achieving Operational Acceptance, together with particulars of the event or circumstance justifying such extension as soon as reasonably practicable after the commencement of such

event or circumstance. As soon as reasonably practicable after receipt of such notice and supporting particulars of the claim, the Purchaser and the Supplier shall agree upon the period of such extension. In the event that the Supplier does not accept the Purchaser's estimate of a fair and reasonable time extension, the Supplier shall be entitled to refer the matter to the provisions for the Settlement of Disputes pursuant to GCC Clause 6.

40.3 The Supplier shall at all times use its reasonable efforts to minimize any delay in the performance of its obligations under the Contract.

41. Termination

41.1 Termination for Purchaser's Convenience

41.1.1 The Purchaser may at any time terminate the Contract for any reason by giving the Supplier a notice of termination that refers to this GCC Clause 41.1.

41.1.2 Upon receipt of the notice of termination under GCC Clause 41.1.1, the Supplier shall either as soon as reasonably practical or upon the date specified in the notice of termination

(a) cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the System already executed, or any work required to leave the site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Purchaser pursuant to GCC Clause 41.1.2 (d) (ii) below;

(c) remove all Supplier's Equipment from the site, repatriate the Supplier's and its Subcontractors' personnel from the site, remove from the site any wreckage, rubbish, and debris of any kind;

(d) in addition, the Supplier, subject to the payment specified in GCC Clause 41.1.3, shall

(i) deliver to the Purchaser the parts of the System executed by the Supplier up to the date of termination;

(ii) to the extent legally possible, assign to the

Purchaser all right, title, and benefit of the Supplier to the System, or Subsystem, as at the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded between the Supplier and its Subcontractors;

(iii) deliver to the Purchaser all nonproprietary drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as of the date of termination in connection with the System.

41.1.3 In the event of termination of the Contract under GCC Clause 41.1.1, the Purchaser shall pay to the Supplier the following amounts:

(a) the Contract Price, properly attributable to the parts of the System executed by the Supplier as of the date of termination;

(b) the costs reasonably incurred by the Supplier in the removal of the Supplier's Equipment from the site and in the repatriation of the Supplier's and its Subcontractors' personnel;

(c) any amount to be paid by the Supplier to its Subcontractors in connection with the termination of any subcontracts, including any cancellation charges;

(d) costs incurred by the Supplier in protecting the System and leaving the site in a clean and safe condition pursuant to GCC Clause 41.1.2 (a); and

(e) the cost of satisfying all other obligations, commitments, and claims that the Supplier may in good faith have undertaken with third parties in connection with the Contract and that are not covered by GCC Clauses 41.1.3 (a) through (d) above.

41.2 Termination for Supplier's Default

41.2.1 The Purchaser, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of termination and its reasons therefore to the Supplier, referring

to this GCC Clause 41.2:

(a) if the Supplier becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Supplier is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Supplier takes or suffers any other analogous action in consequence of debt;

(b) if the Supplier assigns or transfers the Contract or any right or interest therein in violation of the provision of GCC Clause 42 (Assignment); or

(c) if the Supplier, in the judgment of the Purchaser, has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices, in competing for or in executing the Contract, including but not limited to willful misrepresentation of facts concerning ownership of Intellectual Property Rights in, or proper authorization and/or licenses from the owner to offer, the hardware, software, or materials provided under this Contract.

For the purposes of this Clause:

(i) "corrupt practice"[1] is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;

(ii) "fraudulent practice"[2] is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an

[1] "Another party" refers to a public official acting in relation to the procurement process or contract execution]. In this context, "public official" includes World Bank staff and employees of other organizations taking or reviewing procurement decisions.

[2] A "party" refers to a public official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

obligation;

(iii) "collusive practice"[1] is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;

(iv) "coercive practice"[2] is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;

(v) "obstructive practice" is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a Bank investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or

(bb) acts intended to materially impede the exercise of the Bank's inspection and audit rights provided for under Sub-Clause 9.8.

41.2.2 If the Supplier:

(a) has abandoned or repudiated the Contract;

(b) has without valid reason failed to commence work on the System promptly;

(c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the

[1] "Parties" refers to participants in the procurement process (including public officials) attempting to establish bid prices at artificial, non competitive levels.

[2] A "party" refers to a participant in the procurement process or contract execution.

Contract without just cause;

(d) refuses or is unable to provide sufficient Materials, Services, or labor to execute and complete the System in the manner specified in the Agreed and Finalized Project Plan furnished under GCC Clause 19 at rates of progress that give reasonable assurance to the Purchaser that the Supplier can attain Operational Acceptance of the System by the Time for Achieving Operational Acceptance as extended;

then the Purchaser may, without prejudice to any other rights it may possess under the Contract, give a notice to the Supplier stating the nature of the default and requiring the Supplier to remedy the same. If the Supplier fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Purchaser may terminate the Contract forthwith by giving a notice of termination to the Supplier that refers to this GCC Clause 41.2.

41.2.3 Upon receipt of the notice of termination under GCC Clauses 41.2.1 or 41.2.2, the Supplier shall, either immediately or upon such date as is specified in the notice of termination:

(a) cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the System already executed or any work required to leave the site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Purchaser pursuant to GCC Clause 41.2.3 (d) below;

(c) deliver to the Purchaser the parts of the System executed by the Supplier up to the date of termination;

(d) to the extent legally possible, assign to the Purchaser all right, title and benefit of the Supplier to the System or Subsystems as at the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded

between the Supplier and its Subcontractors;

(e) deliver to the Purchaser all drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as at the date of termination in connection with the System.

41.2.4 The Purchaser may enter upon the site, expel the Supplier, and complete the System itself or by employing any third party. Upon completion of the System or at such earlier date as the Purchaser thinks appropriate, the Purchaser shall give notice to the Supplier that such Supplier's Equipment will be returned to the Supplier at or near the site and shall return such Supplier's Equipment to the Supplier in accordance with such notice. The Supplier shall thereafter without delay and at its cost remove or arrange removal of the same from the site.

41.2.5 Subject to GCC Clause 41.2.6, the Supplier shall be entitled to be paid the Contract Price attributable to the portion of the System executed as at the date of termination and the costs, if any, incurred in protecting the System and in leaving the site in a clean and safe condition pursuant to GCC Clause 41.2.3 (a). Any sums due the Purchaser from the Supplier accruing prior to the date of termination shall be deducted from the amount to be paid to the Supplier under this Contract.

41.2.6 If the Purchaser completes the System, the cost of completing the System by the Purchaser shall be determined. If the sum that the Supplier is entitled to be paid, pursuant to GCC Clause 41.2.5, plus the reasonable costs incurred by the Purchaser in completing the System, exceeds the Contract Price, the Supplier shall be liable for such excess. If such excess is greater than the sums due the Supplier under GCC Clause 41.2.5, the Supplier shall pay the balance to the Purchaser, and if such excess is less than the sums due the Supplier under GCC Clause 41.2.5, the Purchaser shall pay the balance to the Supplier. The Purchaser and the Supplier shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

41.3 Termination by Supplier

41.3.1 If:

(a) the Purchaser has failed to pay the Supplier any sum due under the Contract within the specified period, has failed to approve any invoice or supporting documents without just cause **pursuant to the SCC,** or commits a substantial breach of the Contract, the Supplier may give a notice to the Purchaser that requires payment of such sum, with interest on this sum as stipulated in GCC Clause 12.3, requires approval of such invoice or supporting documents, or specifies the breach and requires the Purchaser to remedy the same, as the case may be. If the Purchaser fails to pay such sum together with such interest, fails to approve such invoice or supporting documents or give its reasons for withholding such approval, fails to remedy the breach or take steps to remedy the breach within fourteen (14) days after receipt of the Supplier's notice; or

(b) the Supplier is unable to carry out any of its obligations under the Contract for any reason attributable to the Purchaser, including but not limited to the Purchaser's failure to provide possession of or access to the site or other areas or failure to obtain any governmental permit necessary for the execution and/or completion of the System;

then the Supplier may give a notice to the Purchaser of such events, and if the Purchaser has failed to pay the outstanding sum, to approve the invoice or supporting documents, to give its reasons for withholding such approval, or to remedy the breach within twenty-eight (28) days of such notice, or if the Supplier is still unable to carry out any of its obligations under the Contract for any reason attributable to the Purchaser within twenty-eight (28) days of the said notice, the Supplier may by a further notice to the Purchaser referring to this GCC Clause 41.3.1, forthwith terminate the Contract.

41.3.2 The Supplier may terminate the Contract immediately by giving a notice to the Purchaser to that effect, referring to this GCC Clause 41.3.2, if

the Purchaser becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, being a corporation, if a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), a receiver is appointed over any part of its undertaking or assets, or if the Purchaser takes or suffers any other analogous action in consequence of debt.

41.3.3 If the Contract is terminated under GCC Clauses 41.3.1 or 41.3.2, then the Supplier shall immediately:

(a) cease all further work, except for such work as may be necessary for the purpose of protecting that part of the System already executed, or any work required to leave the site in a clean and safe condition;

(b) terminate all subcontracts, except those to be assigned to the Purchaser pursuant to Clause 41.3.3 (d) (ii);

(c) remove all Supplier's Equipment from the site and repatriate the Supplier's and its Subcontractor's personnel from the site.

(d) In addition, the Supplier, subject to the payment specified in GCC Clause 41.3.4, shall:

(i) deliver to the Purchaser the parts of the System executed by the Supplier up to the date of termination;

(ii) to the extent legally possible, assign to the Purchaser all right, title, and benefit of the Supplier to the System, or Subsystems, as of the date of termination, and, as may be required by the Purchaser, in any subcontracts concluded between the Supplier and its Subcontractors;

(iii) to the extent legally possible, deliver to the Purchaser all drawings, specifications, and other documents prepared by the Supplier or its Subcontractors as of the date of termination in connection with the System.

41.3.4 If the Contract is terminated under GCC Clauses 41.3.1 or 41.3.2, the Purchaser shall pay to the Supplier all payments specified in GCC Clause 41.1.3, and reasonable compensation for all loss, except for loss of profit, or damage sustained by the Supplier arising out of, in connection with, or in consequence of such termination.

41.3.5 Termination by the Supplier pursuant to this GCC Clause 41.3 is without prejudice to any other rights or remedies of the Supplier that may be exercised in lieu of or in addition to rights conferred by GCC Clause 41.3.

41.4 In this GCC Clause 41, the expression "portion of the System executed" shall include all work executed, Services provided, and all Information Technologies, or other Goods acquired (or subject to a legally binding obligation to purchase) by the Supplier and used or intended to be used for the purpose of the System, up to and including the date of termination.

41.5 In this GCC Clause 41, in calculating any monies due from the Purchaser to the Supplier, account shall be taken of any sum previously paid by the Purchaser to the Supplier under the Contract, including any advance payment paid **pursuant to the SCC.**

42. Assignment

42.l Neither the Purchaser nor the Supplier shall, without the express prior written consent of the other, assign to any third party the Contract or any part thereof, or any right, benefit, obligation, or interest therein or thereunder, except that the Supplier shall be entitled to assign either absolutely or by way of charge any monies due and payable to it or that may become due and payable to it under the Contract.

SECTION V. SPECIAL CONDITIONS OF CONTRACT (SCC)

Table of Clauses

Special Conditions of Contract

The following Special Conditions of Contract (SCC) shall supplement or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions of the SCC shall prevail over those in the General Conditions of Contract. For the purposes of clarity, any referenced GCC clause numbers are indicated in the left column of the SCC.

A. CONTRACT AND INTERPRETATION

1. Definitions (GCC Clause 1)

GCC 1.1 (a) (ix)	The applicable edition of the Procurement Guidelines is dated: October 2011.
GCC 1.1 (b) (i)	The Purchaser is: Chandigarh Transport Undertaking (CTU) or any other agency of Chandigarh Administration entrusted with the running of City Bus Operation in and around the City.
GCC 1.1 (b) (ii)	The Project Manager is: Mr. Amit Talwar , Director Transport cum Divisional Manager, Chandigarh Transport Undertaking(CTU)
GCC 1.1 (e) (i)	The Purchaser's Country is: India
GCC 1.1 (e) (iii)	The Project Site(s) are: **Head Office:** 1. Chandigarh Transport Undertaking (CTU) Plot No.701, Industrial Phase-1, Chandigarh-160002, India Telephone: 0172-2679002 **Depots:** 2 Depot-1, Industrial Area, Phase-1, Chandigarh 3. Depot-2, Industrial Area, Phase-1, Chandigarh 4. Depot-3, Sec-25, Chandigarh 5. Depot-4, Sec-43, Chandigarh **Terminals:** 6. ISBT-17, Sec-17, Chandigarh 7. ISBT-43, Sec-43, Chandigarh **Bus Stops:** 8. As specified in Section VI-Technical Requirements-Annexure B.10-Bus Stops Details. Any other as specified by the Project Manager, Chandigarh Transport Undertaking (CTU).

GCC 1.1 (e) (x)	The Contract shall come into force on the date of signing Agreement and shall continue to be in force until the Information System (ITS System) and all the allied Services have been provided till the end of the maintenance period of 60 Months after operational acceptance unless the Contract is terminated earlier in accordance with the terms set out in the Contract.
GCC 1.1. (e) (xii)	The Post-Warranty Services Period is 3 Months.

2. Contract Documents (GCC Clause 2)

GCC 2	There are no Special Conditions of Contract applicable to GCC Clause 2.

3. Interpretation (GCC Clause 3)

GCC 3.1.1	The Contract's governing language is English.

4. Notices (GCC Clause 4)

GCC 4.3	Address of the Project Manager: Director Transport cum Divisional Manager, Chandigarh Transport Undertaking (CTU) Plot No.701, Industrial Phase-1, Chandigarh-160002, India Telephone: 0172-2679002 Email address: directorctuchd@gmail.com Website: http://www.chdctu.gov.in

5. Governing Law (GCC Clause 5)

GCC 5.1	The Contract shall be interpreted in accordance with the laws of: Union Of India

6. Settlement of Disputes (GCC Clause 6)

GCC 6.1.4	The Appointing Authority for the Adjudicator shall be Advisor to Administrator, UT Chandigarh Administration.
GCC 6.2.3	*If the Supplier is a Foreign company :* Any dispute between the Purchaser and a Supplier arising in connection with the present

	Contract shall be referred to arbitration in accordance with the UNCITRAL arbitration rules. *If the Supplier is a Indian company :* Any dispute between the Purchaser and a Supplier arising in connection with the present Contract shall be referred to arbitration in accordance with the laws of the Purchaser's country. A single arbitrator will be responsible for the arbitration process. The arbitration will occur in Chandigarh.

B. SUBJECT MATTER OF CONTRACT

7. Scope of the System (GCC Clause 7)

GCC 7.3	The Supplier's obligations under the Contract will include the recurrent cost items, as identified in the Recurrent Cost table-2.6 which mainly pertains to Comprehensive Maintenance Contract.

8. Time for Commencement and Operational Acceptance (GCC Clause 8)

GCC 8.1	The Supplier shall commence work on the System within: 15 (Fifteen) days from the Effective Date of the Contract i.e. date of signing of contract.
GCC 8.2	Operational Acceptance will occur on or before the expiry of 11 (Eleven) months period from the start of the project.

9. Supplier's Responsibilities (GCC Clause 9)

GCC 9.9	None

10. Purchaser's Responsibilities (GCC Clause 10)

GCC 10.12	None

C. PAYMENT

11. Contract Price (GCC Clause 11)

GCC 11.2 (b)	None

12. Terms of Payment (GCC Clause 12)

GCC 12.1	Subject to the provisions of GCC Clause 12 (Terms of Payment), the Purchaser shall pay the Contract Price to the Supplier according to the categories and in the manner specified below. Only the categories Advance Payment and Complete System Integration relate to the entire Contract Price. In other payment categories, the term "total Contract Price" means the total cost of goods or services under the specific payment category. Within each such category, the Contract Implementation Schedule may trigger pro-rata payments for the portion of the total Contract Price for the category corresponding to the goods or services actually Delivered, Installed, or Operationally Accepted, at unit prices and in the currencies specified in the Price Schedules of the Contract Agreement. (a) Advance Payment 10% (ten percent) of the Supply & Installation cost (as mentioned in Sl. No. A of Bid Sheet), exclusive of all Recurrent cost (as mentioned in Sl. No. B of Bid Sheet), shall be paid against receipt of a claim accompanied by the Advance Payment Security specified in GCC Clause 13.2. (b) Information Technologies, Materials, and other Goods, including application software, custom software and custom materials: 25% (twenty five) of the Supply & Installation Cost against delivery on actual unit price quoted. (c) Successful Installation, Testing & Commissioning 30% (thirty) of the Supply & Installation Cost against successful Installation, Testing & Commissioning. (d) Training 5% (five) of the Supply & Installation Cost against training. (e) Complete Operational Acceptance

	30% (thirty) of the Supply & Installation Cost, exclusive of all Recurrent Costs, as final payment against Operational Acceptance of the System as an integrated whole. (f) Recurrent Costs 100% (one hundred) of the price of the services actually delivered will be paid quarterly, on submission and Purchaser's approval of invoices.
GCC 12.3	The Purchaser shall pay to the Supplier interest on the delayed payments at a rate of: 0 % (zero) per annum.
GCC 12.4	For Goods and Services supplied locally, the Purchaser will pay the Supplier in INR.
GCC 12.5	Not Applicable

13. Securities (GCC Clause 13)

GCC 13.2.1	The Supplier shall provide within 21 (twenty one) days of the notification of Contract award an Advance Payment Security equivalent to the amount and currency of the Advance Payment specified in SCC for GCC Clause 12.1 (a) above.
GCC 13.2.2	Not Applicable
GCC 13.3.1	The Performance Security shall be denominated in INR for an amount equal to 10% (ten) of the entire Contract Price for entire Contract Period (additional 3 (three) month period from the date of expiry of contract).
GCC 13.3.4	After the Operational Acceptance of the System, the Performance Security shall be reduced to 10% (ten) of the aggregate recurrent cost which shall be released subject to successful completion of comprehensive maintenance period.

14. Taxes and Duties (GCC Clause 14)

GCC 14	There are no Special Conditions of Contract applicable to GCC Clause 14.

D. INTELLECTUAL PROPERTY

15. Copyright (GCC Clause 15)

GCC 15.3	The Purchaser may assign, license, or otherwise voluntarily transfer its contractual rights to use the Standard Software or elements of the Standard Software, without the Supplier's prior written consent, under any circumstances.
GCC 15.4	The Purchaser's and Supplier's rights and obligations with respect to Custom Software or elements of the Custom Software as well as Custom Material or elements of the Custom Material are as follows: i. The Supplier shall hand over the source code for software, database, and executables to the purchaser which shall correspond 100% (One hundred) to the operational module(s) and shall be verified and certified by an independent agency as identified by the Purchaser (if required). This is limited to all custom software and its subsystems but not limited to (AVL, AFCS, PIS, Scheduling & Roster, TMS (including ERP/MIS, NMS etc.), etc.) of the bidder. ii. The Purchaser may duplicate and use the software on different equipment, such as for back-ups, additional computers, replacements, upgraded units, etc. iii. Bespoke development/ Customization/Application Software: Subject to the provisions for 'pre-existing work', the IPR for any development or customization done during the implementation of the project will lie with Purchaser who shall be entitled to a license with non-discriminatory access and rights to modify licensed software and associated source code in the bespoke development for its internal usage and other e-governance projects. iv. Pre-existing work / COTS/ Proprietary Software: All IPR including the source code and materials developed including any enhancement or modification thereto or otherwise obtained independently of the efforts of a party under this Agreement ("pre-existing work") shall remain the sole property of that party. This also includes any commercial off the shelf (COTS) solution and Proprietary software. During the performance of the services for this agreement, each party grants to the other party (and their sub-contractors as necessary) a non-exclusive license to use, reproduce and modify any of its pre-existing work provided to the other party solely for the performance of such services for duration of the Term of this Agreement and after complete handover also. Except as may

	be otherwise explicitly agreed to in a statement of services, the 'System integrator' should grant Purchaser a non-exclusive, perpetual (beyond the period of this project including O&M period), fully paid-up license etc. to use the pre-existing work in the form delivered to Purchaser as part of the service or deliverables only for its internal business operations. Under such license, either of parties will have no right to sell the pre-existing work of the other party to a Third Party. Perpetual license applies solely to the pre-existing work that bidder leaves with Purchaser at the conclusion of performance of the services. After the completion of the term, the purchaser reserves the right to transfer the license to use pre-existing software to any outsourced party engaged solely for continuity of operations of the purchaser.
GCC 15.5	No software escrow contract is required for the execution of the Contract

16. Software License Agreements (GCC Clause 16)

GCC 16.1 (a) (iii)	The Standard Software license shall be valid throughout the territory of the Purchaser's Country i.e. India.
GCC 16.1 (a) (iv)	None
GCC 16.1 (b) (ii)	The Software license shall permit the Software to be used or copied for use or transferred to a replacement computer, provided the replacement computer falls within approximately the same or a higher class of machine and maintains approximately the same number of users, if a multi-user machine.
GCC 16.1 (b) (vi)	The Software license shall permit the Software to be disclosed to and reproduced for use (including a valid sublicense) by, support service Suppliers or their subcontractors, exclusively for such Suppliers or subcontractors in the performance of their support service contracts, subject to the same restrictions set forth in this Contract.
GCC 16.1 (b) (vii)	In addition to the persons specified in GCC Clause 16.1 (b) (vi), the Software may be disclosed to, and reproduced for use by, Purchaser or its SPV entities or any other party which would take over any project in the future subject to the same restrictions as are set forth in this Contract.
GCC 16.2	There are no Special Conditions of Contract applicable to GCC Clause 16.2

17. Confidential Information (GCC Clause 17)

GCC 17.1	There are no modifications to the confidentiality terms expressed in GCC Clause 17.1 subject to SCC as mentioned above against GCC 16.1 (b).
GCC 17.7	The provisions of this GCC Clause 17 shall survive the termination, for whatever reason, of the Contract for period specified in GCC.

E. SUPPLY, INSTALLATION, TESTING, COMMISSIONING, AND ACCEPTANCE OF THE SYSTEM

18. Representatives (GCC Clause 18)

GCC 18.1	No additional powers or limitations
GCC 18.2.2	No additional powers or limitations

19. Project Plan (GCC Clause 19)

GCC 19.1	Chapters in the Project Plan shall address the following subject**:** (a) Project Organization and Management Plan; (b) Delivery and Installation Plan (c) Training Plan (d) Pre-commissioning and Operational Acceptance Testing Plan (e) Task, Time, and Resource Schedules (f) any other information . Further details regarding the required contents of each of the above chapters are contained in the Section VI- Technical Requirements – Chapter 12: Implementation Plan.
GCC 19.2	Within Thirty (30) days from the Effective Date of the Contract, the Supplier shall present a Project Plan to the Purchaser. The Purchaser shall, within 15 (fifteen) days of receipt of the Project Plan, notify the Supplier of any respects in which it considers that the Project Plan does not adequately ensure that the proposed program of work, proposed methods, and/or proposed Information Technologies will satisfy the Technical Requirements and/or the SCC (in this Clause 19.2 called "non-conformities" below). The Supplier shall, within 5 (five) days of receipt of such notification, correct the Project Plan and resubmit to the Purchaser. The Purchaser shall, within 5 (five) days of

	resubmission of the Project Plan, notify the Supplier of any remaining non-conformities. This procedure shall be repeated as necessary until the Project Plan is free from non-conformities. When the Project Plan is free from non-conformities, the Purchaser shall provide confirmation in writing to the Supplier. This approved Project Plan ("the Agreed and Finalized Project Plan") shall be contractually binding on the Purchaser and the Supplier.
GCC 19.5	None except as mentioned in the Technical Requirement Section *or* Any other report as required by the Purchaser which is related to the present procurement.

20. Subcontracting (GCC Clause 20)

GCC 20	There are no Special Conditions of Contract applicable to GCC Clause 20.

21. Design and Engineering (GCC Clause 21)

GCC 21.2	The Contract shall be executed in accordance with the current edition or the revised version of all referenced codes and standards as on date as specified in the GCC.
GCC 21.3.1	None except as mentioned in the Technical Requirement Section *or* Any other report as required by the Purchaser which is related to the present procurement.

22. Procurement, Delivery, and Transport (GCC Clause 22)

GCC 22.4.3	The Supplier shall be free to use transportation through carriers registered in any eligible country and shall obtain insurance from any eligible country.
GCC 22.5	The Supplier shall provide the Purchaser with shipping and other documents as specified in the GCC.

23. Product Upgrades (GCC Clause 23)

GCC 23.4	The Supplier shall provide the Purchaser: with all new versions, releases,

	and updates for all Software used in the system during the Maintenance Period at no additional cost to the Purchaser.

24. Implementation, Installation, and Other Services (GCC Clause 24)

GCC 24	There are no Special Conditions of Contract applicable to GCC Clause 24.

25. Inspections and Tests (GCC Clause 25)

GCC 25	Purchaser may wish to consider employing qualified inspectors to inspect, test and certify the Information Technologies, Materials, and other Goods prior to shipment. **Information of Inspection:** The Supplier shall intimate the purchaser at least one week prior to the inspection for the items agreed for prior inspection between the supplier and purchaser before dispatch as per the details mentioned below • Product to be inspected (List of items ready for inspection) • Inspection site (Full address and contact nos) • Manufacturer's detail (along with requisite certifications) The Purchaser will send the above mentioned details to his authorized Inspector for his review and fix up schedule for inspection. The schedule of visit of inspector and tentative duration of inspection period shall be informed to supplier atleast 48 hours in advance and it shall be obligatory on part of supplier to keep the product ready for inspection at the schedule date/ time intimated to him. In case of any change in schedule from purchaser side, the same shall be intimated to supplier as early as possible. In case the product is not ready or supplier wants change in schedule he will intimate to the purchaser within 48 hours of such intimation or atleast 48 hours before the scheduled date/ time, whichever is earlier. **Mandatory requirements at Inspections:** The supplier shall arrange all the necessary requirements at the inspection site in order to carry out the inspection. The presence of Supplier or his representative shall be mandatory throughout the period of inspection. The details of inspection must be recorder in writing and the inspection report must be signed by both Inspector and Supplier's representative. The process of inspection may be got video graphed

	by purchaser at his cost. Inspector may conduct test on 100% items or sample test as agreed between the purchaser and supplier for the respective items and supplier shall provide all the necessary assistance in conduct of such inspection or functional test of material. They support services as to sorting, opening and packing of material shall be arranged by the supplier on site. **Failure to inspect or re-inspection:** If due to any reason attributable to supplier the inspection fails to happen on the prescribed schedule the re-inspection shall be done at the expense of supplier and delay in dispatch on this account shall not be a reason for exemption from Liquidated damages.

26. Installation of the System (GCC Clause 26)

GCC 26	There are no Special Conditions of Contract applicable to GCC Clause 26.

27. Commissioning and Operational Acceptance (GCC Clause 27)

GCC 27.2.1	Operational Acceptance Testing shall be conducted in accordance with System, Sub-systems, tests, test procedures, and the required results for acceptance as specified in the Section VI- Technical Requirements – Chapter12.3 –Test Plan.
GCC 27.2.2	If the Operational Acceptance Test of the System, or Subsystem(s), cannot be successfully completed within 90(ninety***)*** days from the date of Installation or any other period agreed upon by the Purchaser and the Supplier, then GCC Clause 27.3.5 (a) or (b) shall apply, as the circumstances may dictate.

F. GUARANTEES AND LIABILITIES

28. Operational Acceptance Time Guarantee (GCC Clause 28)

GCC 28.2	Liquidated damages shall be assessed at 0.1(zero point one) percent per day of system supply and installation cost. The maximum liquidated damages are 10(ten) percent of the entire Contract Price, or relevant part of the Contract Price if the liquidated damages apply to a Subsystem.

GCC 28.3	Liquidated damages shall also be applicable to the Mile Stones as defined in the Section VI – Chapter 12- Implementation Plan.

29. Defect Liability (GCC Clause 29)

GCC 29.1	There are no Special Conditions of Contract applicable to GCC Clause 29.1.
GCC 29.3 (iii)	No specific minimum time requirements are established for this Contract other than that the Information Technologies must have been previously released to the market and all Standard Software must have been commercially available in the market for at least three months.
GCC 29.4	Subsumed in the Comprehensive Annual Maintenance Contract Part of the project.
GCC 29.10	To be guided by provision of Section VI- Technical Requirements – Chapter 14: Service Level Agreement and Penalty matrix.

30. Functional Guarantees (GCC Clause 30)

GCC 30	There are no Special Conditions of Contract applicable to GCC Clause 30.

31. Intellectual Property Rights Warranty (GCC Clause 31)

GCC 31	There are no Special Conditions of Contract applicable to GCC Clause 31.

32. Intellectual Property Rights Indemnity (GCC Clause 32)

GCC 32	There are no Special Conditions of Contract applicable to GCC Clause 32.

33. Limitation of Liability (GCC Clause 33)

GCC 33	There are no Special Conditions of Contract applicable to GCC Clause 33.

G. RISK DISTRIBUTION

34. Transfer of Ownership (GCC Clause 34)

GCC 34	There are no Special Conditions of Contract applicable to GCC Clause 34.

35. Care of the System (GCC Clause 35)

GCC 35	There are no Special Conditions of Contract applicable to GCC Clause 35.

36. Loss of or Damage to Property; Accident or Injury to Workers; Indemnification (GCC Clause 36)

GCC 36	There are no Special Conditions of Contract applicable to GCC Clause 36.

37. Insurances (GCC Clause 37)

GCC 37.1 (c)	The Supplier shall obtain Third-Party Liability Insurance of the amount of INR 10(Ten) Million covering the entire contract period. It will cover personnel of Purchaser and its subcontractor, supplier or any other personnel using or coming in contact with the equipment provided by the supplier.
GCC 37.1 (e)	There are no Special Conditions of Contract applicable to GCC 37.1 (e) except as mandated by statutory requirement of India.

38. Force Majeure (GCC Clause 38)

GCC 38	There are no Special Conditions of Contract applicable to GCC Clause 38.

H. CHANGE IN CONTRACT ELEMENTS

39. Changes to the System (GCC Clause 39)

GCC 39	Value Engineering Not Applicable

40. Extension of Time for Achieving Operational Acceptance (GCC Clause 40)

GCC 40	There are no Special Conditions of Contract applicable to GCC Clause 40.

41. Termination (GCC Clause 41)

GCC 41	There are no Special Conditions of Contract applicable to GCC Clause 41 except that the notice period of minimum 14 days shall be given by either party under normal condition which can be reduced to 3 working days in emergent situations.

42. Assignment (GCC Clause 42)

GCC 42	There are no Special Conditions of Contract applicable to GCC Clause 42.

SECTION VI. TECHNICAL REQUIREMENTS (INCLUDING IMPLEMENTATION SCHEDULE)

TABLE OF CONTENT

1 INTRODUCTION

1.1 Glossary

Short Name	Complete Name
ANPR	Automatic Number Plate Recognition
AP	Accounts Payable
AR	Accounts Receivable
ASRTU	Association of State Road Transport Undertakings
AVL	Automatic Vehicle Location
BDC	Bus Driver Console
BI	Business Intelligence
CCTV	Close Circuit Television
CSP	Customer Service Point
CTU	Chandigarh Transport Undertaking
DB	Database
DMS	Depot Management System
DPR	Detail Project Report
ESCBS	Efficient and Sustainable City Bus Services
ETM	Electronic Ticketing Machine
ERP	Enterprise Resource Planning
AFCS	Automatic Fare Collection System
GEF	Global Environment Facility
GPS	Global Positioning System
GRMS	Grievance Redressal Management System
HR	Human Resource
IMS	Inventory Management System
ISBT	Inter State Bus Terminal
ITS	Intelligent Transportation System
IVRS	Interactive Voice Response System
KM	Kilometre(s)
KMPL	Kilometres per litre
LED	Light Emitting Diode
MIS	Management Information System
NFC	Nearby Field Communication
NIC	National Informatics Centre
NMS	Network Management System
OBITS	On-Board Intelligent Transportation System
OS	Operating System
PC	Personal Computer

Short Name	Complete Name
PIS	Passenger Information System
PIU	Project Implementation Unit
PMC	Project Management Consultant
POS	Point of Sale
RFID	Radio Frequency Identification
SAM	Secure Access Module
SC	Smart Card
SCU	Single Control Unit
SI	System Integrator
SLA	Service Level Agreement
TMC	Transit Management Centre
TMS	Transit Management System
WMS	Workshop Management System

Table 1: Glossary

1.2 Stakeholders

This document should be read by all stakeholders who has direct role in the design, implementation, operation, and/or support of the proposed system, or otherwise expected to be impacted by the system during its lifespan. This includes:

- CTU Management
- Chandigarh Administration (CA) staff involved in CTU Management & Operations
- CTU Technical Staff who will oversee the implementation
- CTU - System maintainers and administrators
- System Integrator Implementing the System
- Organizational planning units (e.g. Labour Relations, Human Resources, and Operations Training)
- World Bank
- Ministry of Housing & Urban Affairs (MoHUA)
- Project Management Consultant (PMC)
- Other stakeholders involved in the project.

1.3 Structure of this document

This document has 15 chapters that are organized to explain the current scenario of CTU operations, need for implementation of proposed Intelligent Transportation System for CTU bus operations. Details of the sections are mentioned below:

- Section 2: Scope of the system and services to be provided
- Section 3: General Requirement
- Section 4: Automatic Fare Collection System (AFCS)

- Section 5: Automatic Vehicle Location (AVL)
- Section 6: Passenger Information System (PIS)
- Section 7: Transit Management Centre (TMC)
- Section 8: Scheduling & Roster
- Section 9: Transit Management System (TMS)
- Section 10: Communication
- Section 11: Maintenance
- Section 12: Implementation Plan
- Section 13: Procurement Plan & Project Financials
- Section 14: Service Level Agreement
- Section 15: Risk Management Process

These sections are complemented with two Annexure:

- Annex A: Technical specifications, referred to the equipment to be provided
- Annex B: CTU data summary

1.4 Purpose of Document

The purpose of this document is to firm up the Chandigarh City Bus Services which includes, but not limited to:

- Requirement of technological parameters
- Solution Description
- Technical Specification
- Implementation & Maintenance Plan
- Project Financials
- Test Plans
- Training and knowledge transfer requirements
- Service Level Agreement
- Risk Management

1.5 Project background

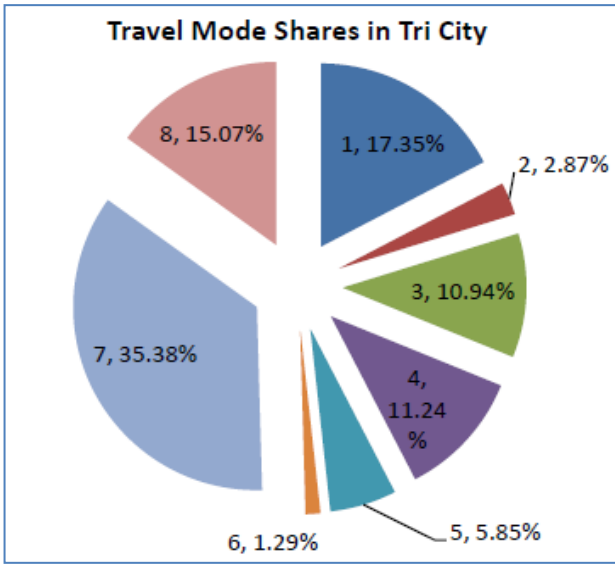
Chandigarh is one of the four cities in India selected for implementing demonstration projects based on a competitive process followed by the World Bank.

1.5.1 Demographics, demand, current Public Transport system and future developments

The following images show some basic figures concerning the population of the Tri-City Area and the travel mode shares.

CITY	POPULATION (2011)	GENDER RATIO[1]	LITERACY RATE (%)	AVERAGE INCOME
Chandigarh	10.55 Lakh	817	86.05 (Female: 64.8)	-
Mohali	1.7 Lakh	911	93.22 (Female: 91.1)	-
Panchkula	2.1 Lakh	883	87.86 (Female: 84.0)	-
Tri city	14.25 Lakh	-	-	Rs. 22,857/month
National Average	-	*940*	*74.04 (Female: 65.5)*	*Around Rs. 5,500/month*

Figure 1: Demographic Characteristics of Study Area



MODE	AVERAGE TRIP LENGTH (KM)
Walk	1.09
Cycle Rickshaw	2.07
Bicycle	3.68
Bus	11.49
Shared Auto	5.85
Auto	4.17
Two Wheeler	6.89
Car	9.06

Figure 2: Mode Shares & Average Trip Lengths for Different Modes in Tri-City Area (2009)

The public transport system in the Tri-City Area includes the CTU city bus service. Shared Auto and Auto are also present which serve as intermediate public transport system.

In 2009 there were 11.2 % of trips by bus mode in the tri city area. However, at present there might an increase of ridership since 100 more new buses have been bought for city bus service after 2010. Most of the travellers with trip lengths more than 10 Km are using bus as their travel mode, and mostly for work & education purpose. The private motorized trips comprise about 50% of total trips from where the shift to public transport should be aimed primarily. There are 30% of trips by non-motorized modes which is a good sign, and bus is also having the scope to get the passenger shift from the motorized trips with improved and modernized services.

1.6 About CTU

Chandigarh Transport Undertaking (CTU) was established in the year 1966 with a fleet of around 30 buses. It now provides bus services to the public covering the city, suburbs and the neighbouring states. CTU is also a member of Association for State Road Transport Undertaking (ASRTU).

Chandigarh Transport Undertaking is responsible for running both city and long distance buses in the city of Chandigarh. CTU runs few city services to neighbouring cities of Mohali and Panchkula. For the financial year FY 2015-2016, CTU operated around 392 buses. CTU has recently formed a Special Purpose Vehicle (SPV-CCBSS) and appointed PMC for implementation of Intelligent Transport System (ITS). These would be completely used for the city bus services.

The organizational structure of CTU is given below:

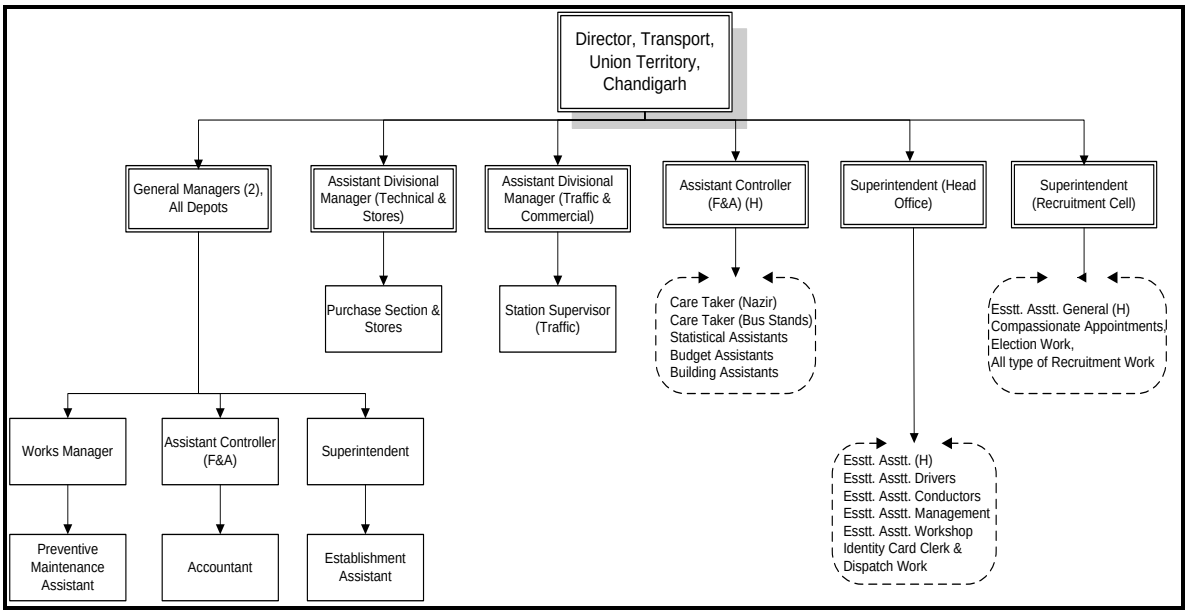


Figure 3: Existing Organizational Structure of CTU

Formation of Special Purpose Vehicle (SPV) for City Bus Operations

As required by JnNURM norms, CTU has started a separate SPV for running the city operations. The SPV, Chandigarh City Bus Services Society (CCBSS), is running the city operations and going forward.

The following thinking process was behind the structure proposed below:

- Start the process with the functional needs of any bus agency.
- Identify the unique departmental responsibilities.
- Make a clean break from job titles of CTU, so that the SPV has a special feel in terms of expectations.
- The Managing Director/General Manager of the SPV will directly report to the Director, Transport. Hence, creating a clear understanding of the importance of the role. Managing Director/General Manager for long distance services from CTU also will be directly reporting to Director, Transport.

The proposed organizational structure in the DPR for the SPV is given below:

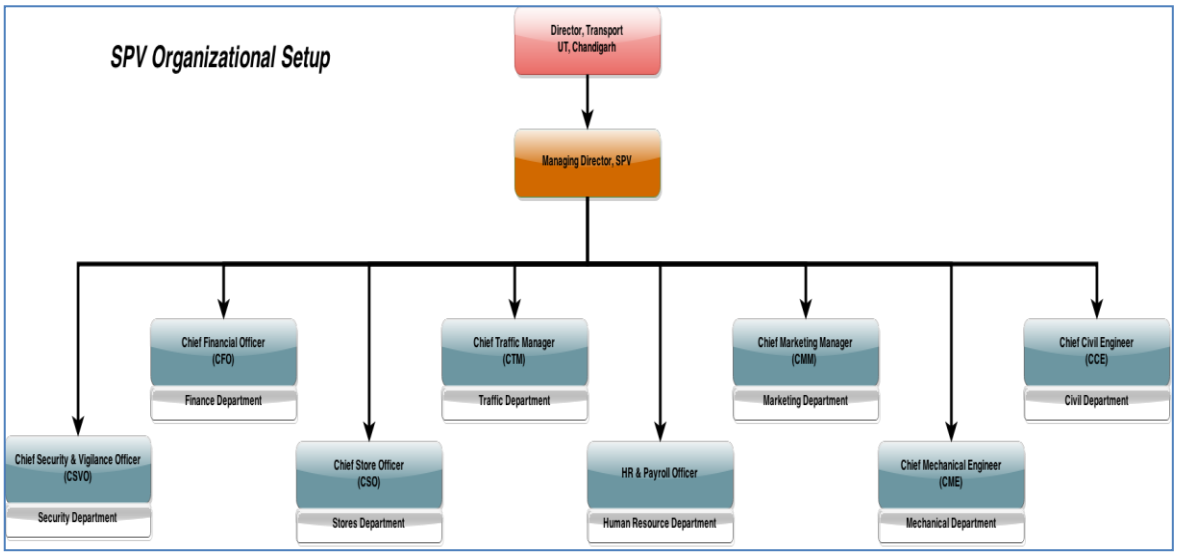


Figure 4: Proposed SPV Organization

1.6.1 Bus Details

CTU has a total fleet of about 558 buses which include both long distance regional buses, city buses and suburban buses. Out of the 558 buses, 392 buses were running as city bus service which serves the Tri-City Area.

There are 60 suburban buses to the nearby areas like Ropar, Kurali, etc. The fleet includes standard size buses, semi low floor non-A/C buses, A/C Buses, Low Floor A/C buses, Low floor non-A/C Buses, and mini A/C buses. 140 Buses are running on long routes.

Bus operational statistics from various depots are as under:

Sr. No.	Depot	Make	Model/Type	Nos.	Total
1	I	ASHOK LEYLAND	HVAC	20	**140**
		ASHOK LEYLAND	Ordinary	35	
		TATA	Normal	85	
2	II	SML	AC	80	**170**
		SML	Non-AC	90	
3	III	CORONA	HVAC	39	**122**
		ASHOK LEYLAND	AC	34	
		TATA	Non-AC	49	
4	IV	TATA	HVAC	40	**100**
		TATA	Non-AC	60	

Table 2: Bus Operation Statistics

1.6.2 Bus Depots & ISBT's

CTU has four depots from where it is operating all the buses including long route, suburban routes and city bus routes. Three depots (Depots 2, 3, 4) are only operating the city bus routes and suburban routes, while other one depot (Depots 1) operates long distance routes.

The following three depots and two ISBT's are part of the project:

- Depot – II, Industrial Area Phase-I
- Depot – III, Sector 25
- Depot – IV, Sector 43
- ISBT Sector-43
- ISBT Sector-17

Proposed Bus Depot

One new depot has been proposed by CTU to be developed in an area of 6.5 acres with the capacity to handle around 125 buses at Raipur Kalan in Chandigarh to cater to the sanctioned JnNURM buses in the future.

1.6.3 Current ITS Infrastructure in CTU

Regarding the current on board equipment in the bus fleet, there are 379 Buses acquired under the JnNURM mission, out of which only 258 buses are equipped with ITS technology –OBITS- (GPS devices, CCTV cameras, bus driver console unit and variable messages signs boards), however the current fleet for city buses are 392.

According to the DPR document, CTU has also introduced some computerized depot management system modules with the help of National Informatics Centre (NIC):

Bus and Crew Scheduling

- It's a combination of manual and computerized process that provides bus & crew roster for the next day.
- An automated SMS goes to the crew members for their next day duty information.

Waybill Management

- All the routes information, crew information and bus information are fed into the system. Then the information noted in the way bill by the conductor during the route operations is entered into the system by attaching the same information with existing information at the end of the shift. The reports module has options to filter and generate reports based on dates and depots.
- ETM has been introduced in Depot-2 and Depot-4, and ticket are issued based on origin and destination, and the ETM data is transferred to existing waybill management system at the end of shift for generation of shift earnings.
- Depot-3 is currently using manual ticketing process. The current fare scheme is based on distance travelled: passengers inform to conductor the destination and the conductor issue the ticket.
- The existing application provides only origin-destination points, it is also limited in providing any level of analysis to optimize/improve planning of city services.

Attendance Leave Information

- The attendance leave information application developed by NIC is being used to capture the leave information of the staff of CTU. The attendance of all the staff is entered manually into the application for all the staff of CTU.
- Its features are limited and are currently not linked with Payroll for automatic generation of salaries.

Store Inventory Management

- Store Inventory Management is deployed by NIC is being and has been utilized for managing stores at each depot with job cards tracking.
- Currently, this software is partially used, no manuals were available for the application and gaps were found in MIS reporting and a few other features that have not been addressed. This software shall be replaced for easy integration with other subsystems of future TMS.
- There is no centralized system to update all the information in one place and in a single shot.

Mobile App

- "Chandigarh Bus Guide Mobile" Android Application is provided by a Private Agency called "86Business Street" in Chandigarh.
- The route information along with fixed maps (raster images) is provided for different routes in the website.

To get additional information regarding CTU. Please refer to Annex B.

2 SCOPE OF THE SYSTEMS AND SERVICES TO BE PROVIDED

2.1 Objectives and ITS systems to be deployed

The objectives of ITS implementation on Chandigarh City Bus service for city bus services are mentioned below:

A) For CTU Passengers

- Provision for information dissemination to bus users for improving the usage of public transportation.
- Improving the reliability of bus service.
- Providing bus arrival information to improve efficiency of accessing the bus network.
- Simplifying the ticketing process for passengers and creating telescopic fares (on transfers) through Electronic Ticketing Machine (ETM) and smart card ticketing system.

B) For CTU Central Administration

- Providing real-time bus location information for enhancing operations.
- Providing passenger information systems to increase ridership.
- Introduction of electronic ticketing system to reduce leakages.
- Introduction of smart card based ticketing system to enhance customer experience with the bus system.
- Implementation of integrated system for efficient decision making.
- Need for data management and analysis.

C) For Depot Activities

- Automated data flow of revenue from bus fares.
- Provision for efficient process for scheduling of trips, buses and crew.
- Efficiency in monitoring of operations as per schedules.
- Provision for real-time guidance to crew when required.
- Provision for reducing revenue leakage and improving efficiency in traffic inspections.
- Provision for data management and analysis at depot level.
- Automating the maintenance and other depot activities.
- Provision for capacity building and training using technology for bus operations.
- Increasing the productivity of staff by improving efficiency in activities performed.

Consequently, the systems to be deployed are the following:

- Automatic Fare Collection System
- Automatic Vehicle Location System
- Passenger Information System
- Transit Management Centre
- Scheduling and Roster software

- Transit Management Systems

The following section describes the global architecture of these systems.

2.2 Systems Architecture

2.2.1 Layer Architecture

The following figure depicts the Layer Architecture of the systems to be deployed.

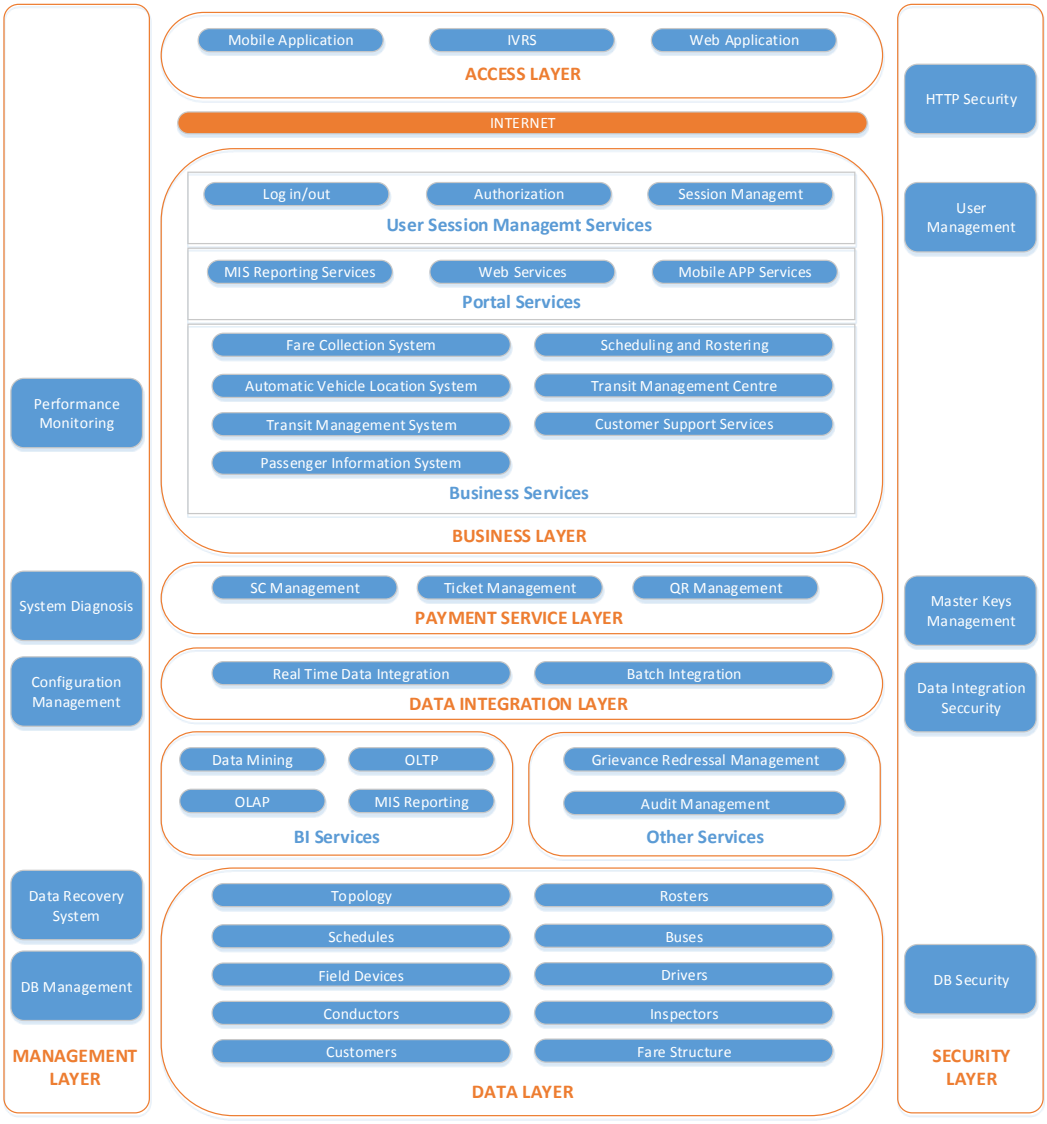


Figure 5: Layer architecture

2.2.2 Global architecture

The following illustration summarizes the global architecture of the systems to be provided.

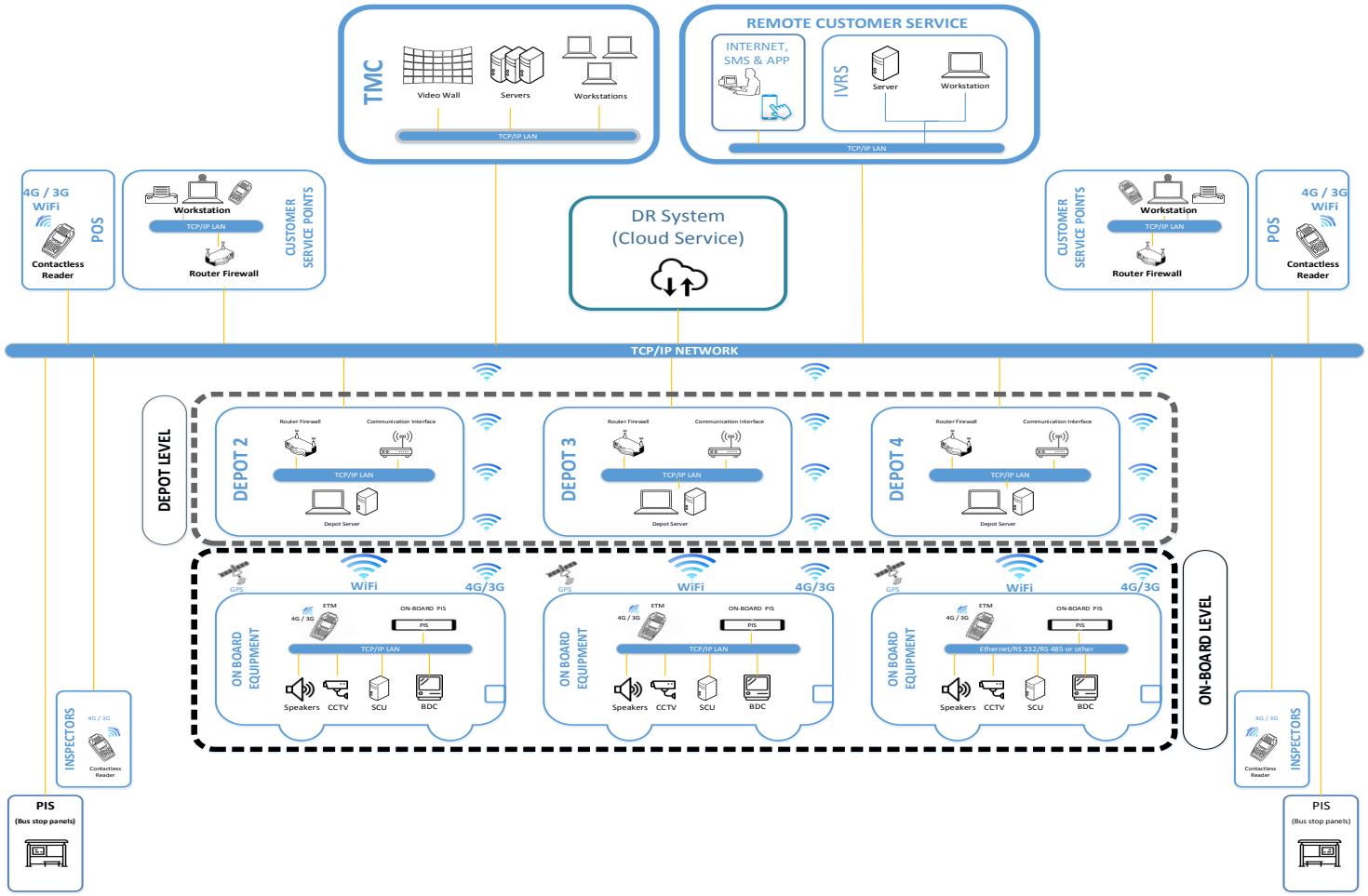


Figure 6: Global Architecture

2.3 Automatic Fare Collection System

The Automatic Fare Collection System (AFCS) is designed to help CTU to meet its operational requirements and to maximize the revenue realization by adopting robust system design approach to minimize the fare leakage. Broad objectives of the AFCS are:

- Customer convenience
- Revenue accountability and realization
- To meet the operational requirements of CTU
- Minimizing revenue leakage
- Audit ability

The commuters using the city bus services shall use smart cards or paper tickets as payment mode for the city bus services. The commuters will be able to buy the tickets after boarding the bus. In case of smart card, the fare will be deducted from commuter smart card after the destination station is entered by bus conductor and the smart card is tapped against ETM.

Smart cards sale/recharge facility is to be provided through various channels for greater convenience of the passengers such as: counters/POS at e-sampark centres, Internet etc.

2.4 Automatic Vehicle Location System

Automatic Vehicle Location system improves the reliability of the bus/transit system, which improves confidence among the commuters and reduces the waiting times for commuters. Information from real-time tracking of buses will be disseminated to commuters through PIS. It also provides information on the common bottlenecks and allows transit agency to work with stakeholders to improve these bottlenecks and improve transit travel times.

2.5 Passenger Information System

The primary purpose of the PIS is to inform passengers of next bus arrival/departure times as per direction of travel, which includes both static and real time data, also in case of any emergency; the operator sitting in Transit Management Centre can send useful information to CTU bus service users. It will also allow commuters to find an optimal means of travelling between two locations. The different means to broadcast information to commuters are listed below:

- LED display panels at bus stops and terminals
- LED display panels and loud speakers in the buses
- Web Portals
- Interactive Voice Response System (IVRS)
- Mobile Apps.

2.6 Transit Management Centre

Transit Management Centre (TMC) shall collect information from AVL and AFCS generates the information to be broadcasted to commuters through PIS. Transit Management Centre software shall be used for computer-aided dispatching, computer-aided service restoration, and service monitoring. Service monitoring is performed through collection of operational data such as bus positions, ticketing data, passenger data, traffic, bus and driver performances, alarms and calls etc. This information is then analysed using various routines in the software to determine such information as schedule adherence, route adherence, status of bus components, and estimated time of arrivals, service requests, statistical information, and emergencies. Assisted by dispatchers, fleet operation, and maintenance processes are supervised in real-time from a control room, responding to incidents, delays caused by traffic, excess of demand or other reasons, etc.

AFCS information is also processed on a daily basis in order to estimate relevant revenue parameters and enable prompt fraud risk detection.

TMC off-line processes provide statistics and indicators that allow supervision of fleet operations and offer useful planning information.

TMC also facilitates coordination between CTU and other operating entities such as emergency response services:

- Enabling stakeholder coordination and proving common data sharing platform. TMC will offer incident and emergency management capabilities at a centralized location for viewing/identifying incidents and dispatching incident response teams.
- Improves bus schedule adherence and reliability, through the AVL application and delay/advance information sent to drivers.

2.7 Scheduling and Roster Software for Planning

Scheduling: Software shall have the ability to create, edit and update the schedules/trips and allocate buses to the schedules. Optimization of bus schedules shall be provided through a proven scheduling and planning software.

Roster: Software shall have the ability to create, edit and update services/shifts and allocate crew to these services. Crew roster preparation shall be done systematically, based on operational principles and procedures defined by CTU. Optimization of crews shall be provided through proven crew roster software.

2.8 Transit Management System

The following figure shows various sub systems of TMS (described in the following chapters):

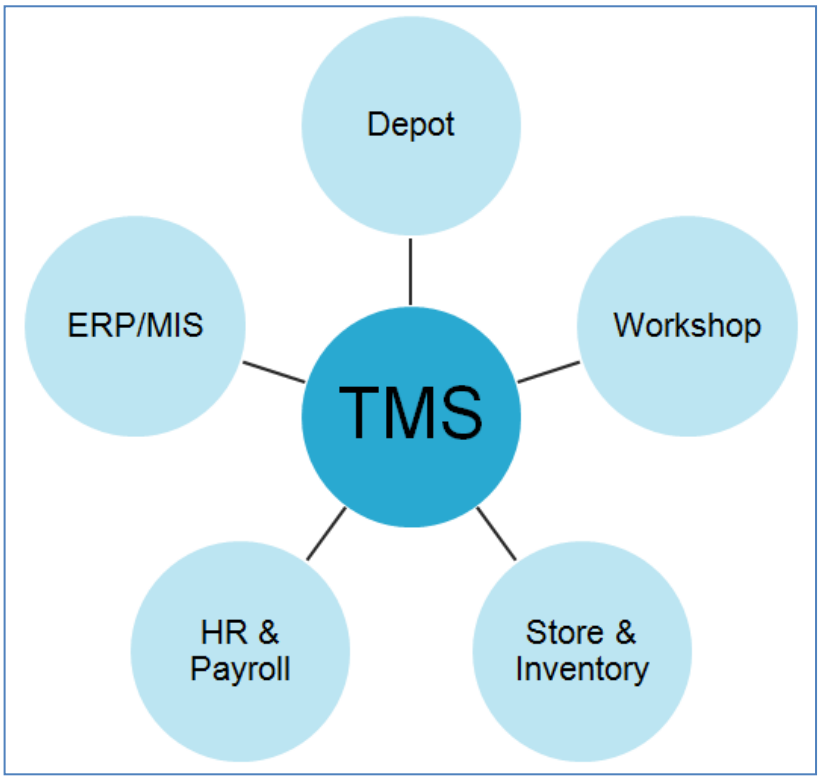


Figure 7: Sub system of TMS

2.8.1 Depot Management System

Depot management system shall support decision makers with data on activities performed along with resource and time requirements. The DMS shall include the following below mentioned functionalities:

- Vehicle Dispatch
- Vehicle Management
- Security System
- Cash-Up and Deposit

2.8.2 Workshop Management System

The WMS software shall be deployed at each workshop. The current/proposed workflow of the workshops shall be captured in the system. This software will be part of a centralized system to manage unique information across the different workshops of CTU. Every single fleet movement shall be captured in the system to track and reduce fleet's non-operational hours and breakdown. WMS shall send alerts through SMS and e-mail to authorized staff.

2.8.3 Stores & Inventory

Stores and Inventory management shall provide inventory position visibility, streamline in-store activity, improve CTU management performance and productivity, reduce labour cost, transport cost, barcode reader to identify product details and enter into system.

2.8.4 HR & Payroll

Human Resource and Payroll Software shall provide comprehensive solution to meet the demands of current CTU business processes and future needs based on the system requirements. The system shall enable the user the choice of sort order, selection of branch, department, position, etc. and other parameters to generate payroll output as per requirement, either on screen or as hard copies.

2.8.5 Accounting

Accounting software shall record and processes transactions within functional modules such as accounts payable, accounts receivable, general ledger and trial balance. It functions as an accounting information system.

2.8.6 Management Information System (MIS) & Enterprise Resource Planning (ERP)

The objective is to provide MIS reports on the various depot, terminal, workshop and bus operations activities:

- Providing holistic, integrated information to the CTU management through detailed MIS reports and user friendly, flexible dash board consisting of tables and graphs.
- Providing ridership and mode share details on a daily, monthly and yearly basis using filters in the dashboard. The information shall also be provided through filters by bus, route, conductor/driver, schedule, origin, destination and various other useful decision making parameters.
- Providing passenger counts and revenue information in real time and/or pre-set intervals based on ETM tickets as stated by the CTU during the design phase.
- Providing route and schedule adherence information with various filters for the decision makers to get an understanding of the ground problems.
- Providing bus maintenance information in terms of preventive and reactive maintenance (breakdowns, etc.).
- Providing critical stores & purchase inventory details for decision support.

2.8.7 Network Management System (NMS)

NMS shall provide fault and performance management of the entire network infrastructure that various services operate in. It provides Network Discovery & Reporting, Fault Analysis, Configuration Management, Advance IP Services Management, Service Management and Integrations with other modules.

2.8.8 Grievance Redressal Management System (GRMS)

GRMS shall consists primarily to undertake such user-centric initiatives in the fields of administration and user grievances in the CTU to enable the administrative machinery to deliver quality city bus services to the user in a hassle-free manner and eliminate the cause of grievance.

3 GENERAL REQUIREMENTS

3.1 Reference Standards

The following standards shall be considered for the systems and services to be provided:

On board equipment

- Urban Bus Specifications II (UBS-II)
- Automotive Industrial Standard 140 (AIS-140)
- LED Destination Board System for Buses -Specification (IS-16490)

Data models

- Shall be based on public and international standards as:
  - GTFS- General Transit Feed Specification Reference
  - Transmodel (Reference Data Model for Public Transport, EN12896 1-3)
  - SIRI (Standard Interface for Real Time Information) EN 15531 1-4
  - Network and Timetable Exchange NeTex (CEN/TS 16614 1-3), including:
    - → NeTEx-Part 1: Public Transport Network Topology exchange format, CEN/TS 16614-1:2014
    - → NeTEx-Part 2: Public Transport Scheduled Timetables exchange format, CEN/TS 16614-2:2014
    - → NeTEx-Part 3: Fare Information exchange format, CEN/TS 16614-3:2014

Payment means

- ISO 14443 Identification cards -- Contactless integrated circuit cards -- Proximity cards, including:
  - ISO/IEC 14443-1:2016 Part 1: Physical characteristics
  - ISO/IEC 14443-2:2016 Part 2: Radio frequency power and signal interface
  - ISO/IEC 14443-3:2016 Part 3: Initialization and anti-collision
  - ISO/IEC 14443-4:2016 Part 4: Transmission protocol
- ISO 7810 Identification cards — Physical characteristics (type ID-1)
- ISO 10373 Identification cards - Test methods
- ISO 18092 (Information technology -- Telecommunications and information exchange between systems -- Near Field Communication -- Interface and Protocol (NFCIP-1))
- ISO 21481 (Information technology -- Telecommunications and information exchange between systems -- Near Field Communication Interface and Protocol -2 (NFCIP-2)
- EMV Integrated Circuit Card Specifications for Payment Systems, Version 4.3, November 2011, including the following and all applicable Specification Bulletins:
  - [EMV 4.3 Book 1] EMV Integrated Circuit Card Specifications for Payment Systems, Book 1, Application Independent ICC to Terminal Interface Requirements
  - [EMV 4.3 Book 2] EMV Integrated Circuit Card Specifications for Payment Systems, Book 2, Security and Key Management
  - [EMV 4.3 Book 3] EMV Integrated Circuit Card Specifications for Payment Systems, Book 3, Application Specification
  - [EMV 4.3 Book 4] EMV Integrated Circuit Card Specifications for Payment Systems, Book 4, Cardholder, Attendant, and Acquirer Interface Requirements

3.2 Responsibilities of the parties

3.2.1 CTU

CTU will set up a Project Implementation Unit (PIU) with his internal staff or external member for the monitoring of the project implementation. Key activities of this PIU shall include:

- Supplying information on Standard Operating Procedures (SOPs) for all processes and freeze the requirements with SI during design phase.
- Approvals at various stages and release of funds based on the project progress.
- Providing and arranging the permissions for SI for implementation of the work.
- Providing power supply connections at bus stops where information boards are to be installed by SI.
- Providing required assistance in data gathering and other key requirements during the implementation phase of the project.
- Facilitate meetings between various stakeholders during the project execution phase.
- Facilitating workshops for knowledge transfer from the SI to the CTU staff on the use of the ITS equipment and software.

3.2.2 System Integrator (SI)

The SI shall carry out the appropriate sizing for the present project, based on the information indicated in this document regarding following points but not limited to: number of buses, sales and recharge network, inspection terminals, Customer Service Points and, in general, all functionalities and System Requirements.

- The SI shall prepare a Master Schedule of Work in Gantt format using MS Project or equivalent, to be submitted following the Contract award as a part of Project Plan. The schedule shall identify the phases for designing, manufacturing/development, delivery, and installation of equipment (software and hardware), training programs, acceptance testing, and delivery of documentation. The schedule should clearly indicate the responsibilities for CTU and any third party.
- The schedule shall be updated by the SI on a bi-weekly basis to reflect the progress attained to date and the anticipated changes in the future. In case of any deviation from the Master schedule, the SI shall submit the reason for the deviation and a plan to meet the project activities/plan as per Master schedule timelines.
- The SI shall discuss in detail and take necessary approval from CTU or its representatives on the detailed design of the ITS system and fine tune the requirements. It shall be the SI's responsibility to satisfy the operational requirements of the CTU during the design stage itself.
- During the period of the contract the SI shall hold all valid and current licenses in the name of Chandigarh Transport Undertaking (CTU) for all system software (OS, Data base, Antivirus etc.) required to perform the services, in relation to this Agreement and any matter relating to them.

- The SI shall be responsible for delivery and installation of all parts of the systems provided under this contract. Further, the SI is required to integrate certain components of the OBITS system which is being supplied by the bus manufacturers as part of their scope as per UBS-II, AIS-140 and IS-16490 specifications to provide a fully integrated seamless solution. Any additional component or equipment required for the seamless integration with OBITS shall be provided by the SI and must be factored into the bid by the SI. In addition to this, Integration with Chandigarh Smart City Card shall also be the responsibility of SI.

- Each installation will be inspected and tested in accordance with the requirements specified in this document and will be subject to CTU approval.
- The SI's installation process should be flexible to accommodate CTU's requirements and should not affect the schedule as specified in the bidding document.
- The SI shall provide required information/API for integration with Chandigarh Smart Command Control Centre (Smart City Project).
- The SI shall be responsible for comprehensive maintenance of both hardware and software, up-gradations in the system, expansion of the system, technical manpower, spares management and replenishment, performance monitoring and enhancements of the systems deployed as part of this project and shall maintain service levels as defined in section 14 .
- Under Contract Completion
  - Six months prior to the contract ending, the SI shall fully train CTU's staff or any other agency designated by CTU, who is designated to take over the operation and maintenance of the ITS System.
  - The SI shall be responsible for transferring all the knowledge regarding all the systems under the scope of the contract, technically and operationally to enable CTU to carry out the requisite functions.
  - All latest operations & technical manuals, configuration files, software, licenses, as-built drawings etc., shall be handed over to CTU at least 3 months before contract completion.
  - CTU shall release the performance security to the SI only after satisfactory Exit Management is achieved as part of the project and the SI is obligated to perform all required additional functions to facilitate the same for a smooth transfer of the duties.
- Under Termination for CTU's Convenience, Supplier's Default
  - After termination notice by the CTU, the SI shall as soon as possible and within 90 days (of Termination Period) fully train CTU's staff or any other agency designated by CTU who is designated to take over the operation and maintenance of the whole system.
  - The SI shall be responsible for continuing the maintenance as per the scope of the contract during the Termination period as per the SLA's in the section 14 .
  - All latest operations & technical manuals, configuration files, software, licenses, as-built drawings etc. shall be handed over to CTU by SI under the scope of the contract, technically and operationally within 1 month after termination notice to carry out requisite functions.
- Other duties of the SI during the system start-up. SI shall generate all the data required to the systems to operate, including, but not limited to:
  - A Network Data Base that will consist of:
    - → Collection of existing data and documents.
    - → Digitalization of stops / terminals / depots (field survey).
    - → Digitalization of routes based on road network.
    - → Study of speed patterns.
    - → Network report to be validated and exported to other systems.
  - Schedules Data Base that will consist of:
    - → Collection of existing data and documents.
    - → Production of schedules database based on speed pattern and existing CTU forms.
    - → Optimization of schedules based on CTU requirements.
    - → Production of bus and crew allocation plan.
    - → Optimization of bus and crew utilization based on CTU requirements.

- Schedules report to be implemented on the field.
- Production of timetables for all routes, stops and directions.
- Export of entire Database for other systems (including detailed timings for commercial and non-commercial trips).

The CTU will provide one or several rooms for the implementation of the TMC. The SI must carry out the necessary arrangement for UPS equipment, control panels etc. among others that good practice recommends for these installations.

The following table shows the responsibility matrix on various activities carried out during the project execution and maintenance.

Category	**System component**	**Setup**	**Ownership**	**Support and maintenance**
Software and configuration data	AFCS, AVL, PIS, TMC, TMS	SI	CTU shall receive run-time license of all applications and base software with no time restriction	SI
	Accurate data required for the systems	CTU will provide existing data. SI shall complete with additional detailed geographical data	CTU	CTU
	Data entry work for all master data into application	SI	CTU	SI
Hardware	AFCS, AVL, PIS, TMC, TMS	SI	CTU	SI
	Communication System			
	UPS power backup			
	Removal of obsolete ITS equipment on buses, cabling and installation of new equipment			
Disaster recovery	Disaster recovery site	SI	CTU	SI
Infrastructure	Civil works, raw power supply for bus stop information panels	CTU	CTU	CTU
	Depot Non IT infrastructure, raw power supply and furniture and fire protection	CTU		CTU
	Control Centre room and Data Centre room, air conditioning, raw power supply, furniture and fire protection	CTU		CTU

Category	System component	Setup	Ownership	Support and maintenance
	Control Centre room and Data Centre room: UPS	SI		SI
	Space for maintenance team and equipment (stocks)	CTU		CTU
Communications and others	Provision of SIM cards required for buses, bus-stops, POS and ETMs	SI	CTU	SI
	Telecommunication Bills (SIM card bills for buses, PIS, ETM, POS, SMS) Cloud computing services	SI	CTU	SI
	Electricity bills associated to ITS equipment on stops, depots or TMC	-	CTU	CTU
	Web Hosting bill	SI	CTU	SI
Consumables	Printer paper Replacement of paper rolls for ETM machines and POS DVD/CD (for information back-up) Replacement of printer cartridges Additional tape data cartridges Batteries (when renewed)	CTU	CTU	CTU
Training	Space for training	CTU	CTU	CTU
	Training materials, projection equipment and others	SI	SI Copies of the training materials will be delivered to CTU	SI

3.2.3 Project Management Consultant (PMC)

PMC shall supervise and monitor as well as provide guidance to CTU. Key activities shall include:

- Providing proactive inputs to CTU as well as to the SI to ensure that results are achieved as per the desired objectives.
- Monitor the performance of the SI on defined SLA's.
- Ensure schedule and process compliance with effective project planning and monitoring.
- Periodic status reporting.
- Risk assessment with recommendations to mitigate the identified risks.
- Resource utilization and variances.
- Validation of solution proposed.

- Ensure critical elements of the project are covered in the Proof-of-Concept (PoC) for technology and solution validation.
- Facilitate acceptance testing.
- Provide suggestions for Business Process Re-engineering wherever required.
- Review SI's project methodology, project templates, questionnaires and other toolkits that aid in capturing detailed requirements in developing the solution. Coordinate/arrange workshops and interviews that need to be conducted.
- Assist CTU for certification of quality assurance including certification of hardware, software and other related components before commissioning and monitor compliance to service level agreement for the same. Ensure only open data sharing standards are used.
- The Consultant shall give recommendations on training and deployment plans, proposed migration plan and may include phases (alpha, beta, pilot roll out) before a full-scale roll out. Critical reports such as transition plan; feedback of pilot roll out shall be submitted to CTU.
- Validate solution architecture to ensure interoperability, data & application security, access management, data backup and recovery, scalability and performance.
- Ensure that the vendor has addressed the issues of maintenance of the system satisfactorily.
- Ensure that the project life cycle activities are conducted as per the project plan finalized with the SI.
- Ensure quality of deliverables at each review milestone and advise corrective action as needed.
- Evaluate project progress on cost schedule and resource utilization. Advice corrective action for variance in performance against set standards.
- Review the working prototype and final delivery of the solution.
- The Consultant shall advise the SI on evolving the test plan required to meet the outlined specifications and SLA. The Consultant shall ensure timely and proper fixing of bug and report the same. Critical test reports in areas such as scalability, interoperability and performance shall be submitted.

4 AUTOMATIC FARE COLLECTION SYSTEM (AFCS)

4.1 Objectives

AFCS objectives are the following:

- Speedy validation (bus access) and recharge operations, promoting strategies that prevent long queues in both mentioned operations.
- Implement an electronic fare collection system compatible with a fare structure, defined by CTU, to reduce fraud and be user-friendly.
- Eliminate or reduce fraud due to misuse of concessional cards. Reduce cash payment on board.
- Define strategies that allow the participation of all buses in the electronic fare collection system that is to be implemented in the bus fleet of CTU.
- Enable the technological integration of the fare collection system and other systems implemented to improve CTU operations.

4.2 Architecture

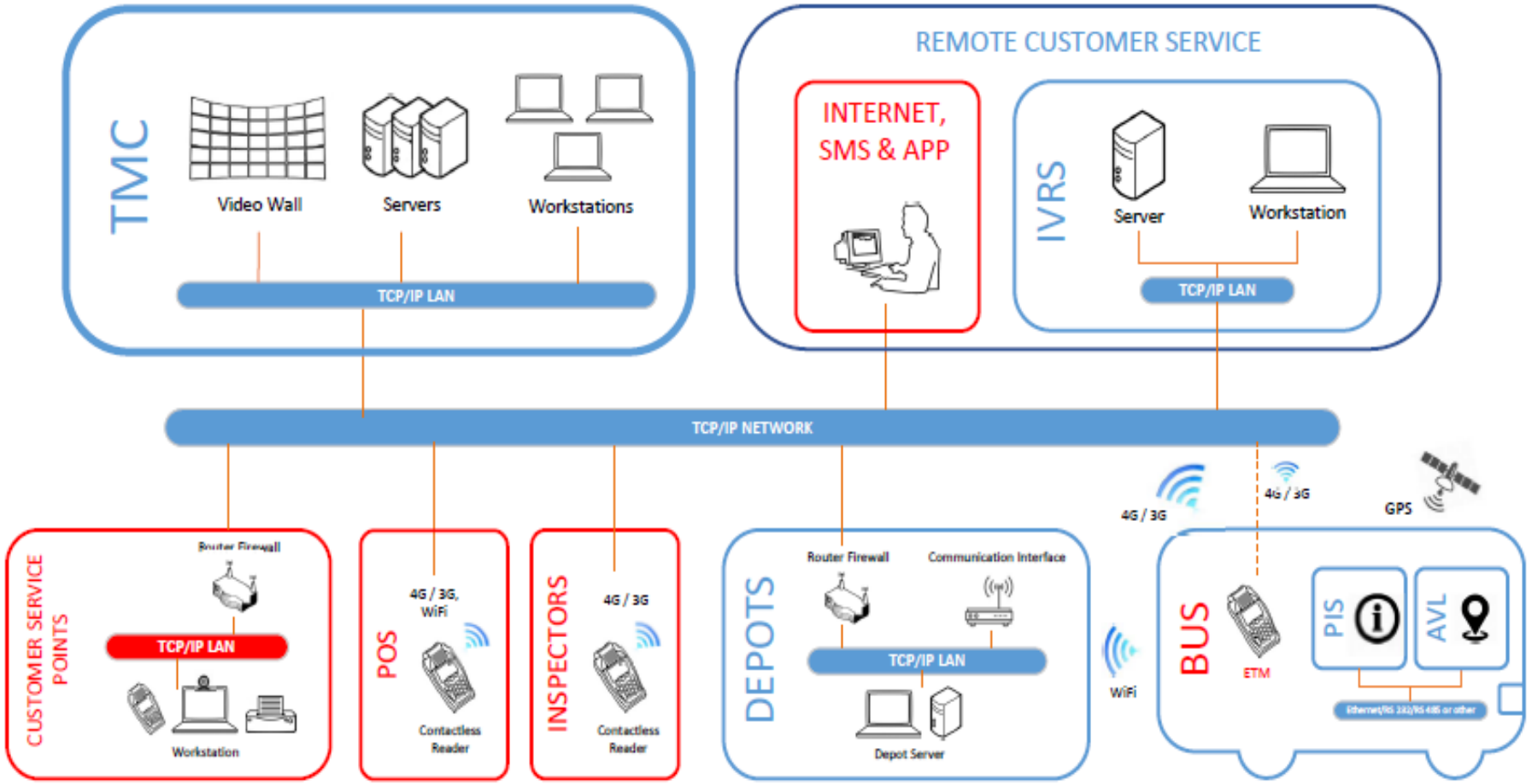


Figure 8: AFCS Architecture

4.3 Payment Means Management

The city bus services shall use on-board ticketing using paper tickets (payment on board in cash) and smart cards.

The commuters will be able to buy the tickets after boarding the bus. Paper tickets will be sold by conductors. These tickets shall be printed with a QR code where all the information relative to transaction will be registered (fare, bus id, conductor id, driver id, date/time, bus stop of origin/destination, etc…)

In case of smart card, the fare will be deducted from commuter smart card after the origin and destination station is entered by bus conductor and the smart card is tapped against ETM.

The process shall adhere to the "Guidelines for issuance and operation of Prepaid Payment Instruments in India" issued by Reserve Bank of India (RBI). According to classification collected in RBI's guidelines, the SI shall provide a closed system. However the SI shall allow the incorporation of other payment means in coordination with CTU. Therefore the proposed hardware should be capable of incorporating the need of Open Loop or smart phone payment requirements. The provided solution shall fulfil at hardware level requirements to allow both these access means, according to specifications included in Annex A.

SCs shall be designed to be used as an e-purse as well as to handle at least 15 different policies with multiple configurable parameters. The policies along with configurable parameters shall be discussed with CTU at design stage and finalized as per their requirements. In any case, regarding the on-board validation of the SC, SI shall not implement a "check-out" solution, that is, it is not required the user to tap against the ETM before to get off the bus (the user only has to tap the SC against the ETM when getting on the bus).

The SI will consider at least the following types of accounts (the list is not exhaustive. Only a few representative examples are included; in any case, the fare scheme defined by CTU shall be implemented. The AFCS proposed by the bidder shall have enough flexibility and robustness to implement several types of fare schemes):

- E-purse:
  - The e-purse cards will have certain, user provided, value stored in the card account. Based on each usage, the applicable fare will get deducted from the SC account. E-purse cards have long validity/expiry date and the amount unused is refundable if the commuter wishes to unsubscribe and close his/her SC account.
  - Users will be able to buy recharge (load credit) through different commercial channels, as explained in section 4.3.5 .
  - Commercial conditions such as minimum recharge credit and maximum credit to be stored in the cards will be defined by CTU, and the same they shall be considered as a system parameter that may be modified over the time.
  - The information of the balance of the cards shall also be centrally (at TMC) stored, and a consistency check shall be run on a daily basis, taking into consideration the information of SC validations and recharges of every single user in order to identify inconsistencies in the balance registered in TMC and read from SCs.
  - The telescopic and other journey based fare discounts/benefits will be applicable on e-purse accounts. For a SC user to make a trip. SC shall at least have the minimum balance which is consistent with his/her origin and destination.
- Smart Pass:

- Any type of concession policies, monthly pass, weekly pass etc. shall be configured under smart pass. These types of accounts will be applicable for some routes and will be time/duration based and the account does not have any monetary value. Once a commuter purchases a Smart Pass, it has time duration limit and the unused time is not refundable.
- If a user with this category of Smart Pass travels on a route other than the assigned, the SC will not be accepted by the system and the commuter has to purchase paper ticket to complete the journey.
- For a SC user to make a trip the SC shall have a valid policy for that specific location/ route.
- If the SC is programmed as a Smart Pass then the requisite policy is to be validated. There shall be random audits at the time the commuter exits at the destination to avoid any fare evasion by checking if the SC commuter has a valid ticket or not. Therefore a SC user needs to handover the SC to the conductor only once just before making a trip making the transaction quick and similar to that of a cash user.

- Smart Multi journey:
  - Operation similar to the e-purse, but a certain number of trips by default is stored on the card instead of monetary value.
  - When the user taps the SC against the ETM the stored trip is deducted.

CTU also provides the long distance bus services. These buses are out of the scope of the current bidding process but the fare integration between city bus services and long distance service shall be considered by the SI in the design of the AFCS.

Types of SCs:

Two SC types shall exist in AFCS:

- **Personalized SC.** The card owner's details such as name, photograph and other information that CTU shall consider to include, will be printed on the card. At least, SI shall consider the following types of personalized cards:
  - Personalized concessional SCs:
    - → People with disabilities.
    - → School students.
    - → University students.
    - → Free cards in cases expressly predicted in law.
    - → Other profiles decided by CTU.
  - Personalized non-concessional SCs.
- **Anonymous SCs.** These SCs shall be able to use by any CTU bus user. General fares shall be applied to this type of card.

SI shall provide preliminary graphic designs for every type of SCs that shall be approved by CTU before manufacturing of first SC lots.

SC lifecycle is described in the following sections.

4.3.1 Acquisition and initialization of SC

SI shall provide the number of SC's required in the BoQ before the commissioning of the system; once this lot of SC's is issued, SI shall provide new lots of SC, upon request by CTU.

In the same way, SI shall be responsible for:

- Graphic printing of SCs (personalized and anonymous).
- Initialization of all of the SCs, i.e. recording of the integrated SC memory map and the security keys. The initialized SCs shall not be charged with any initial monetary value.

4.3.2 Storage and inventory of SC

SI shall provide the required functionality to enable:

- Storage and custody of the SC.
- Physical security of the SC inventory throughout the lifecycle (even distributed ones).
- Warning messages to ensure sufficient stock of SCs to supply demand of sales network.
- Exhaustive monitoring of inventory and movements of issued SCs throughout their whole lifecycle.

4.3.3 Monitoring of SCs status

Following status shall be considered throughout the SCs lifecycle:

- **Initialized**. A SC is initialized when memory map is recorded on it.
- **Activated.** A SC is activated when it is given to user during a sale transaction.
- **Inactivated.** A card could be inactivated for several reasons**:**
  - SC in blacklist. If a device of the system detects a SC in black list it will inactivate the SC instantly.
  - Expired SC. Every SC has an expiry date which is internally stored during initialization process. If the expiration date of the SC is exceeded it will not work.
  - A SC that is not used for a certain period it shall be automatically switched to inactive. The length of this period shall be set by CTU, according to its commercial policy, with a minimum value of 1 year and maximum (default) of unlimited number of years.

Changes in status shall be reported to the TMC, within 1 hour.

Validation, sale and recharge transactions shall be sent to the TMC and recorded in a database.

4.3.4 Distribution and sale of SC

Following SCs sale and distribution networks shall made available to the user:

- **Customer Service Points (CSPs)**. At these points it shall be possible to recharge and buy anonymous and personalized SCs, as well as solve user incidences.
- **Points of Sale (POS)**. At these points it shall be possible to recharge anonymous and personalized SCs, and buy anonymous SC.

Following shall be the responsibility of SI:

- Distribution of SCs to points of distribution mentioned above.
- Sufficient stock in points of distribution mentioned above.
- Security arrangements to guarantee SCs safe delivery.

4.3.5 Recharge of SC

Following recharge network shall be made available to user:

- **Points of sale (POS)**: At these points, user can recharge SCs.
- **Customer Service Points (CSPs)**: At these points, user can get new SC and also recharge SCs.
- **Mobile App & Web:** User can use these payment means to recharge SC through online transfer or credit/debit card payment.

4.3.6 Validation with SC

When a SC user gets on the bus, the conductor requests the commuter for his destination bus stop and enters the origin and destination bus stop in the ETM machine. Then commuter taps SC against the ETM. The ETM checks the immediate prior transaction of the commuter, stored locally on the SC, and deducts the fare accordingly from the SC balance. Therefore to make it possible the fare integration based on distance , the immediate prior trip transaction has to be stored locally (it will also be stored at TMC, but this way there will be no need to access centralized information for the transaction to be completed). So, ETM will take the prior journey into consideration (if any), present within a specified threshold time, and applicable fare deducts from the balance accordingly. If there is no prior trip information falling within the threshold time the applicable fare is deducted.

4.3.7 Inspection

A workforce of inspectors shall randomly check, the commuters to ensure that there is no ticketless traveller in bus. Any user can be inspected by a member of the workforce; including those who avail free transport, so it is mandatory to carry valid identity proof to avoid any sort of inconvenience.

Inspectors shall carry out their tasks within a legal framework that delimit their responsibilities and competences.

Their activity will be delimited to buses, terminals and/or stations.

Every user of the public transport shall be required to carry his SC or any other authorized payment mean.

For SC holders, inspectors shall be able to read latest transactions. In the case of personalised SC, the external photo and user information printed in the card will complement the user information accessible with the inspection terminal.

For paper ticket holders, the inspection terminal shall be able to read QR code and check the validity of the ticket, offering an additional verification on the information printed on the ticket.

4.3.8 User support

User support shall be provided through these two media:

- **CSPs**: Their main functions are:
  - SCs sale, personalized and anonymous.
  - SCs personalization both externally (graphic printing through a card printer) and internally (user information recording on card’s memory).
  - SCs recharge.

  - Incidences management regarding SCs usage. I.e. replacement of SCs due to defective cards, loss or stealing.
  - User complaints management.
  - User information point. User will be able to consult any doubt about the ticketing system and routes information at these points.
  - User information points, physical or virtual, shall attend all levels of service and user's needs raised in usage of revenue system. SCs replacement.
- Remote Customer Service: Internet, Mobile App, IVRS. In section 7.3.5 Remote Customer Service functionalities are explained more detailed.

4.3.8_1 SC replacement

Defective SCs, due to failures during manufacturing process and/or initialization, shall be withdrawn and replaced completely free of charge for the user. Card balance shall be transferred from the defective card to the new card. This service shall be provided in CSPs.

User will be able to request the balance refund from lost, stolen and damaged (by misuse) cards into a new card. User shall pay for the new SC. Balance refund will be free of charge. Aforementioned functionality shall be possible in the following cases:

- Personalized concessional SCs owners.
- Other users who had been previously registered and linked to a SC. Users shall be able to register in CSPs through web site and Mobile App.

In case of lost or stolen cards, a user with personalized SCs shall be able to register complaint and apply for a new card through CSP or Remote Customer Service. The SI shall provide additional channels to do this (by web site and Mobile App) with sufficient security levels. In any case, replacement of the card will be done at a CSP. Balance refund shall be done 24 hours later from loss or stealing reporting, and the lost or stolen cards will be permanently deactivated form the system.

4.4 Automatic Fare Collection System integration requirements

All design and specification documents must be vetted and approved by CTU before implementation, and same need to be delivered by SI. The designed system shall allow CTU to work in a multi-vendor scheme which guarantees its technological independence.

To do this, SI shall deliver a set of technical and functional specifications to be reported to future technological suppliers, including, but not limited to:

- Memory map and/or data storing structure of the SC.
- Functional specifications of each field equipment (ETMs, POSs, CSPs, inspection terminals…) in relation to management rules and/or applications of SC's fields.
- Security Architecture of the AFCS system (SAM modules usage, SC keys management and ownership …)
- Transactions formats (sales and recharges, inspections, validations…) and configuration data (black lists, fares…).

This set of documents shall be oriented to open the possibility of deploying an interoperable automatic fare collection system supplied by other system providers. Customized specifications will be intellectual property of CTU, and especially CTU will be the only owner of the SC keys.

AFCS shall be able to integrate in future with Chandigarh Citizen Card. Recharge, validation and inspection with Citizen Card shall be possible after this integration.

4.5 Functional requirements

4.5.1 Electronic Ticket Machine (ETM)

- The validation carried out on a SC by the ETM shall include at least the following steps:
  - Check the SC in blacklist.
  - Validity of SC.
  - Inform conductor about the user profile (in case special concessions are being applied).
  - Anti-passback: for SCs with fare reduction shall not be used in the same ETM more than once within a defined time threshold (i.e. 5 min) to avoid multiple fraudulent validations.
  - Store the information for transaction validation (to be sent to TMC), including but not limited to: ETM id, card id, complete date (YY/MM/DD + hh/mm/ss), bus, route, origin, destination.
- It shall identify the SC profile and apply the convenient fare.
- It shall allow one “credit journey” with a maximum parametrical value. This parameter shall initially be set to “0 rupees”, however CTU shall be able to modify this parameter to a different value as many times as necessary.
- It shall display the charged and the balance amount in SC on ETM screen.
- It shall issue single journey or time based tickets (paper tickets).
- Paper tickets shall be printed by ETM. This ticket shall contain a QR code as a security mean.
- QR codes shall have a SAM based security key.
- ETM shall have capability to read QR codes.
- ETM shall be able to validate QR based tickets:
  - Check the QR security key, date and zone or line.
  - Inform conductor about the user profile (when price reductions are being applied).
  - Anti-passback: for tickets shall not be valid in the same ETM more than once within a defined time threshold (i.e. 5 min) to avoid multiple fraudulent validations.
  - Store the information regarding the validation transaction (to be sent to TMC), including but not limited to: ETM id, card id, complete date (YY/MM/DD + hh/mm/ss), bus, route, origin, destination
- The conductor shall be able to enter origin and destination stated by passenger and applies fare based on travelled distance. ETM shall automatically calculate the fare to be deducted from the user's SC balance, from the destination declared by the user. A paper ticket is printed only when the user pays with cash. The ticket shall include the destination declared by the user and the furthest destination permitted for the fare the passenger has paid relative to the boarding point.
- Generation of ETM’s internal equipment failure alarms, alerts, error logs to monitor its performance.
- Information transference to send transactions to the TMC (validations and sales of single journeys or others), configuration parameters (blacklists, fares) and software updates.

- It shall be able to write recharges on SCs performed via internet or other remote means. This does not mean that recharges on board will be permitted: on board recharge carried out by conductors shall not be allowed. The credit uploads shall be done safely with a SAM module (where the recharge keys shall be stored), with a limited "recharge quota" (system parameter). Once the user has paid for the recharge through the Web or App, the ETMs shall receive a white list with the SC where the credit should be upgraded. The ETMs shall request to update this information to the TMC at least once every 15 min (while they are switched-on under communications coverage). This functionality may not be enabled if SAM modules with recharge keys are not installed in the ETMs.
- Receipt printing for each transaction if it is required by user.
- Each system user shall have a user name and password to open and close a service. The equipment only shall work when a user is logged in.
- For each service closing it shall print a report with at least the following information:
  - Operations date.
  - Service number.
  - Opening hour.
  - Closing hour.
  - Serial number of the equipment.
  - Amount of validation transactions performed.
  - Amount of on-board tickets sold.
  - Other.
- Last operation cancellation.
- Generation of basic reports.
- Communications interfaces: 3G/4G
  - Via 3G/4G: this shall be the main mean to interchange information with TMC (transactions, configuration data, alarms, command).

4.5.2 Inspection terminal

- Balance consultation of SCs: inspector shall be able to check balance of SCs.
- Infractions detection and registration.
- Penalty fee determinations depending on the legal framework.
- Verification of the identity of cardholders.
- Blacklist check.
- Card blocking.
- QR reader.
- Collection of penalty fees.
- Printing of receipts with information to the user regarding the detected infraction and penalty fee applied.
- Generation of alerts, error logs, faults and alarms records to detect failures in equipment.
- It shall have an opening and closing operation control system.
- Each inspector shall have a user name and password to open and close a session. The equipment only shall work when a user is logged in.
- For each service closing it shall print a report with at least the information:

  - Operations date.
  - Service number.
  - Opening hour.
  - Closing hour.
  - Serial number of the equipment.
  - Amount of inspections performed.
  - Amount of penalty fees applied during service.
  - Other.
- Generation of basic reports.
- Inspection terminals shall have a source of power able to guarantee inspection service.
- Communications interfaces: 3G/4G, WiFi and Ethernet,
  - Via 3G/4G: this shall be the main mean to interchange information with TMC (transactions, configuration data, alarms, command).
  - WiFi/Ethernet:
    → In case of failure 3G/4G mobile communications of inspection terminal, WiFi or Ethernet shall be used to upload and download data/parameters with TMC.
    → WiFi connections with other devices.

4.5.3 POS terminal

- It shall recharge users' SCs.
- User will be able to check his balance at the moment of recharge.
- The POS can register a sale of an anonymous SC.
- Generation of alerts, error logs, faults and alarms records to detect failures in equipment.
- Each POS user shall have a user name and password to open and close a service. The equipment only shall work when a user is logged in.
- For each service closing it shall print a report with at least the following information of the service:
  - Operations date.
  - Service number.
  - Opening hour.
  - Closing hour.
  - Serial number of the equipment.
  - Amount of recharge transactions performed.
  - Anonymous SC sales.
  - Other.
- Generation of basic reports.
- Communications interfaces: 3G/4G, WiFi and Ethernet,
  - Via 3G/4G: this shall be the main mean to interchange information with TMC (transactions, configuration data, alarms, command).
  - In case of failure 3G/4G mobile communications of inspection terminal, WiFi or Ethernet shall be used to upload and download data/parameters with TMC.
  - WiFi connections with other devices.

4.5.4 Customer Service Point

- It shall recharge users' SCs
- User will be able to check his balance at the moment of recharge.
- Personalization of SCs, using a Webcam, card printer, smartcard printer and document scanner in order to register new users in the system.
- Declaration of stolen and lost cards, in order to get the user his proper balance refund into a new card (to receive balance refund, SC user need to be previously registered in the system).
- Replacement of defective cards.
- Registration of users with general fare.
- Actualization of expiration date of cards with certain profiles (student, other).
- Information query concerning ticketing system.
- Complaints attention.
- Generation of faults and alarms records to detect failures in equipment.
- Each Customer Service Point (CSP) user shall have a user name and password to open and close a service. The equipment only shall work when a user is logged in.
- For each service closing it shall print a report with at least the following information of the service:
  - Operations date.
  - Service number.
  - Opening hour.
  - Closing hour.
  - Serial number of the equipment.
  - Amount of recharge transactions performed.
  - Amount of SCs sold during service.
  - Amount of SCs replaced during service.
  - Other.
- Generation of basic reports.
- Communications interfaces: 3G/4G, WiFi and Ethernet,
  - Via 3G/4G: this shall be the main mean to interchange information with TMC (transactions, configuration data, alarms, command).
  - In case of failure 3G/4G mobile communications of inspection terminal, WiFi or Ethernet shall be used to upload and download data/parameters with TMC.
  - WiFi connections with other devices.

4.6 Non functional requirements

- Regarding to periodicity of information transference:
  - Transactions shall be received in TMC at least with a daily periodicity. When information of one bus is not received, other means shall be carried out to ensure the information is received by the TMC within 48 hours from its generation.
  - TMC shall update blacklists daily to all field devices which interface with SCs (POSs, Inspection Terminals, ETMs and CSPs).

- When one device doesn't receive blacklist information, other means shall be carried out to ensure the information is received by the bus within 48 hours from its generation.
- Other configuration parameters and software updates shall be sent under demand and/or annual periodicity.

4.6.1 Security requirements

- Authentication of ETM and inspection devices, as well as payment means shall be done with SAM modules technologies that guarantee a proper authentication and validation of each component.
- All the information generated and stored in ETM s and Inspection terminals shall be protected against alterations or interventions by third parties of the project. ETM shall sign all the operations by the SAM module guaranteeing its tracking and providing enable detection of any eventual manipulation. This information must be transparent for CTU so the concessionary shall provide proper tools and accounts to CTU in order to enable its management.
- ETM shall make a backup of the information at least 30 days of operation (at detailed transaction level).

4.6.1_1 Security Keys Management

4.6.1_1.1 Diversified keys

To increase the security of the system, each SC shall have its own key set, derived by the master key, through an inner calculation in the SC id. The formulas of the calculation will be defined by CTU

4.6.1_1.2 Creation process of master keys of AFCS

The first step will be the creation of master keys. In order to carry out this process, three people designated by CTU will define their own sequences of words and numbers that will be applied to an algorithm to create the encrypted master key.

After being encrypted, this set of characters is registered in a contact card (dual), called "System Master Key".

The information registered in this card will be protected by a specific key, called PIN code of the Master Card. This PIN code will be known by a fourth person designated for this responsibility.

Every time there is a need to read the card, following which the PIN code shall be dialled. Officials 1, 2 and 3 only take part in Master Key creation.

From this Master card, the rest of keys of the system will be generated, so it shall be protected and kept in a safety place. This card will also take the responsibility of creating the cards that will take the responsibility of personalizing all the cards of the system in the production environment, this card will be called Personalization Master Card, which contains the same keys of the master card.

This process has several functionalities that are not managed by the AFCS, but they need to be synchronized to the card inventory control will be effective.

These functionalities are:

- Card receiving
- Card initialization

- Card formatting
- Card identification in AFCS

4.7 Integration requirements

- No data exchange on board is required between AVLS and AFCS, however AVLS data shall be linked with AFCS data through common server.
- AFCS shall be integrated with Chandigarh Smart City Card within 3 months of the proper rollout of the same.
- AFCS should be able to integrate with e-wallet/smart phone payment or open loop in parallel which shall be undertaken by CTU as a future project in next 2-3 years. SI shall assist in total integration with such future project.

5 AUTOMATIC VEHICLE LOCATION (AVL)

The Automated Vehicle Location System (AVLS) shall primarily use GPS based location tracking devices mounted on the bus as primary source of data for tracking purposes. The location and associated data acquired from the bus units shall act as input source for tracking and operations process management required by user executing their specific functions. The AVLS system shall enable CTU to monitor bus movement in real-time and synthesize the AVL field data to deliver the same on the public information system devices installed on Bus Stops, Terminals, Buses, CTU customer portal, mobile information delivery system in case of public transit application.

5.1 Objectives

AVL objectives are the following:

- Improving quality of service and indirectly increasing demand. It will be realized by achieving the following goals:
  - Schedule adherence.
  - Regularity in buses transit at stops.
  - Waiting time reduction at stops.
  - Connections management.
  - User information on-board (next stop) and at-stop (ETA).
- Calculating the optimal scheduling of transport service.
- Improving CTU management, through the achievement of the following specific objectives:
  - Computerization of transport services scheduling and operations of transport operators
  - Operation costs reduction through hours-driver-vehicle optimization as well as inspection staff.
  - Increasing knowledge of operation parameters through collecting automatically indicators and data.
  - Operation management in real time, solving incidences and resuming optimal service conditions in a minimum time.
  - Improving service scheduling and allowing supply and demand to be better matched, through the accurate knowledge of travelling and waiting times, and demand received per station/stop and time band.
  - Reduction of customer complaints through availability of accurate and reliable data.
  - Improving information exchange between different systems, using a unified data model.
- Improve transport service matching scheduled services and transport demand by:
  - Using statistical data (average travel times, passengers boarded, bus loads, etc.).
  - Monitoring improvement of offered service.
- Improving drivers working conditions through the following:
  - Increasing driving safety through immediate notifications capability to TMC in emergency situations.
  - Improving compliance of resting times due to automatic operation data collection and re-scheduling.
  - Continuous reporting to driver of accurate instructions (progress in route, scheduling, following routes…).

- Providing better shifts scheduling.

5.2 Architecture

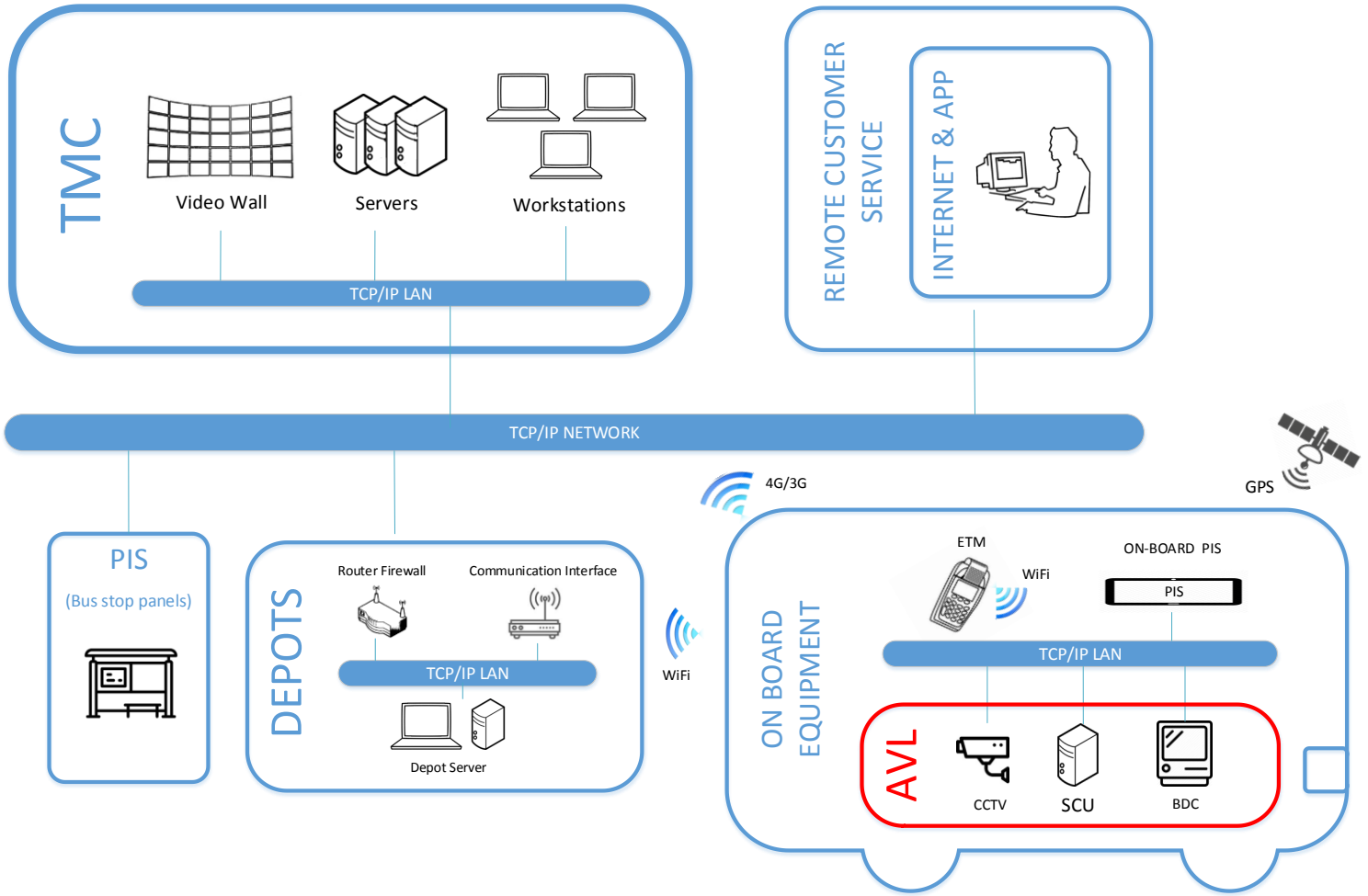


Figure 9: AVL System Architecture

5.3 Functional requirements

At on board level, AVL combines both general functions and specific functions for driver assistance en route. In addition, the functionality of on board CCTV system shall also be taken into account.

5.3.1 General functions

- Robust and accurate location via GPS receiver. Intelligent identification of the actual position of the bus en route, linking the geographical position to the control points of the current route.
- As an option, door open/closed signals, odometer readings, gyroscope and accelerometer signals may be used for enhanced location.
- Local database of topology, transport service and drivers, including all itineraries and services and planned journeys. Any bus shall have on-board enough topologic and service information, to perform autonomous (with a temporal disruption of the connection to TMC) on-board AVL operation any service and route.
- Intelligent 3G/4G data communication, on the buses initiative based on defined events (driver registration, service assignment, departure from header, passing by predefined points, off-route and other programmed stops). In this way the buses only send information when they have relevant information, per cyclic status message (position updates shall be configurable, as per UBS-II, AIS-140), or upon request of TMC. This optimizes communication costs while ensuring the fastest information refresh rate.
- Voice communications management (calls request, etc.) between buses and TMC. Hands free GSM voice communication.
- Autonomous operation and local registration of data in case of dark zone areas (no coverage). These functions shall include driver-vehicle-service assignments, location, schedule adherence, on board information and data logging.
- Sending data related to buses telemetry, when available, such as information of opening and closing doors, speed, odometer, fuel level, average consumption, lights on/off indicators, windscreen cleaner on/off, harsh deceleration, and others.

5.3.2 Bus Driver Console functions

- Driver registration and log in (user and password, both alphanumeric), at the start and at the end of each shift.
- Service starting and ending.
- Service Assignment:
  - Line, service and journey assignment.
  - Service assignment to bus and driver's shift.
  - Departure time indication of next journey.
  - Line, service, journey, travel and destination indication.
- Automatic regulation en route:
  - Automatic stop advancement based on odometer reading or GPS signal.
  - Informing automatically and continuously of transport service status (on time, delayed, advanced) and indicating its position relative to others.
  - Synchronized time throughout the fleet.

- Route itinerary visualization.
- Driver interface with on-board equipment (passenger information boards, cameras, etc.). The AVL shall include provision for displaying bus and on-board equipment status and alerts, as communicated from the bus, both in alarm/warning mode and on look-up basis. Driver shall be able to correct location in cases where SCU is not providing a correct location. He shall also be able to switch on/off the on board next stop information functionality, in case AVLS is not working correctly.
- Communications with TMC:
  - Voice calls request to TMC (hands-free speakerphone and microphone).
  - Driver interface with TMC, making possible messages exchange (preset messages sending service to TMC, messages receiving service from TMC).
  - Emergency alarms status monitoring, after sending an alarm message, through a alarm pedal installed in buses.
  - Emergency alarms status monitoring, after sending an alarm message, through a panic button installed in buses.

5.3.3 On-board CCTV

- There will be 6 (six) on-board CCTV camera in each bus including a dashboard camera, which shall store and record images/videos, and shall integrate with SCU to allow data transfer to the video management software via WiFi at Depot on request by dispatcher.
- The video will be stored for 30 days, at least, in the NVR to be installed in every bus. This information will be continuously overwritten.
- The on-board CCTV system shall have remote on request access to recordings and live video from any camera in the bus via 3G/4G. (In order to estimate bandwidth requirements for any bus, resolution of 1280 x 720 pixels will be considered, with 25-30 fps for 2% of total cameras per day).
- The on-board CCTV system shall provide videos with stable images, despite the vibration and movement of buses.
- Integration capability to Geographic Information Systems (GIS), for making on request bus tracking on a digital map, while watching live videos from at least one on board camera at the same time, with a minimum capacity of 25 buses concurrently.
- On-board CCTV system feed shall be accessible on mobile applicable formats for the usage of CTU officials.

5.3.4 Control centre functions

Please see section 7.3.3 Transit Management Centre (TMC) - Functional requirements – Automatic Vehicle Location (AVL).

5.4 Non functional requirements

5.5 Integration requirements

- No data exchange on board is required between AVLS and AFCS, however AVLS data shall be linked with AFCS data: these systems shall share the same common data model.

6 PASSENGER INFORMATION SYSTEMS (PIS)

Passenger Information System (PIS) is an electronic information system which provides real-time passenger information on bus arrivals and departures, on board information (current and next stops) as well as information about nature and causes of the disruptions, and other important real-time information is also shared through PIS.

6.1 Objectives

PIS objectives are the following:

- Improving user service, providing dynamic information, reliable and on real time: on-board, at bus stops and ISBT, through Display panels, IVRS, web site and mobile applications.
- Promoting public transport, reducing user and eventual traveller uncertainty.
- Improving user certainty, reducing waiting time at stops.

6.2 Architecture

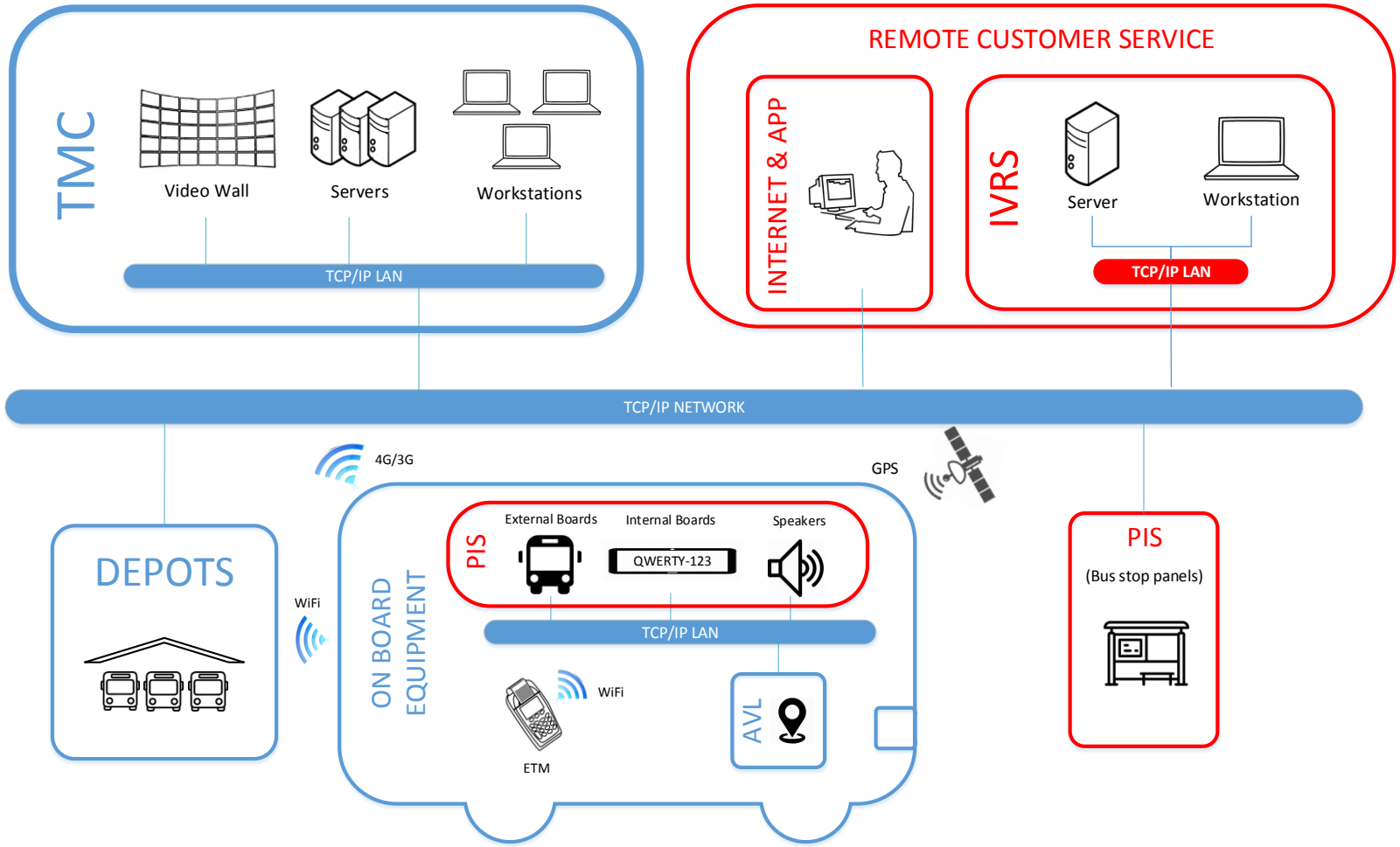


Figure 10: PIS Architecture

6.3 Functional requirements

Functional requirements will be divided in three categories, those which are installed on board the buses, those that are allocated at bus stops and remote information systems.

In general, the ETA calculation process and other real time calculation processes required to show information in on-board boards, bus stops boards and remote information systems will be carried out according section 7.3.4 .

6.3.1 On-board passenger information system

On board functional requirements will be divided in two categories depending on the location where device provides information, inside the bus or outside the bus:

6.3.1_1 Internal equipment

- **Internal boards** shall show at least the following information:
  - Route and destination
  - Next stop
  - Estimated time to destination
  - Emergency alarms
  - Free text messages received from TMC
  - Time/date information based on GPS clock
- **Voice messages** on-board of the bus:
  - All buses shall be equipped with automated voice messages system, which shall notify the passengers for the name of the next bus stop in English/Hindi/Punjabi language.

6.3.1_2 External boards

- **Front and lateral board** shall show at least the following information:
  - Route and line number
  - Origin and destination
- **Rear board** shall show at least the following information:
  - Route and line number

The configuration of electronic boards with line numbers and the route of the bus shall be performed automatically at the beginning of each route. If it is not possible, configuration shall done manually by drivers through BDC.

6.3.2 Bus stop boards

- These boards shall display information regarding:
  - The ETA of at least two next buses of each route that stops at the stop or station
  - Pre-set messages (alarms, incidences, etc.)
  - Free text messages received from TMC
  - Time and date information

6.4 Non functional requirements

6.4.1 On-board passenger information system

- Displays shall be alphanumeric with graphic capability in English/Hindi/Punjabi languages and shall be visible scrolling and flashing mode with fixed route number as per CTU requirements.

6.4.1_1 Internal equipment

- Each bus shall be equipped with a single information board. It shall be installed at a convenient location in the front part of the ceiling of the passenger compartment, thereby allowing maximum visibility to the passengers.
- The on-board equipment shall be designed as per industrial grade standards considering the automotive environment, which can work efficiently in robust environment and shall be tamperproof.

6.4.1_2 External boards

- The electronic board shall be installed at an appropriate location above the front windshield, on the inside of the bus and it shall provide to the passengers information regarding the bus route information.
- The board information shall be automatically generated by the on-board system on the basis of the available information (service assignment) and shall be initiated at the time of the registration of the driver. The display brightness shall be set automatically depending on the outside light conditions.
- The electronic boards shall be compliant with the conditions of the buses which are currently servicing the public transportation in Chandigarh and IS-16490.

6.4.2 Bus stop boards

- Passenger information generated by the algorithms at TMC shall be sent to each bus stop board, included in the system.
- Each board shall consist of structure and electronic display. The provision, installation and the commissioning of the electronic information boards and any other associated required elements (posts, founding, housings, etc. will be done by the SI. The provision of the power supply will be done by CTU).

6.5 Integration requirements

- PIS shall be integrated with AVL system in order to receive the proper information to be shown.
- The PIS system shall also provide the ability for integration with the IVRS and SMS sub-systems.

7 TRANSIT MANAGEMENT CENTRE (TMC)

Transit Management Centre (TMC) is a vital part of CTU operations to bring together all the administrative functions at one place. TMC is a centralized location or hub of traffic/ administration of all the ITS components for processing data inputs and delivering outputs to the different ITS components, command and control, computing using the appropriate software's and skilled key staff and communication to and from different types of ITS applications.

7.1 Objectives

TMC has the following objectives:

- Hosting a physical space where operators and IT equipment of different ITS subsystems could carry out their functions.
- Hosting responsible stakeholders (CTU officials and other stakeholders) to monitor the CTU operations and take any decision collectively and quickly.
- Centralizing in a single data base various data sources.
- Monitoring of various operations at one place to improve productivity.
- Improving response level.
- Effective and efficient monitoring and control.
- Reduced response time in emergency situations.
- Disseminate real time information to users, commuters and project and other authorities.
- Integrated monitoring and control of various sub-systems and devices installed on the CTU buses.
- Compilation, recording, analysis, processing, storage of information and data.

7.2 Architecture

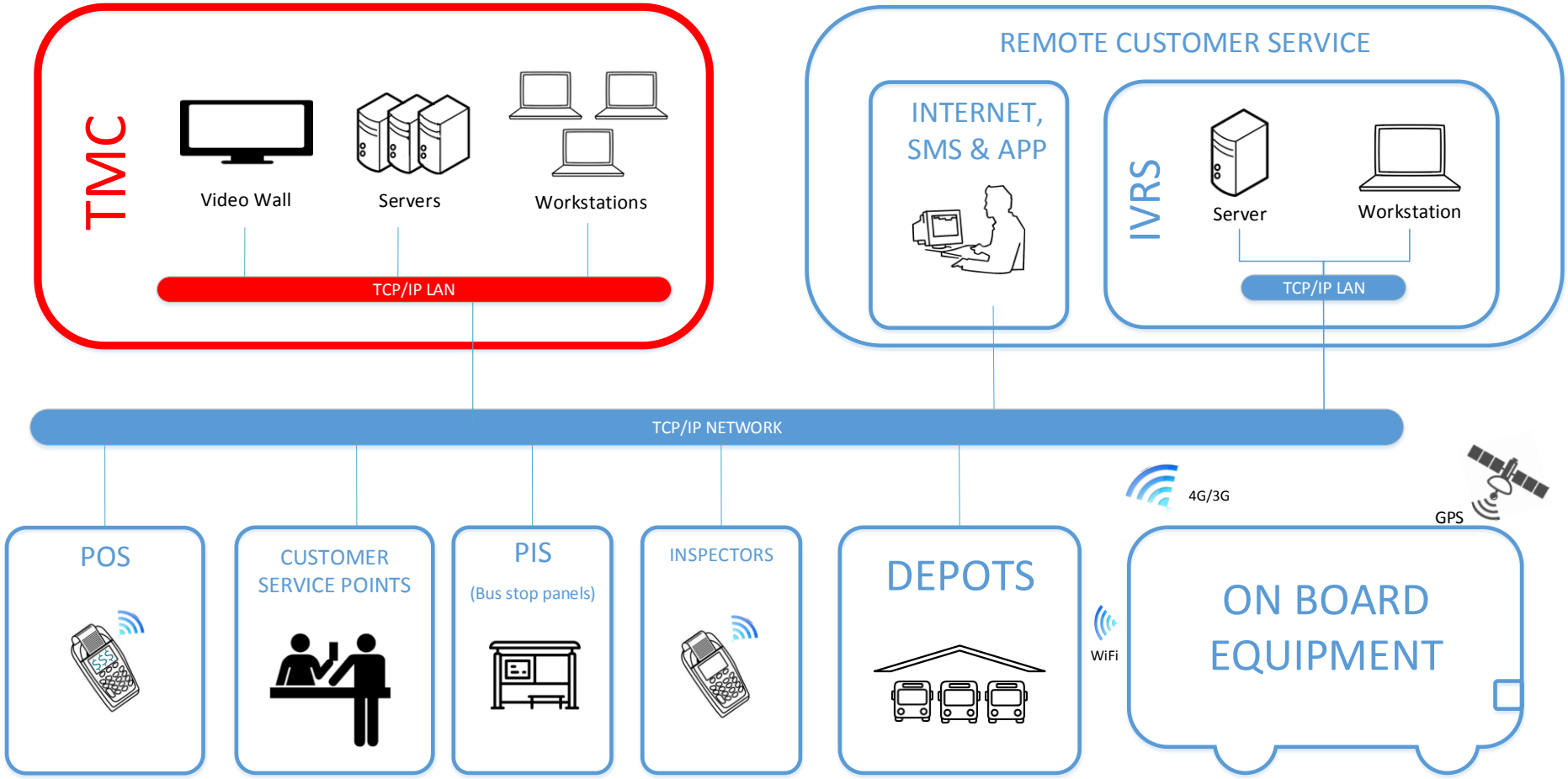


Figure 11: TMC Architecture

7.3 Functional requirements

7.3.1 General requirements

The general functional requirements are given below but not limited to:

- Real-time information and actions, both in normal operation and emergency situations.
- Monitoring the ITS system, fault diagnosis and alarm monitoring of all sub-systems.
- Data of various ITS components (data archiving) stored in TMC for any future planning or R&D purposes.
- Provide data connectivity to control room equipment and all PIS display proposed for the system.
- Provide required information/API to Chandigarh Smart Command Control Centre (Smart City Project).
- As it needs a large amount of data processing and transmitting, TMC requires a powerful communication system to support its operations, wired or wireless. The following TMC features shall be considered:
  - Automated Data Acquisition.
  - Fast data communication to and from TMC.
  - Sophisticated data analysis for purpose of improving the efficiency of operation.
  - Reliable information to the passengers/operators/other stakeholders.

The accurate data analysis includes the data filtering, fusion and analysis. Once data from the sensors or SCU units received in the TMC, their consistency should be checked. Reliable passenger information should be passed on to the public. The system shall have the capabilities to transmit the information through SMS, Internet to bus stops and buses in real time.

Every transaction generated in field devices shall be processed at TMC within appropriate time limit.

TMC shall support the registration and activation of all field devices onboard, ISBT's, Bus Stops etc.

7.3.2 Automatic Fare Collection System (AFCS)

The following are the functionalities to be provided by AFCS at the centre level:

- User administration of the technology platform.
- Management of the following elements (insertion, modification, deletion, etc.):
  - Sales and recharge networks.
  - Transport operators.
  - Buses.
  - Field equipment and devices (sales and recharge network equipment –POS's-, on-board equipment, inspection equipment, equipment in CSP's).
  - Users of the public transport system.
- Reception, processing and loading in the database of field equipment transactions (sales, recharges, cancellations/validations, inspections, status data of the system and alarms: equipment, communications, etc.).
- Definition, management, sending and distribution of configuration data, black and white lists (action lists), software updates, field equipment commands, etc to the field equipment.
- Management of alarms and remote control. Analysis of status data, alarms and equipment events.
- User interface with editing functions, of at least:

  - Fares.
  - Types of cards.
  - Matrices of transfer points allowed for passengers free of charge.
  - Lines, routes, bus stops.
  - Users of public transport.
- Functions as clearing centre; at least the following:
  - Sales and recharge networks clearing.
  - Transport operators clearing (if applicable).
  - Tools for demand studies.
  - Interface to transfer funds to banks.
- Keys and system security management.
- Tools for analysis and fraud control.
- Reports.
  - It shall provide a report design tool that allows CTU to make customized reports from the data stored in the database.
  - By default, it shall be provided at least the following reports, related with:
  - SC's sold.
  - On board sales.
  - Recharges carried out.
  - Cancelations carried out.
  - Inspections carried out.
  - SAM modules.
  - Financial issues.
  - Maintenance.
  - It shall be possible to export reports in different formats: csv, xls, plain text, pdf.

The processes shall adhere to the "Guidelines for issuance and operation of Prepaid Payment Instruments in India" issued by Reserve Bank of India (RBI).

7.3.3 Automatic Vehicle Location (AVL)

At centre level, AVL shall allow real time monitoring and tracking of the buses during the bus service operation. This shall enable CTU to work upon real time data, disseminate information and take decisions to solve incidents that may arise, thus improving the performance in the operations:

- Identifying drivers on each bus as per the assigned roster.
- Tracking all buses in the fleet: assigned transport service, status of travel bus (delay, advance, in time), and graphic reference with the buses which precede and follow on the route, geographical location.
- Detecting anomalies or deviations in the operation such as recognizing the person on duty if different from the assigned work, delay/advance in departure, deviation from the assigned route, over speeding, minimizing the bunching in operation. etc.
- Handling diversions, disruptions, etc., both these notified in advance (for a scheduled day or for an extended time period) and those which occur unexpectedly on the day.

- Allowing communication with bus drivers through voice calls, sending / receiving text messages, and receiving ambient sound during emergencies.
- Collection of status, events and alarms for on-board field equipment.
- Sending of commands to the on-board field equipment and activating emergency response system as per delineated SOP.
- Location tracking of the bus including real-time as well as detailed history tracking for up to last 90 days.
- Tracking of buses in case of off route i.e. bus is in switch off mode and in stationary position or parked in Depot/ISBT during night hours or along the road side. Only location data is required during this period. Other devices like PIS display boards, BDC, CCTV will be in switch off mode.
- Every equipment/device and bus stops etc. shall have unique identification, so that it can be easily tracked.
- The functionalities at TMC level are grouped in:
- Operation station (on real time monitoring and tracking).
- Analysis station (operation reports).

7.3.3_1 Operation station (on real time monitoring and tracking)

At TMC there shall be several operator workstations (minimum 4) and one additional workstation for operator supervisor. Every operator will monitor several routes, according to the routes assignment, done from supervisor´s workstation. This means that although they may monitor the position and service information of any bus, messages and alarms received from buses will only be sent to the corresponding operator and the supervisor (who will have a complete view of all the information from any bus).

AVL in TMC shall include at least the following graphical interfaces:

- Synoptic map:
  - On a line diagram: it shall be shown graphically the location of the assigned and operating buses. Planned (logical) buses which do not have a physical bus assigned, shall also be represented in this diagram, moving according to planned schedule and marked in a different colour.
  - Linear representation shall include all the bus stops on the route, actual location of the buses and location point.
  - Relevant data associated with the bus (bus number, assigned service, status, registered driver, delay or advance with respect to the schedule), shall be easily accessible.
  - Buses under regulation measure, offline or without mobile coverage and delay/advance alerts shall be clearly identified.
- Dynamic vehicles table:
  - All the available information about buses shall be organized on a flexible and dynamic grid.
  - It shall filtering, ordering and grouping of buses by multiple criteria to see the most delayed or advanced bus, all buses per route, buses in service, buses in workshop, available buses in depots, etc.
- Buses assignment to services: it shall allow monitoring and, if necessary, correcting the buses assignment to the services of the route, from TMC:
  - It shall show all buses in the fleet and their status of service assignment.
  - It shall show all the services and their corresponding daily planned journeys, for the current operative day.

- The vehicle-to-service assignments shall be shown in the BDC after driver log-in. In case this information is not correctly matching with driver´s assignment, TMC operators interface shall enable them to do the necessary changes according to the actual assignments. Any assignment changes will be logged including operator´s identification number and all relevant assignment changes.

- Localization and geographic representation: the line of the route, the buses stops locations and the real time position for all the buses shall be shown on Google map or similar:
  - It shall be possible to enable/disable the display of route and bus stops.
  - It shall be possible to select buses by groups: all buses, only buses selected manually, all connected/non connected buses, all assigned buses, all buses assigned to a route, all connected buses without assignment, etc.
  - Buses which are registered in the data base, but are not active (not updating location information), will be shown in a different colour, located in the latest known position.
  - Most relevant service data shall be accessible (service, trip, driver, delay / advance, speed, etc.) by clicking on the icons of the buses.
- Events, messages, calls and emergencies shall be displayed in additional interfaces enabling:
  - Chronologic visualization of relevant events as driver registries, service assignments, start / end of journey, etc.
  - Sending and reception of predefined text messages as well as free text messages.
  - Reception of call requests done by drivers from buses, in two modes: normal and urgent.
  - Reception of emergency alarms sent by drivers using alarm pedal or other means.
  - Reception of emergency alarms sent by commuters using panic button.
- Mechanism of Alarm Pedal:
  - When a bus has an alarm situation (alarm pedal is pressed), an alarm message is shown in the screen of the dispatcher at TMC.
  - An acoustic signal is activated at the dispatchers´ workstation to call his attention. The dispatcher should confirm the alarm message, (alarm and confirmation are logged for later analysis).
  - By confirming the alarm, the transmission of live video and audio from the bus are sent to the control centre and visualized on dispatcher´s screen also on the video wall. By default video from the camera which is closest to driver is sent, however dispatcher can switch to any other camera in order to evaluate the situation. Location information of the bus is updated every 10 secs.
  - The dispatcher (and his supervisor) should evaluate the situation based on the video images and the ambient sound received from the bus at TMC.
  - In case he comes to the conclusion that it is a false alarm, he should contact the driver (audio communication) to let his know that the alarm was activated (presumably by mistake) and confirm everything is OK. Then he will inform the system that the alarm situation is finished.
  - In case the dispatcher comes to the conclusion that the alarm situation is real, he will react according to protocols depending on the type of incident (robbery, attack to women, medical problem, traffic accident etc.). Actions may include:
    - Call the police.
    - Call the medical services.
    - Send another bus to take the passengers.
    - Send mechanical assistance
    - Etc.
  - Depending on the incident observed the dispatcher may decide to contact the driver with audio communication (e.g. In case of traffic accident) or react discretely without drivers intervention.

  - Once the situation is over, the dispatcher will inform the system that the emergency situation is finished, and the corresponding situation will be logged.
- Mechanism of Panic Button:
  - The protocol and architecture shall be as per the requirement mandated by Govt. of India.

7.3.3_2 Analysis station (operation reports)

AVL shall allow visualization in different aggregation levels of historic stored data and configure operation reports and statistics, comparing the real and scheduled information:

- Services compliance
- Route times and average speeds
- Travelled kilometres
- Start hours for every trip, total travel time and delays / advances at stops

Application shall allow controlling and managing statistical data generated by the system and stored in DB, defining the way it is shown, following this sequence:

- All relevant service data (starts, stops, incidences, events and others) are registered in real time in an operational DB.
- These data are daily organized in a historical DB that shall be used to generate reports.
- Reports shall be configurable by users, with different selection, sorting and filtering criteria.
- Reports shall be generated by date range, or route, and it shall allow to group, filter and organize data by bus, driver, route, etc.
- Reports shall be exported to other file formats as .pdf, .xls, .csv.

Despite the fact that it is possible configuration of multiple reports, as well as edition of custom reports and specific designs, the following reports shall be submitted:

- Route speeds and travel times reports
- Travelled kilometres report
- Stops reports: buses passing a stop within a certain time frame.

7.3.4 Passenger Information System (PIS)

PIS functional requirements in TMC shall be the following:

- It shall have a central module for data processing that shall include algorithms for bus stop passing time calculation. This software module shall provide automatically all information concerning to next buses ETA to remote devices (i.e. boards at stops or Website and smart phones). For this purpose, the next two buses for each route shall be considered.
- It shall have a message sending and passenger information monitoring in real-time. The system shall allow sending messages and monitoring ETA information that is being shown in each stop and station.
- In this application, the following information shall be shown:
  - List of passenger information boards registered in the system (there shall be different types: stops, ISBT etc.)
  - Bus ETA, routes and type of service, that are being shown in each information point
  - Active special messages sent from TMC for each information point

- Application shall include an interface to edit and activate (and automatic sending) messages to stops & buses about incidences and relevant events or institutional messages sent from TMC, including the possibility of setting, at least, the following parameters:
  - Priority, duration and frequency of message visualization
  - Date and time range when it shall be shown
  - Week days when it shall be shown
  - Single board or group of boards selection for bus stops
  - Single bus, multiple buses, or all the fleet for messages sent to on board internal displays.
- The configuration of electronic boards i.e. setting the information to be display such as definition of routes, service messages, ETA information etc. and shall be performed by a specifically designed interface to be used at control centre, such configurations can be automatically updated by way of algorithm or on generation of interrupt.
- The system shall record status messages of the electronic boards. These messages shall be used to produce reports showing the availability of electronic boards.
- Messages containing data from the central system to the electronic boards, which have not been received successfully, shall be resent. In case of unsuccessfully sent messages, generated by an employee, the employee shall be informed through the respective interface, and shall have the option for manual resending of the message to the respective electronic board. The automatically generated messages shall be resent again on the basis of the configured time intervals and if the message could not be successfully sent within certain period of time, they shall be marked (as non-updated) and the event shall be recorded in the log. The electronic boards shall regularly resend messages regarding the status and the information for the respective software version to the central system.
- The dispatcher shall have the option to activate and deactivate the provision of ETA information (automated or manual mode) for specific stops or routes.
- PIS shall include Open Data functionalities. The Open Data functionalities to be provided by the SI and shall include the following:
  - PIS shall provide the required information in order to allow a third SW provider to develop its own passenger information service (for example: an App or a web page) with the same accuracy and capacity than the PIS. At least,
  - → It shall provide general and specific static data about scheduled service in different formats as appropriate (excel, xml, jpg, etc), for instance: lines, routes, bus stops, etc.
  - → It shall provide a Web Service with the following information in real time:
    - Buses
    - Services
    - Geo (Topology, Stops, Points of Interest, …)
    - Service messages
  - SI shall provide an API for third parties (as App developers) to gather transport information above mentioned. General Transit Feed Specification Reference (GTFS) shall be used for this purpose.
  - The internal displays of the buses shall also display service messages sent from TMC.

7.3.5 Remote Customer Service

7.3.5_1 Mobile App & Web

- Regarding the ticketing functionalities, the Mobile App & Web shall provide at least the following functionalities:

  - SCs recharge
  - Declaration of stolen and lost cards.
  - Registration of SC holder for the purpose of identification.
  - Information queries concerning the use of the revenue system.
  - Customer service (claims)
- Regarding the bus service the Mobile App & Web shall provide at least the following requirements:
  - Provide accurate departure times at any stops.
  - Provide users current location together with close line/route information and ETA at the nearby bus stops automatically.
  - Display real-time based bus schedules.
  - Display of specific bus schedule based on current location.
  - Alert to users when specific bus is leaving/is about to arrive.
  - Those commuters who do not have 3G/4G connection may use SMS service to get the real time information (ETA) on their mobile phones, by sending a bus stop code in a text message.
  - It shall be able to feed directly an external system or a Web server, so that, user shall be able to view the information in real time on the next arrivals in all stops of the enabled routes by accessing a specific address.
  - It shall be displayed the list of all the stops of both directions in the route selected by the user. Also it shall be shown on digital cartography (Google Maps or similar) the area and the route of the line.
  - Users shall be able to make a request by pressing a stop on the list or on the interactive map in which are represented the routes and the location of the stops. After the request, the ETA (in minutes) for the next two buses, for each of the routes that pass through the stop, shall be shown on the screen.
  - User shall be able to plan his journey to find an optimal means of travelling between two given bus stops.
- Web site shall include the Open Data functionalities defined in chapter 7.3.4, as well as an application form where SW developers can register and apply for the information.

7.3.5_2 Manager Mobile App

- It shall include the following graphical interfaces:
- Schematic line view: It shall provide information regarding actual location of all buses in the fleet: assigned transport service, status of travel bus (delay, advance, in time, passenger count according to ticket sales and validations), and graphic reference with the buses which precede and follow on the route.
- Localization and geographic representation: route, the buses stops locations and the real time position for all the buses shall be shown on Google map or similar:
  - It shall be possible to filter the information of a single route and its buses.
  - It shall be obtained the most relevant service data (service, trip, driver, conductor, delay / advance) by clicking on the icons of the buses.
  - It shall allow easy identification of buses under emergency situation (alarm pedal activated).
  - Vehicle table: It shall provide a list of buses with information regarding identification of drivers and conductor on duty in each bus, the corresponding service information (route, trip, stop, at depot, etc.).
  - Drivers/conductors list: It shall provide information regarding the actual and daily scheduled services assigned to drivers and conductors.

  - Bus stop board information: It shall be possible to access the information being displayed at bus stop information boards.
- It shall provide accurate departure times for a selected stop.
- It shall enable visualization of real time on-board CCTV.
  - User shall be able to select a bus from a map or a list and view recorded video in real time by on-board CCTV.
  - User shall be able to select any of the on board cameras.
- It shall support authentication system with:
  - Access control by user name and password (log in/log out)
  - Password reminder
- A Master User shall be able to:
  - Create new users with different profiles and user credentials
  - Delete users
  - Modify users

7.3.5_3 IVRS

An Interactive Voice Response System (IVRS) shall be provided: Automated telephone software that provides passenger information pertaining to fare, time table/schedule and will record passenger complaints and their suggestions. There will be operator at TMC to assist commuters during CTU operation hours.

The IVR System shall include the following features:

- It shall provide assistance to customers on specific incidents and register complaints received from commuters.
- It shall have the ability to interact with remote servers and connect to the database. It shall be able to read, store and update information. It shall also offer help features for the operator.
- It shall consist on an IP-based telephone system which shall allow answer and transfer calls. It shall also allow running menus and options.
- It shall have an automatic call identification system and the information of registered users. Thus, customer history information will be recovered and it will be shown when a customer call is received. This way customer will be identified.
- In cases customers cannot be identified automatically; information shall be accessible by entering specific user details, as long as they are registered as users.
- Information shown to the operator shall be customizable and it shall include not only recent but also historic information.
- It shall have a feature to record phone conversations between operator and customers and it shall be possible to recover them afterwards.
- The system shall save statistics about customers calls in order to generate reports, including:
  - Incidents and complaints received, rejected, solved and pending.
  - Indicator of calls by operator and duration of each call.
  - Satisfaction of customers on the service and the attention that is being given.
- The system shall reply to any query received, within 5 seconds from the time when the information is entered.

- Regarding complaint resolution processes and consultation of validations, the system shall allow to search according to the information available depending on the line, route and bus used. That is to say that when facing an incident or complaint, the following information will be available:
  - Date of use
  - Service available data (line, route, bus, driver, conductor, etc.)
  - Card identification number
  - User profile
  - Remaining balance at the last date available

7.4 Integration requirements

In order to simplify and optimize information updating processes and to reduce the probability of errors in data editing and their maintenance, all systems included in TMC (AFCS, AVL, PIS) and TMS, as well as the Scheduling and Roster system shall share the same common data model. That is,

- There will be a set of common tables, common entities and common data regarding all mentioned systems whose maintenance and updation shall be carried out centrally by SI. In this way, each updation performed by a user shall be performed only once and shall be made automatically and synchronized in all indicated systems.
- A user interface shall be implemented to update centrally this set of common data. In general, all data or entities repeated in several of the indicated systems shall be updated and maintained from this common interface.
- For illustrative purposes, the following information considered common is detailed: lines, routes, stops, buses, drivers, conductors, etc. The list of common data and common entities shall be agreed and approved by CTU.
- The list of common data mentioned above will be managed in a single global database, or alternatively each system will have a separated database, each of them shall be properly synchronized.
- Solution shall be integrated with other systems through the TMC in such a way that data structures (such as lines, stops, buses, crew, services, etc.) can be easily imported and exported and there is no need to duplicate the editing process of this information in two different systems when there is a change (new line definition, route, buses, crew, tariff, etc.)

This common data model to be implemented and developed by the SI shall be:

- Non-proprietary.
- Based on public and international standards as Transmodel (Reference Data Model for Public Transport, EN12896) or SIRI (Service Interface for Real Time Information) or GTFS (General Transit Feed Specification).

All the subsystems will be synchronized using NTP via a central source located at the TMC.

7.5 Disaster Recovery

The SI shall provide cloud computing services for disaster recovery to mitigate risk of any outages on account of Hardware /Software / Connectivity failure. In event of the primary TMC failure, the system shall automatically route the field equipment (on-board equipment and information boards at bus stops and ISBTs, ETM, Inspection Terminals, POS, CSPs and depot equipment) to alternative (cloud) TMC site for service continuity. While successful connection to primary and secondary TMC is not available, field equipment such as ETMs, AVL and PIS on board systems will work in stand-alone mode, maintaining all the functions

that do not require real-time connection to the TMC (ticket sales, SC validations, next stop information announcement, etc.). And the corresponding events will be stored locally for later transmission. The SI shall guarantee up time of 5 minutes for disaster recovery (secondary) TMC.

As soon as the secondary TMC is active, the dispatchers shall be able to take control of the situation, by connecting their client workstations to the alternative TMC through an internet link. Mobile Apps, Web information and IVRS will be also automatically redirected to the alternative TMC.

After the problem that caused the disruption of the service from primary TMC has been evaluated and corresponding action have been done to avoid primary TMC failures, the control will be switched over to primary TMC:

- The SI shall guarantee up time of 5 minutes for the primary TMC to take full control of the system, interacting with all field equipment.
- The system shall automatically route the field equipment (on-board equipment and information boards at bus stops and ISBTs, ETM, Inspection Terminals, POS, CSPs and depot equipment) to Primary TMC site.
- All information stored in the secondary TMC during primary TMC failure will be transferred to primary TMC in order to avoid information gaps in statistical reports.
- All real-time information such as bus, driver duty assignments, actual trip information, and commands sent to the PIS, etc. will be automatically transferred to primary TMC.

The SI shall provide reporting access to secondary TMC server to CTU authorized officials to cross verify day end reports sent from primary TMC. The secondary TMC is expected to be on auto pilot mode in normal circumstances receiving a copy of the information from primary TMC and may act as a primary source of reporting.

In case of disaster due to corrupted data, system recovery may be based on the restoration of data and applications from the latest available backup.

SI shall provide automatic backup/restore functionalities to ensure a safe copy of all information, including daily data backups and weekly complete system backups.

Restore procedures shall be provided to allow a complete system restoration after system failure due to corrupted data, damaged software or similar causes.

The SI shall submit the appropriate design/solution for Disaster Recovery in the technical proposal.

7.5.1 Architecture

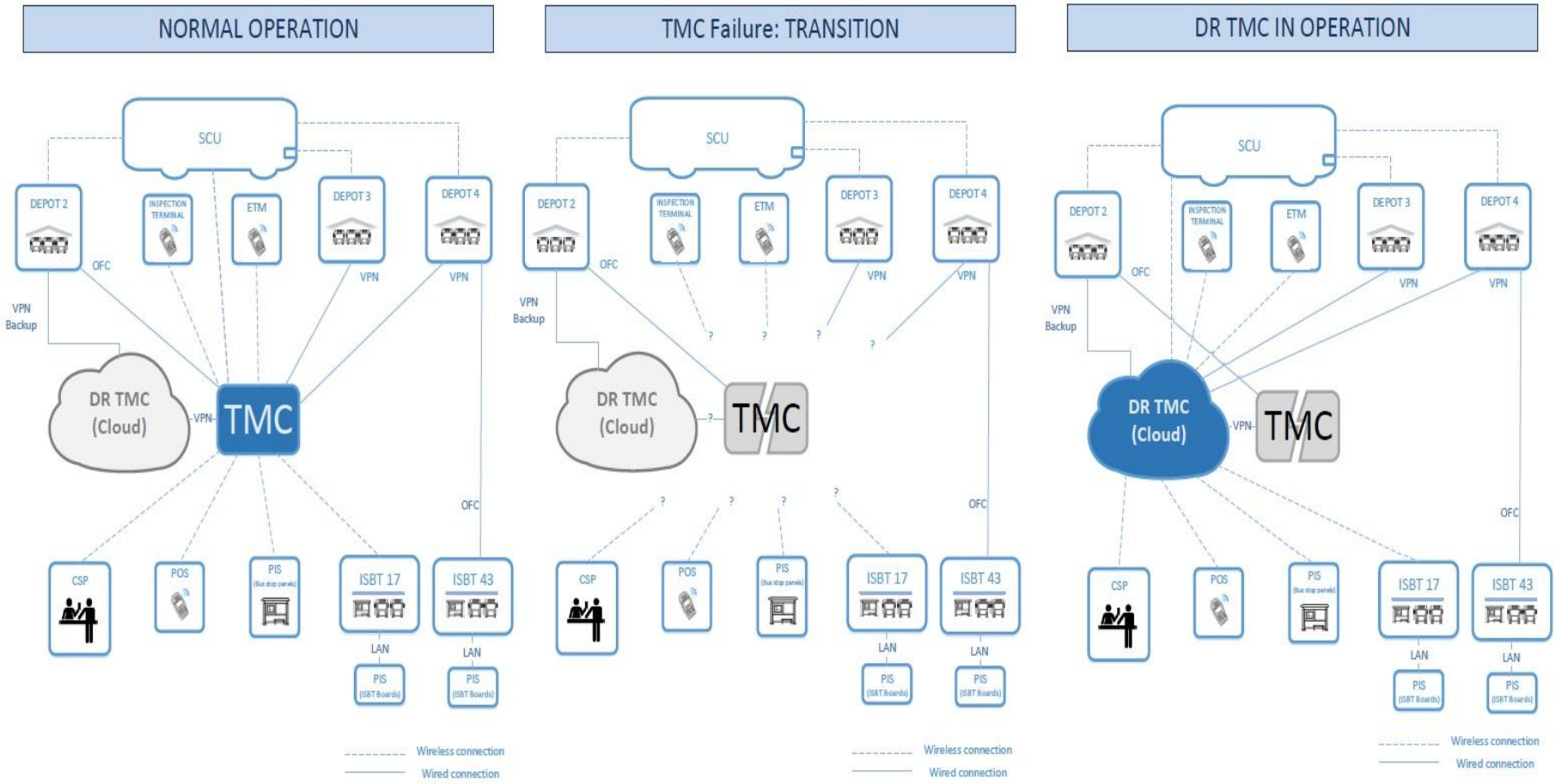


Figure 12 Disaster Recovery Architecture

8 SCHEDULING AND ROSTER

The scheduling system will provide CTU the tools to build efficient fixed route bus schedules, driver assignments and time tables for the complete city-wide network. The system will provide flexibility and control over bus & crew scheduling as well as improve bus and crew efficiencies.

8.1 Objectives

Scheduling and roster objectives are the following:

- Organize and optimize the complete service delivery, using only the necessary means (buses, man power) to satisfy the demand.

8.2 Functional requirements

8.2.1 Bus Scheduling

- Ability to optimize the complete service delivery by developing the route network and publish final timetables & rosters.
- Ability to generate informative statistical summaries and detailed reports from the system.
- Solution shall have feature to capture trip/schedule wise revenue kilometre.
- Capability to evaluate dead kilometres in the solution.
- Ability to make changes in routes and bus stop locations due to traffic management changes (one way streets, construction, etc.).
- Solution should have integrated Optimisation Tool for buses and crew based on various constraints and preferences.
- Ability to generate reports such as but are not limited to:
    - Statistic report - headway, running times for each trip
    - Running boards - time table of each RUN
    - Arrive-depart graph
    - Timetable reports - to be displayed at bus stops
- The solution shall be capable to interface with GIS Maps to plot the road, route, etc.
- Solution shall be able to calculate distances between associated points defined as stop / terminals / depot on the GIS Maps.
- Solution shall have ability to link various nodes (stops, terminals, depots, etc.) with paths to create a graphical route that is easy to understand.
- Solution shall have ability to add/modify/delete/undelete/view bus type.
- Solution shall have ability to create timetable, adding and modification of trips, assigning the buses to the trips thus creating a bus schedule.
- Solution shall have ability to create, delete, edit and modify depots, stops, routes, terminals or any other entity that is subject to change in the future in system and shall update in other systems expected to interface with this.

- Solution shall have the ability to import geographical data, bus database, crew data, etc. from other systems, such as AVL.
- Solution shall have the ability to export service to other systems such as AFCS or AVL.
- Solution shall have ability to track and minimize dead runs.
- The solution shall have ability to generate “what-if” scenarios.
- Solution shall have ability to create various types of stops as per CTU.
- Solution shall have ability to add / remove turn restrictions.
- Solution shall have ability to enable / disable turn restriction.
- Solution shall have ability to set to One-way.
- Solution shall have ability to set to Two – way.
- Solution shall have ability to set to Blocked Road.
- Solution shall have ability to Define Road Class - Main roads, highway, narrow road, service road, freeway, toll road etc.
- Solution shall be able to carry out the bus scheduling independently of regulations/labour agreements on maximum and average crew platform times, meal breaks, etc.
- System shall support the ability of creating special trips for days with additional demand due to special events (festivals etc.) These trips shall be reflected into the operation module for roster and dispatch functions.

8.2.2 Roster

- Solution shall have ability to create crew schedules considering different shifts parameters such as shift spreads, meal time etc.
- Solution shall have ability to create crew scheduling in accordance with Motor Vehicle Act followed by CTU.
- Solution shall have ability to minimize travel time from relief points to depot / meal locations.
- Solution shall have ability to define shift start and end points.
- Solution shall have ability to minimize breaks between 2 blocks of service.
- Solution shall have ability to schedule duties such that the last portion of duty shall close at a particular depot/terminal or specified location defined by CTU.
- Solution shall be capable of creating crew schedules for Bus schedules which operate from a specific depot or division.
- Solution shall have the ability to implement crew transfer within division or depots.
- Ability to create groups and types of crew.
- Capability to create crew schedule considering a specific meal break location for a particular Route Number / selected route numbers.
- Solution shall be accessible by all depot authorized users to download the crew schedules created by the system.
- Solution shall have provision for creating the Roster as per Rules, Acts and statutory requirements.
- The proposed roster application shall plan and generate the roster automatically for next one month to one year and till current financial year.
- The proposed roster application shall display or provide roster using graphical representation for the selected period. The roster module shall interface with scheduling module to assign crews automatically to the schedule.

- In case schedule is cancelled then roster shall update crew's operation hours etc., for day to improve the operation.
- Roster shall have technique to minimize and help CTU to identify the nonperforming/ underperforming crew.
- Scheduling module shall support CTU to assign the bus to particular schedule and number of trips. Forms and acts applicable to CTU shall be incorporated into the scheduling & roster application.
- It shall allow admin or authorized user to create and view the planning for a week/month before it applies to real production.
- Solution shall have provisions to easily make changes to the planned roster.
- Solution shall have provision to create rosters for user definable day types such as Public Holidays, weekends etc.
- Solution shall have capability to automatically rotate crew as per the user definable parameters.
- Solution shall have ability to assign crew work/duties based on user defined groups.
- Ability to send SMS alerts prior to day of duty and also if crew has not arrived as per his schedule and if schedule has changed.
- Solution should have provision to include non-driving work in the roster.
- Solution should have provision to utilize drivers from other depots.
- Should have integrated Optimization Tool for bus and crew based on various constraints and preferences.
- Solution shall provide facility to export data/reports to in pdf, excel /.csv /XML or HTML formats.

8.3 Non functional requirements

- Solution should have capability and be used at public transport operator with bus operations exceeding 1000 buses.

8.4 Integration requirements

The same integration requirements indicated in section 7.4 apply.

9 TRANSIT MANAGEMENT SYSTEM (TMS)

The TMS software shall consist of the following modules:

- Depot Management System (DMS),
- Workshop Management System,
- Store & Inventory,
- HR & Payroll,
- Accounting,
- ERP/MIS,
- Network Monitoring System (NMS),
- Grievance Redressal Management System.

It shall be integrated with data structures of AFCS AVL system, PIS and Scheduling & Roster system to provide effective information exchange of fleets, crew, topological information, service information, etc. between these sub systems.

The TMS software shall be deployed at each city bus depot (1, 2, 3 and 4) for smooth operation and maintenance. The central TMS servers shall be installed on the same location as Transit Management Centre and shall communicate with various components of the TMS system at each depot, synchronising the data at frequent interval to update the records. The TMS software at each depot shall work as standalone with a local database in case of communication failure between centralized TMS and depots. Figure 13 illustrates the centralized TMS.

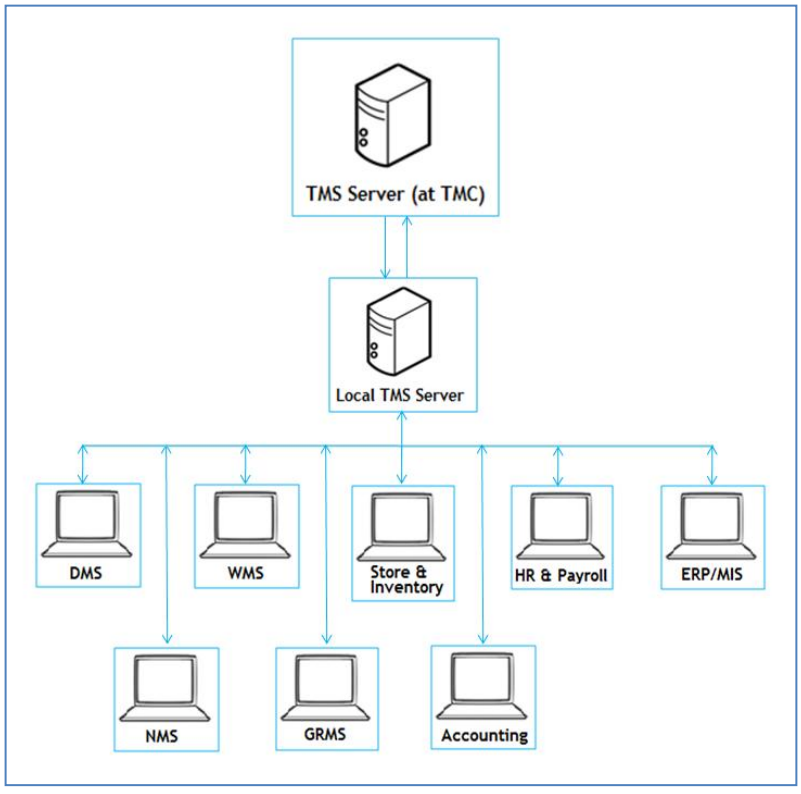


Figure 13: Conceptual Centralized TMS

9.1 Objectives

The following are the goals and objectives for integrated TMS:

- **Effective Vehicle Maintenance**
  - By providing systematic planning for bus maintenance will cut down the idle time for non-operational buses, bus routine maintenance, breakdown ratio shall come down, automated alert for maintenance, bus on time departure from depot, easy to check bus in/out status according to schedule time, bus transfer between depots/divisions.
- **Effective Fuel Management**
  - By providing integration with fuel management systems, fuel consumption and stock can be controlled and monitored. Fuel leakages also can be monitored.
- **Effective MIS/ERP Reporting**
  - MIS/ERP reporting will help CTU to run the hassle free operation, for example looking at the data will provide idea of cut down the schedule/trip, dead kilometres, bus wise KMPL or manufacture wise KMPL or driver wise KMPL, utilization of tyre and life cycle of tyre retreading, battery life, repeated issues by fleet wise of manufacture wise, bus utilization, accident and breakdown data, master data of crew, bus and other staffs, over time hours, warranty details necessary items, fuel consumption, etc.
- **Effective Vehicle Management**
  - The entire movement of the buses shall be recorded in the system to manage effectively. Depends on priority system shall send alerts to concerned department or staff. Each bus history provides usage and lifetime of the fleet to decide for scrap. Fitness certificate, road permit, insurance shall be maintained in system to track and manage smoothly, to track history of tyre lifetime to do tyre treading to minimize operational cost.
- **Effective Store Inventory**
  - Stores module shall have history of stock, material forecasting, accurate information of spare parts, warranty details, spare tracking shall provide accurate information.
- **Ensure Manpower Management**
  - Attendance shall be recorded through biometric machine to avoid manual intervention. Leave and holiday will be managed systematically to monitor staff attendance. The system shall help CTU to monitor staff's in and out time. In case a bus does not departure on time the system helps management to track delays associated with driver, conductor and service information.
- **Effective Payment Processing**
  - System helps CTU to track and pay staff's salary, incentive, ESI, PF and IT in short time.
- **Develop Centralized System**
  - TMS shall use single database to maintain employee record and other information. This is to avoid manual duplication at various places. In case of staff transfer from depot to depot and division to division it shall require to be updated only once.

9.2 Functional Requirements

9.2.1 Depot Management System

A bus depot is an operating base for a transportation system. It provides parking accommodation, servicing and maintenance, scheduling, crew management, facilities for buses, an administrative function, and facilities for staff.

CTU has four depots from where it is operating all the buses including long route, suburban routes and city bus routes. Three depots (Depots 2, 3, 4) are only operating the city bus routes, while other one depot (Depots 1) operates long distance routes.

The following three depots and two ISBT's are part of the project:

- Depot – 2, Industrial Area Phase-I
- Depot – 3, Sector 25
- Depot – 4, Sector 43
- ISBT Sector-43
- ISBT Sector-17

General system functions:

- Ability to handle multiple bus type like AC buses, ordinary buses etc.
- Proposed solution should have fully integrated functionalities/tools including to following but not limited to:
  - Performance monitoring
  - Fuel Management
- Capability to scan and upload documents like license, purchase order copy, etc. into corresponding sub systems
- The proposed solution shall provide feature for creating buses in one depot and process for transferring buses to other depots.
- Ability to create multiple options for allocation that follow the same allocation rules and methods.
- Solution shall have Gantt chart for a visual aid to work day.
- Solution shall be able to provide driver instruction report.
- Solution shall support bus change over's, breakdowns.
- Ability to create users in the system.
- Ability to assign roles, access and user permission in the system.
- Solution shall support user defined event definition for sending alerts, SMS message and e-mails.
- Solution shall be able to send alerts and e-mail based on certain conditions, events or transactions.
- Solution shall support drag and drop functions; undo and redo; search.
- Ability to generate on-demand statistical reports and summaries.
- Ability to import master data such as bus data, etc.
- Solution shall provide facility to export data/reports to in pdf, excel /.csv /XML or HTML formats.
- Solution should support following MIS Reporting but are not limited to:
  - Crew allocation

- Schedule allocation
- Crew utilization report
- Fleet departure at depot
- Fleet dead KM per route/ fleet wise
- Crew license renewal history
- Over time details per staff wise
- Fuel consumption every day
- Fleet wise fuel consumption
- Vehicle service alerts
- Crew Performance Report
- Vehicle Performance Report

9.2.1_1 Vehicle Dispatch

The operation process for vehicle dispatch is given in figure below:

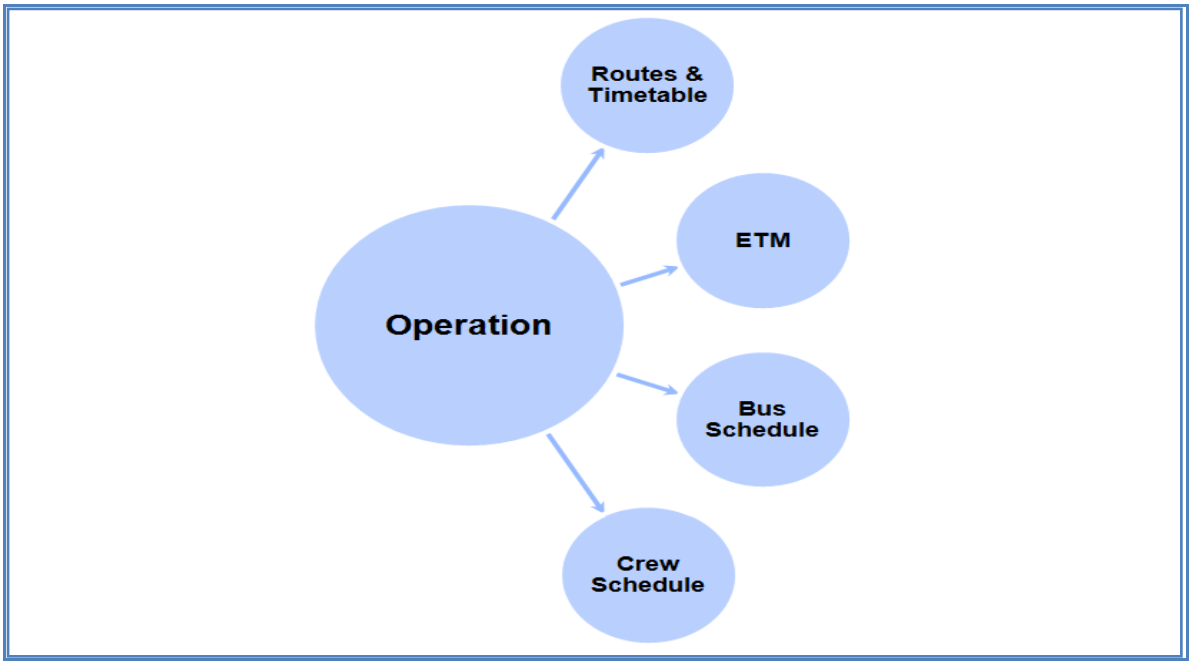


Figure 14: Operational Process for Vehicle Dispatch

Dispatch/Daily Operations

- Ability to assign a bus to a crew and its schedule, linked to a specific ETM and service to be done.
- Solution shall be fully integrated with Roster and Dispatch.
- Solution shall also be fully integrated with AVL and AFCS so that real-time information about buses, crews and services registered in these systems can be accessed through Depot Management System.
- Solution shall be fully integrated with Workshop Management System so that information about the buses included in the workshop plan in the coming hours can be easily displayed.
- Data from multiple dispatches shall be available on one screen for workshop manager/duty in-charge to make decisions.

- The dispatch module shall be fully integrated to other systems and have availability of buses in real time from workshop.
- The system shall support and capture buses in/out (from depot) details. This requires integration with RFID/ANPR based barrier gate system currently installed in depots.
- The solution should have ability to display the current and future duties to be performed by the staff and buses.
- Solution shall have provision to easily swap work between crew and buses.
- Solution shall have provision to handle on-road bus changes due to accidents, breakdowns etc.
- The solution shall have provisions to store driver licenses and other statutory documents.
- Solution shall alert various stake holders including driver in case the document have expired and need to be renewed.
- Solution shall have provisions to manage crew contact details.
- Ability to register volunteers for additional work by crew from the crew kiosks.
- Solution shall have detailed service information available to workshop manager/ duty in-charge.
- Solution shall highlight the workshop plan and buses required for workshop maintenance for the period.
- Solution shall have capability to send the SMS messaging to crew, either in bulk or individually.
- Ability to send SMS alerts prior to day of duty and also if crew is late for work and if work has changed.
- System shall flag and give late crew popup alerts.
- Ability to sort bus / drivers /conductors as required.
- Workshop manager/duty in-charge shall be provided real-time information and reports on staff presence from the system using the biometric attendance machine (integration of current biometric attendance system).
- Solution shall have ability to generate list of buses with their current location (in depot, workshop or on-service) and their history.

Performance Monitor

- Ability to capture KPI events as they occur
- Ability to capture crew performance
- Ability to capture vehicle performance
- Ability to capture depot performance
- Ability to capture incidents and trigger the training requirements for the crew
- Ability to generate a score/performance card for individual staff. (e.g. Conductor, Driver)

9.2.1_2 Vehicle Management

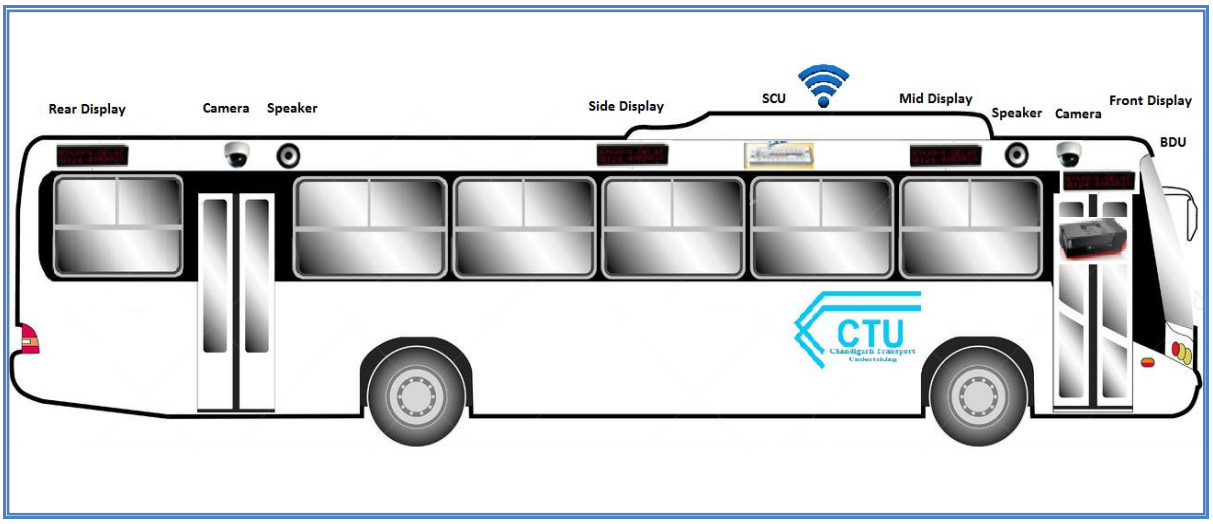


Figure 15: Bus with on-board ITS Equipment

- In addition to ensuring proper control of all statutory safety issues, vehicle management shall also provide a complete solution, looking to manage the maintenance of buses for maximum efficiency and longevity in accordance with manufacturer's recommendations.
- Ability to create their own scheduled maintenance activities each consisting of an unlimited number of user definable planned maintenance items.
- The activity cycle for each bus can be controlled by distance, days, hours or fixed date. Activities can either be scheduled individually or automatically up to any future date.

Defect Reporting

- Solution shall have a parallel system for managing unexpected breakdowns and repairs.
- The defect reporting system shall incorporate definable defect types, stored common defect descriptions and full implementation of the statutory reasons for failure structure.

Unscheduled Activities

- Ability to add unscheduled activities at any point of time, and can be attached to an existing scheduled activity.

Activity Planner

- Ability to include a planner for allocating scheduled and unscheduled activities into workshop.
- Ability to move activities to a different bay or time using drag and drop. The planner shall make the optimization of resources easy.

9.2.1_3 Security System

Facility Surveillance

Solution shall support integration with existing video surveillance system installed in bus depots and ISBT’s.

Employee Credentialing

Solution shall support integration of existing biometric attendance system installed in bus depots and ISBT's to maintain the security of public transport and support facilities.

9.2.1_4 Cash-Up and Deposit Module (Accounting)

The dedicated cash-up and deposit workstations in the Depot and Bus Terminal shall be used to carry out these functions:

- Solution shall calculate the Fare Collection amount at the end of each shift of the conductor.
- Solution shall have cash-up features to facilitate conductor deposits.
- Solution shall register the estimated amount to be deposited by the conductor and the actual deposited amount. The differences between these two amounts will be registered, linked to the specific conductor. In case of shortage the conductor will be informed and difference amount will be recovered from him.
- Solution shall have the ability to differentiate the cash transactions and smart card transactions.
- Solution shall allow conductors to obtain a printed copy of the deposit document.
- Solution shall have reports and for reconciling the conductor deposits.
- The dedicated cash-up and deposit workstations in the Depot or Bus Terminal (wherever they are installed) shall be used to carry out these functions.

9.2.2 Workshop Management System

All the buses are being maintained by CTU with its own staff, except for 100 buses operated from Depot-4 which are being maintained under comprehensive maintenance contract by Tata.

At present all bus depots have their own parking and workshops facilities where vehicle maintenance operations are being done. These include facilities for buse fuelling, washing and cleaning, inspection pits, tools and equipment for major and minor routine servicing and mechanical repairs, and facilities for changing and maintaining tyres.

All depots have workshops and all repairs are taken care internally in the depot except Depot-4, where comprehensive maintenance contract is given to TATA Motors. CTU is also planning to outsource the Comprehensive Annual Maintenance Contract (CAMC) for Depot-2 in future. (However Integration of TMS with WMS of Tata Motors of Depot-4 and WMS of agency which shall be adopted for CAMC of Depot-2 will be required).

Works Manager in depot takes care of all the maintenance activities at the depot level.

The WMS shall be deployed at each workshop area. This software will be part of a centralized system to manage unique information across the CTU facilities. Each and every fleet movement shall be captured in the system to track and reduce fleet's non-operational hours. WMS shall send alerts through SMS and Email to authorized staff.

The functional requirements for the system are listed below:

- Ability to create the bus as a maintainable asset in the system.
- Asset shall have unit make, model, part number and location of asset for both movable and immovable.
- Solution shall support creation of components for the bus.
- Solution shall support identification of components by serial and should have serial tracking.

- Ability to track MTBF/longevity of parts and consumables, failure patterns and potential cross-linkages (e.g. by make/model of bus)
- Solution shall have functionality for body repairs.
- Ability to have alerts for Fitness Certificate Renewal.
- Ability to perform reconditioning of assemblies and engines.
- Solution shall be able to track the spares required for maintenance and integrated with inventory system.
- Solution shall maintain the tyre tracking and tyre retreading.
- Ability to dispose of Scrap buses.
- The application shall capture tyre retreading cycle with history of kilometre run.
- Solution shall provide list of checks that should be done before the fitness certificate.
- Bus breakdown and accident details shall be captured in the application.
- Provision shall be available to capture bus maintenance on the application.
- Workshop specific scheduled maintenance alerts shall be sent to concerned staff or department.
- Solution shall provide query by fleet to view and update the fleet status. The solution shall have features to capture daily progress of particular bus depot-wise to track progress by type of workshop activity (accident, engine rebuild, fitness certificate, etc.)
- Solution shall have features to capture and report bus-wise insurance claims, road permit, etc.
- Solution shall capture scrap buses information along with history.
- Solution shall manage all buses and workshop equipment.
- Ability to capture all relevant bus information.
- Solution shall support all maintenance schedule and rebuilds (with Type-A and Type-B service)
- Ability to maintenance schedule based on hours, days, date, km travelled or a combination of these.
- Solution shall have functionality for defect rectification.
- Solution shall have functionality for running a maintenance campaign, such change of certain component on all buses.
- Ability to capture Permits and registration information.
- Solution shall create reports of fuel sheets and odometers.
- Ability to amortization of consumable items against services performed.
- Solution shall support maintenance of buses and depot equipment.
- Solution shall be able to define and record the manufacturer and model for bus.
- Solution shall be able to define and record the purchase and in service dates for bus.
- Solution shall be able to define and record the parts (e.g. engine) for bus.
- Solution shall be able to define and record the permits (i.e. licences) for bus.
- Solution shall be able to define and record the last service details for bus.
- Solution shall be able to define and record the odometer and service history for bus.
- Solution shall be able to define and record the fuel compliance for bus.
- Solution shall be able to define and record the warranties for bus.
- Solution shall be able to define and record the dimensions and weight for bus, components item within the fleet.
- Solution should be able to define and record the passenger capacity for bus.

- Solution should be able to define and record the warranty/expected life period.
- Ability to add mechanics to maintenance schedule.
- Ability to add inventory items to maintenance schedule.
- Ability to add a checklist of actions to maintenance schedule.
- Ability for workshop manager / team to view all defects at all depots.
- Ability for workshop manager / team to view all scheduled services at their respective depots.
- Ability for workshop manager / team to book a job at their respective depot.
- Ability for workshop manager / team to allocate / change a mechanic against a job.
- Ability for workshop manager / team to move jobs to another day.
- Ability for workshop manager / team to create a book back (i.e. tyre change in the morning, create a book back to bring the bus back in for a wheel nut retention).
- Ability to add/update labour on a work order.
- Ability to add/update inventory on a work order.
- Ability to post the work order (this process updates bus, inventory and other records).
- Ability to enter and track workshop labour costs.
- Ability to enter and track spare parts costs.
- Ability to enter and track consumables.
- Ability to compare KMPL statistics with historical data with date, month and year wise.
- Ability to define multiple cost categories.
- Details of detained bus with history should be reflected from Dispatch/Daily Operations.
- The following MIS reports from the tentative list but are not limited to:
    - Breakdown
    - Accident
    - Bus In/Out
    - Pending maintenance
    - KMPL for each Fleet
    - KMPL Comparison
    - Warranty status of parts
    - Vehicle Fitness Certificate, Road permit history
    - Complete history of each bus maintenance by month and year

Tyre Management

- Solution shall provide tyre tracking and tyre rethreading cycle with history of kilometre run.
- Solution shall be able to obtain precise information regarding the tyre operational conditions and how this can affect the performance and costs.
- Solution shall capture wear rates by tyre brand, size, type, bus and position.
- Solution shall capture cost per hour, distance.
- Solution shall capture details of rim tests and inspections, failure reasons, lost tread value.
- Solution shall keep track on the flow of tyres, moving in/out of the retreading shop and Km usage on buses.
- Solution shall keep history of the tyres and ability to link with Bus Number and its mounting positions.

- Solution shall be able to monitor tyre pressure.

Fuel Management

- Solution shall have capability to integrate with existing Fuel management system as per the detail provided in Annexure B.6.
- Opening of fuel stock shall be captured in the system.
- Fuel consumption shall be captured for each bus and notified by bus, bus type, depot, driver details etc.
- Solution shall have capability to integrate with bus fuel meter.
- Ability to interfaces with wide range of fuel gauge systems/external fuel suppliers.
- Ability to manually add a fuel sheet for each depot.
- Ability to add bus for fuelling not from that depot.
- Ability to enter fuel quantity and current odo-solution and km travelled from last odometer reading.
- Ability to enter oil, coolant, ad blue quantities.
- Solution shall have the ability to monitor and perform:
    - Tank Inventory Level Information
    - Tank Leak Detection

9.2.3 Stores and Inventory

Inventory control is seamlessly integrated into both scheduled and unscheduled activities. The default parts manifest for each maintenance activity can be created in advance and is then applied automatically as each activity is assigned to a date. As each date approaches the system shall automatically generate stock movements for the required parts raising supplier orders as required. The system shall allow adding additional parts to both scheduled and unscheduled activities as required. The module shall also include a comprehensive set of functions for the efficient management of warranty claims.

- The proposed Stores and Inventory application shall have features to generate purchase orders, maintenance details, previous quotes, etc.
- Inventory shall be implemented in single software, to maintain all the physical items belonging to this project and all the mechanical/electrical components required to maintain the fleet.
- Application shall have receipt of incoming goods.
- The application shall support barcode reader to read the item information, warranty, etc. and register into application.
- By reading the bar code label the application shall provide access to relevant information related to the corresponding good: warranty, batch, year of manufacture, etc..
- The application shall have provision to track goods transferred to other depots.
- Each item shall set with threshold level for stock. When the stock is going below threshold then system shall send alerts to concerned person(s) or department.
- The system shall have warranty information for each item with an alert if warranty near to expire.
- There shall be a provision to note the physical stock location number on the application to identify the stock easily.
- All the items entered into system shall have suitable information fields: date of manufacture, date of warranty expiry, batch, date of purchase, etc.
- Query screen to check warranty information of particular item shall be available.

- Asset scrap detail shall be entered in the system.
- The system shall have ability to enter and track items in stock.
- The system shall have ability to enter and track an item as consumable.
- The system shall have ability to enter and track issue equipment to staff.
- The system shall have ability to enter and track scan items to a work order.
- The system shall have ability to manage rebuilds stock.
- The system shall have ability to create and run stock takes.
- The system shall have ability to easily determine minimum quantity and reorder levels, and automatically popup a notification to generate purchase orders for those items.
- The system shall have ability to transfer stock to/from other warehouses.
- The system shall have ability to set items to ‘phase out’ or ‘obsolete’.
- Inventory management shall be able to capture new and used items.
- The system shall have ability to enter and track warehouse info.
- The system shall have ability to enter and track open PO’s/Receiving’s.
- The system shall have ability to track item history.
- The system shall have ability to enter and track item as used on vehicle-linked to service/repair history showing what buses have been fitted with that part.
- The system shall have ability to enter and track suppliers.
- The system shall have ability to enter and track notes linked to items etc.
- The system shall have ability to enter and track alternate items with serials.
- The system shall have ability to enter and track stock transfer from one warehouse to another.
- The system shall have ability to adjust stock quantities or average prices.
- The system shall have ability to enter and track set opening quantity on hand by stock adjustment at the time of new item creation.
- The system shall have ability to run annual or cyclical stock takes.
- The system shall have ability to generate a stock takes list of all items.
- The system shall have ability to randomly generate stock takes.
- The system shall have ability to enter and track stock takes item category wise.
- The system shall have ability to create stock takes with start/end item – e.g. all items between codes 00001-10000.
- The system shall have ability to apportion the total costs of a consumable item onto work orders over a period as specified by the user.
- The system shall have ability to do non-tracked item setup.
- The system shall have ability to enter and track service codes during item setup.
- The system shall have ability to enter and track a portion of the total cost for that item onto work orders that contain those service codes.
- The system shall have ability to enter and track work order in completed and posted phases.
- The system shall have ability to create and receive orders for parts stock.
- The system shall have ability to enter and track purchase orders for stock items and from a work order.
- The system shall have ability to enter and track posting receiving’s to update inventory, bus records.

- The system shall have ability to enter and track purchase order authorisation, can be enabled to set user's maximum ₹ value spend per item on a purchase order.
- The system shall have ability to send an email alert if exceeds the PO limit, to authorised user for approval.
- The system shall have ability to automatically generate purchase orders for stock items where the quantity on hand is less than the re-order level amount.
- The system shall have ability to track reorders generated from service template.
- The following MIS reports from the tentative list but are not limited to:
  - Monthly stock detail
  - Item wise stock
  - Item name & code with warranty
  - Stores accounting value
  - Utilized stock
  - Inventory control
  - Maintenance of stock record
  - Stock transfer
  - Asset detail
  - Asset summary – depot wise, division wise
  - Scrap detail

9.2.4 HR & Payroll

Human Resource and Payroll Software shall provide comprehensive solution to meet the demands of current CTU business processes and future needs based on the system requirements. The system shall enable the user the choice of sort order, selection of branch, department, position, etc. and other parameters to generate payroll output as per requirement, either on screen or as hard copies.

Following are the required major features of HR & Payroll, but not limited to:

- Management of employee information details
- Staffs score card system
- Time management using biometric machine
- Centralized system
- Quick payroll process
- Email alerts as per requirements
- Leave Management System
- Electronic salary slip generated automatically or on-demand by authorized staff.
- Integration with other systems of TMS, AVL and AFCS for crew details and leave information.

Workflow structure of the payroll system is showing as under:

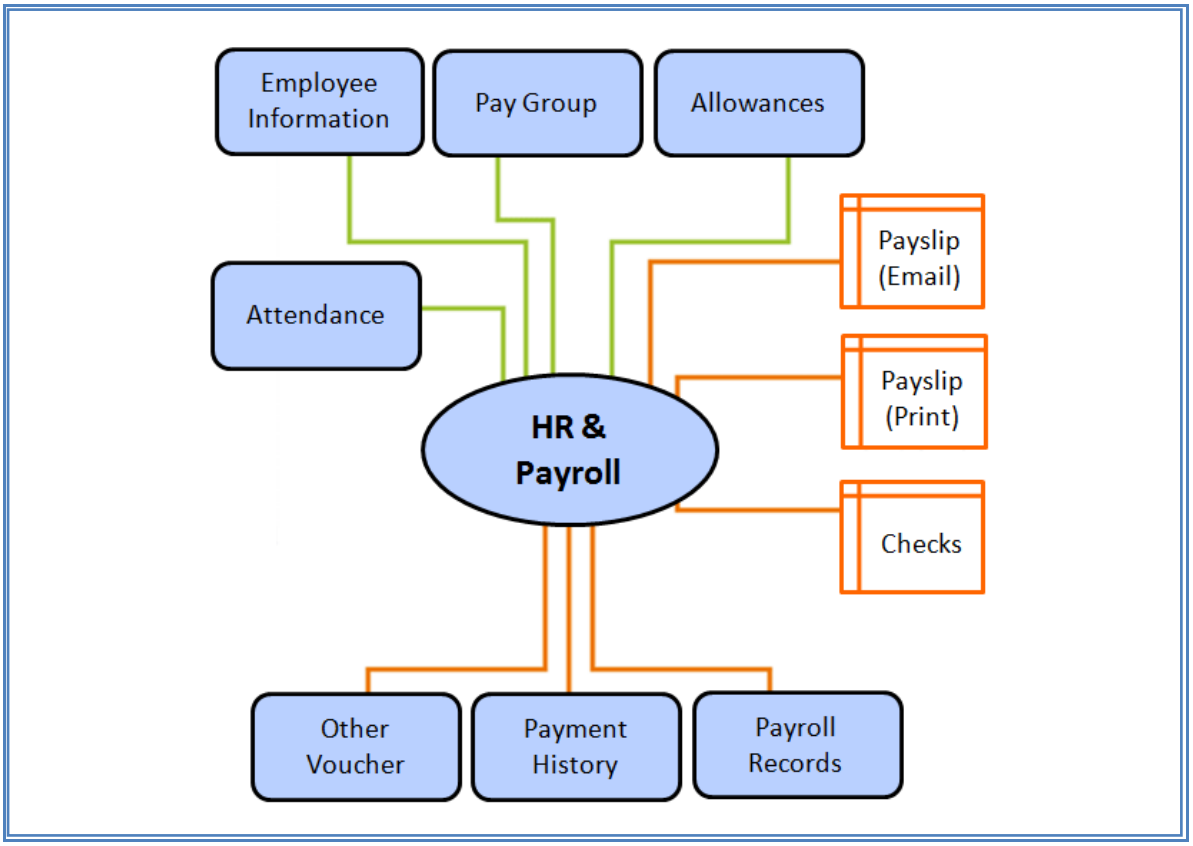


Figure 16: HR & Payroll Process

9.2.4_1 Employee Self Service (ESS)/Crew kiosk

- The system shall allow employees to initiate their own change of address and update his contact detail as well as emergency contact phone numbers when these change.
- The system shall allow employees to add dependents' birthdates and social security numbers.
- The system shall allow employees to update beneficiaries in Employee Self-Service.
- The system shall allow employees to see the various benefit plans available for them.
- The system shall allow employees to see their job title, supervisor's name and department information in Employee Self-Service. Although these items are usually only viewable but not editable to employees, they shall be able to alert the proper people when they think this information is not correct.
- The above is also true of salary information. The system shall allow employees to know how much money they make for their job and if they see a different amount in the Employee Self-Service module they will report their supervisor and possibly payroll section to get it corrected.
- The system shall allow employees to see their Performance Reviews through Employee Self-Service.
- The system shall allow employees to plan holidays by checking the leave balances and send leave application online.
- The system shall provide crew to see the duty and allocated bus for the duty.

9.2.4_2 Leave Management System

Solution shall have capability to integrate with existing Biometric Attendance System as per the detail provided in Annexure B.4.

Leave management system shall enable the HR manager to track and maintain leaves of the employees of the firm / organization. The leave management module shall allow definition of various leave types based on their eligibility, which could be assigned to various employee levels. Various types of leaves are:

- Earned Leave (EL) / Privileged Leave (PL)
- Casual Leave (CL)
- Sick Leave (SL)
- Compensatory off (Comp offs)
- Maternity Leave (ML)
- Paternity Leave (PL)

Leave management system shall enable user to create and configure leave types as per grades, designation or any other hierarchy in the organization which are driven by the rules and HR policies. Leave policies shall be configured based on the requirements.

- Applicability of leave type to a pre-defined grade.
- No of leaves eligible / yearly quota per leave type.
- Monthly leave accrual setting.
- Leave rule during probation period.
- Leave to be applied by no of days in advance.
- Leave regularization policy within a defined time period.
- Define a window of no. of day for long & short leave application.
- Sandwich leave rule configuration that is leaves taken between public holidays or weekly offs.
- Validate if two leaves types can be clubbed.
- Leave encashment & carry forward policy.
- Leave type lapse rule for paid leaves, sick leave, comp offs.

Leave management system shall allow the user to configure and exports the reports as part of the MIS and alerts. It shall allow to maintain the leave record of all the staff and officers and reports can be generated for different departments and to schedule the allocation of resources based on the leave calendar.

9.2.5 Accounting

Accounting software shall record and processes transactions within functional modules such as accounts payable, accounts receivable, general ledger and trial balance. It functions as an accounting information system.

- Solution shall have ability to generate fund receive and transfer.
- Solution shall have ability to generate fund allocation.
- Solution shall have ability to generate receipt and payment.
- Solution shall have ability to generate bank book.
- Solution shall have ability to generate cash book.
- Solution shall have ability to generate petty-bills and establishment bills from concerned department and e-audit and e-payment.
- Solution shall have ability to generate cancellation of cheque.

- Solution shall have ability to generate stock book of cheque book.
- Solution shall have ability to record of bank guarantee received from various vendors.
- Solution shall have ability to generate travelling allowance.
- Solution shall have ability for deduction of IT/TDS from bills and other related activities.
- Solution shall have ability to provide difference of bills.
- Solution shall have ability to provide arrears payment as per labour settlement rules.
- Solution shall have ability for payments of retirement, dismissed, resigned employees, etc.
- Solution shall have ability to provide Section/ Department wise profit and loss.
- Solution shall have ability to provide costs for Maintenance, Body building, etc., by depot and division.
- Solution shall have ability to create scrapping bus/equipment process including tender, award, profit, reuse, etc.
- Solution shall log any changes/deletions of account related data. This log files should be fully protected from deletion.
- Solution shall support calculation and allocation of budget for division, depot, and other infrastructure associated to the project.
- Solution shall provide for budget grant allocation.
- Solution shall have ability to save all PO's in the system.
- Solution shall provide for processing pay order and loan repayment interest, etc.
- Solution shall have ability to record all movable and immoveable assets of corporation.
- Solution shall have ability to maintain seven years of transaction history.
- Solution shall have ability to enter budgets and report on variances.
- Solution shall have ability to enter forecasts and report on variances.
- Solution shall have ability to dynamically drill down to account and transaction level.
- Solution shall have capability to require manager approvals of transactions prior to posting.
- Solution shall have ability to group accounts into categories for reporting.
- Solution shall provide minimum reporting consisting of Balance Sheet, P&L, Income Statement, Cash Flow, Trial Balance, AP, AR, Payroll.
- Solution shall have ad-hoc reporting ability and easy export to Excel in a user friendly manner.
- Solution shall have flexible time reporting parameters - monthly, quarterly, annually or custom dates.
- Solution shall have ability to add distinct operating entities to accommodate growth and expansion.
- Solution shall have ability to facilitate multiple funds.
- Solution shall have ability to create recurring entry templates.

Accounts Payable & Receivable

- Solution shall have ability to categorize vendors.
- Solution shall have ability to assign payment priorities by vendor type.
- Solution shall have ability to enter multiple addresses - pay to and delivery - for each vendor.
- Solution shall have ability to apply concessions and credits based on payment terms.
- Solution shall have ability for automated check signing based on payment amounts and vendor type.
- Solution shall have ability for electronic approval process.

- Solution shall have ability to void open transactions, void checks, etc.
- Solution shall have ability to scan and attach supporting documentation for each transaction.
- Solution shall provide reports by aging, vendor type, and categories.
- Solution shall accommodate multiple payment methods - check, direct deposit, wire transfer (ACH).
- Solution shall detect and notify duplicate transactions (i.e. prohibits double paying on same invoice).
- Solution shall have ability to produce relevant tax forms at year end.
- Solution shall have ability to make and track partial invoice payments to vendor across multiple financial periods.
- Solution shall have ability to issue refunds/corrections to vendor accounts within the Accounts Payable module.
- Grant tracking - support tracking based on amount or percent completion.
- Grant tracking - ability to track grants across multiple financial periods.
- Solution shall have ability to retrieve 7 years of Accounts Payable history.
- All Accounts Payable functionality supports transactions originating from grants and purchase orders.
- Solution shall have ability to make payment and record partial deliveries and encumber remaining funds on purchase order.
- Solution shall have ability to set up customer categories.
- Solution shall have ability to record multiple addresses for each customer.
- Solution shall have ability to establish on-line approval process for issuing invoices and receiving payments.
- Solution shall have ability to adjust or void open receivables.
- Solution shall provide reporting by customer, type code, timing, PO number, department, GL account number, reference comment.
- Solution shall have ability to print customer statements with payment information.
- Solution shall have ability to apply partial payments without impacting the total invoice amount.
- Solution shall have ability to accept electronic payments.
- Solution shall have ability to edit payment terms.
- Solution shall have ability to establish inventory tracking of purchased items (bus passes) and tracks outstanding inventory in a "system manager" module or account.
- Solution shall have ability to batch process.

Fixed Asset

- Solution shall have ability to categorize assets with different depreciation rules and time periods.
- Solution shall have ability to track assets and assigning location, user, department/division and cost centre.
- Solution shall have ability to depreciate assets over 12 equal periods.
- Solution shall have ability to support multiple asset transactions (acquisitions, disposals, partial disposals, transfers, additions, etc.).
- Solution shall provide barcode scanning capabilities for fixed asset tracking.
- Solution shall integrate fixed asset module with purchasing module and payables module to streamline transaction tracking.

- Solution shall provide automatic assignment of Fixed Asset tracking number with ability to manually edit.
- Solution shall have ability to adjust asset value with explanation.
- Solution shall have ability to attach supporting documents/transactions to Fixed Asset record.

Procurement

- Solution shall provide integrated requisition and purchase order system.
- Solution shall have ability to support requisition approval rules and workflow based on established role and amount levels.
- Purchase Orders - ability to add notes to issued purchase orders (late deliveries, status, issue resolution, performance of vendor, etc.).
- Purchase Orders - capability to initiate tracking asset information to the location, user, department/division, and/or cost centre.
- Solution shall have ability to track partial receipts against purchase orders.
- Solution shall have ability for on-line approvals for requisitions/purchase orders with automatic forwarding to next approval level.
- Solution shall have ability to support non-material goods such as services.
- Solution shall have ability to email/fax purchase orders to vendors.
- Solution shall support multiple items per vendor.
- Solution shall support multiple contacts and addresses for vendors.
- Solution shall support custom reporting of activity - outstanding purchase orders, balances, by vendor, by item/category.
- Solution shall support blanket purchase orders.
- Solution shall have ability to copy and edit existing purchase orders to produce new purchase order.
- Solution shall support generating revised purchase order number when Purchase order is revised.
- Solution shall have ability to close purchase order without paying full amount.
- Solution shall provide reporting - ability for ad-hoc reporting by PO#, vendor, item type, requestor, date, open/closed status, etc.

9.2.6 Management Information System & Enterprise Resource Planning (MIS/ERP) System

A management information system (MIS) needs to let management know how well the city bus operation is doing in a particular area.

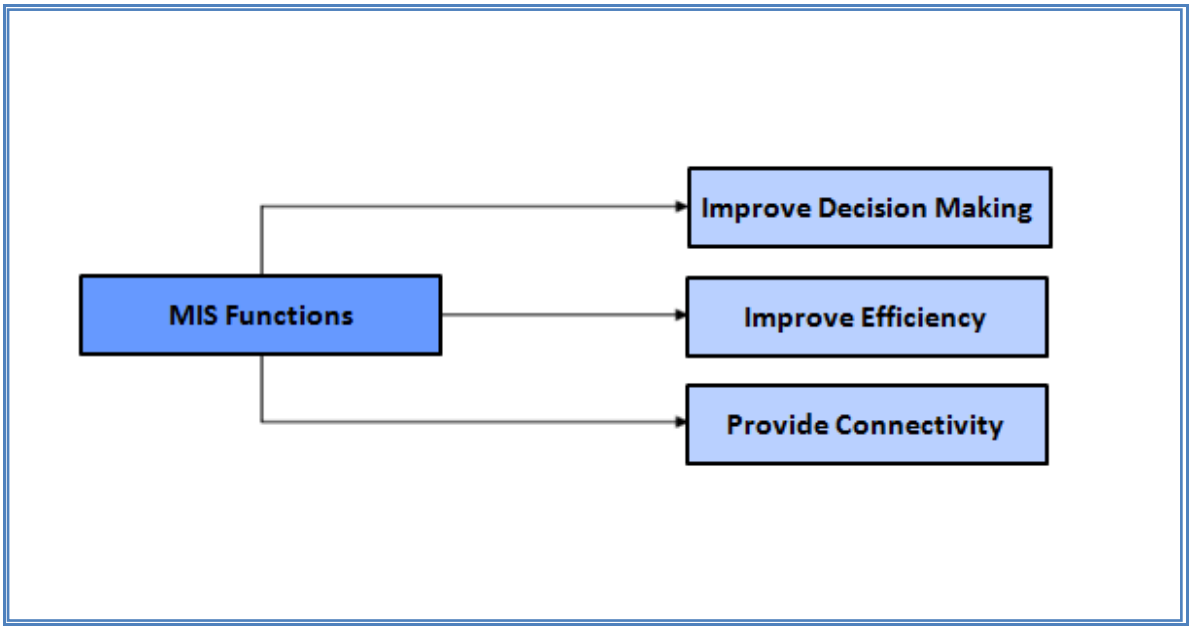


Figure 17: MIS/ERP Functions

To improve decision-making:

MIS shall help management by providing background information on a variety of issues and helps to improve the decision-making quality of management. The fast and accurate information supplied by MIS is leveraged by the managers to take quicker and better decisions thereby improving the decision-making quality and adding to the bottom line of the company.

To improve efficiency:

MIS shall help managers to conduct their tasks with greater ease and with better efficiency. This reflects in better productivity for the company.

To provide connectivity:

- Ability to provide MIS managers with better connectivity with the rest of the organization.
- With the ability to automate processes. It provides better operational, financial and accounting control over its billing operations and receivables.
- MIS/ERP system can be used for accomplish every task by integrating the information system, seamless flow of information across every department. It is helpful to make automation of every business process.
- MIS/ERP system shall treats the organisation as single entity and caters to the information needs of the whole organisation because information is the key resource of every organisation to win the competition. ERP system provides accurate, relevant and timeliness information to all department on one software system.
- Ability to provide information updated and on real time.
- Ability to provide answer of any query by its powerful query and filtering facility.
- Ability to provide the facility to manage import, export, and tax and fulfilling other legal requirements.
- Ability to provide all financial analysis under finance modules and complies with CTU and other international accounting standards.

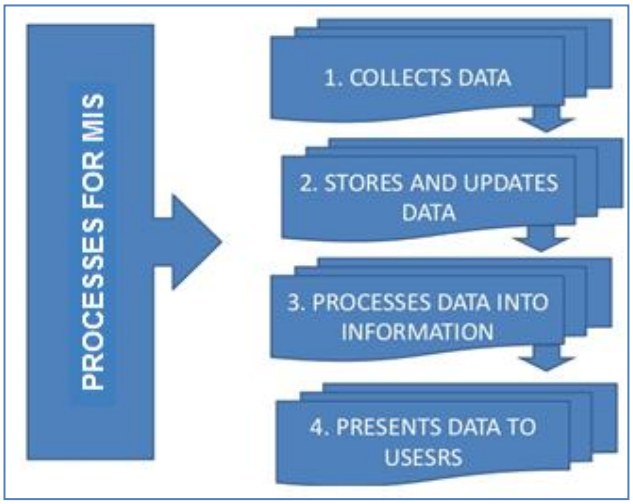


Figure 18: Processes for MIS

MIS Reports Requirements:

The Solution shall provide standard reports based on the system. Summary reports for different levels of management staff shall be designed By SI during the design stage. Automated graphs/plots for commonly used data shall be provided.

Following are tentative list, this may be updated/added during design and implementation period:

1. Schedule adherence at depot, terminal and various selected bus stops/stations
2. Headway adherence/Bus bunching report
3. Active fleet (weekday and weekend)
4. Service hours and mileage
5. Speed violation reports
6. Alerts reports
7. Missed/Cancelled Trip
8. Route Deviation
9. Dead KMs report
10. Vehicle Distance Travelled as per schedule/ trip/ charted trip
11. Bus stop skipped
12. Improper stop report
13. Daily bus out shedding report
14. Bus breakdown report
15. Depot IN/OUT report
16. Monthly summary reports breakdown by system, division, depot, route, bus type, driver, conductor, bus make, etc.
17. Bus Location : by date/time, location, and other parameters
18. Driver performance report consisting of bus stop skipping, harsh acceleration, harsh deceleration, over speeding, etc.
19. Fraudulent activity reports with the hardware (Tampering reports)
20. Faults and errors
21. Bus trip reports;
22. System exceptions reports
23. System performance and activity reports
24. Financial reports SLA violation report based on the business rules specified in bus operations tender.
25. Travel time reports between stops.

26. Reports on events that hinder movement of buses.
27. Consolidated GPS analysis report – service provider wise, bus wise, depot wise, service wise
28. Estimation of cost and collection reports for each route.
29. Historical reports
    a. Employee detail
    b. Bus detail
    c. Bus stops names by route

The SI shall be able to collect all the required data from the OBITS to generate the required PIS display data and MIS reports.

- The solution shall have the capability to generate reports based on exceptions as per thresholds set by the CTU for various AVL components.
- The solution shall have the capability to generate report for penalty based on defined SLA's.
- All reports must use standard reporting tools (e.g., Crystal Reports) and have the ability to export data into file formats that can be exported to and edited with standard office software (e.g., Microsoft Word, Adobe Acrobat and Excel)

  Any portion of the transactional database shall be exportable in standard formats (such as .csv, xls, xlsx, xml, etc.) for analysis in third party programs. (".xml" in case of uploading on CCH in further reference)
- It shall be possible for users to build custom reports from the data in the transactional database with support tools such as Crystal Reports and MS Excel. The reports should be customizable for various time periods through the dashboard of the reporting system.
- The Solution shall provide sufficient summarized and detailed data, including features to generate standard report based on pre-established criteria, as well as as-required reports based on a user-definable set of search criteria.
- Reporting software shall include the ability to generate graphs and charts based on criteria and format defined by the user.
- All reports shall be generated with configurable time parameters, including as a minimum annual, monthly, weekly, daily, hourly and with user defined start-end date and time ranges.
- As a minimum, the system shall generate required standard system reports daily, weekly, monthly, quarterly and annually. These reports shall be available through the AVL Application Software.
- The SI shall provide an ad-hoc reporting function and interface into the data and reports server to allow CTU personnel to create, execute and receive custom reports without SI assistance. An Internet-based interface shall be provided for this function, accessible by CTU personnel with appropriate permissions. CTU users shall be able to generate ad-hoc reports and do additional analysis of ridership, revenue and other System data. The SI shall enable CTU's staff to generate reports and use the system. Examples of the types of reports include:

  a) Transaction-level reports by stop and for user-defined start and end points;

  b) Statistical and research reports using user-defined criteria.

- It shall be possible to aggregate data (filter) for reporting, at a minimum, by:
  - Date/Time
  - Origin
  - Destination
  - Location
  - Bus number

- Crew Name

It shall not be necessary that values be consecutive for the purposes of aggregation (e.g. non-consecutive months).

- The actual bus operational business rules will keep varying and the CTU shall share the same with the selected SI from periodically, which the SI has to reflect in the AVL application for generating any additional reports during the project period.
- The Solution shall be capable of establishing automatic periodic (monthly/quarterly/yearly/ routines to automatically produce and email standard reports to defined user groups.
- The Solution shall provide a web-based reporting tool to allow for access from anywhere. The access and views of the reports will be based on Role based access control.
- Solution shall allow CTU to generate Summary and Detail reports as applicable.

MIS with ITS Sub system:

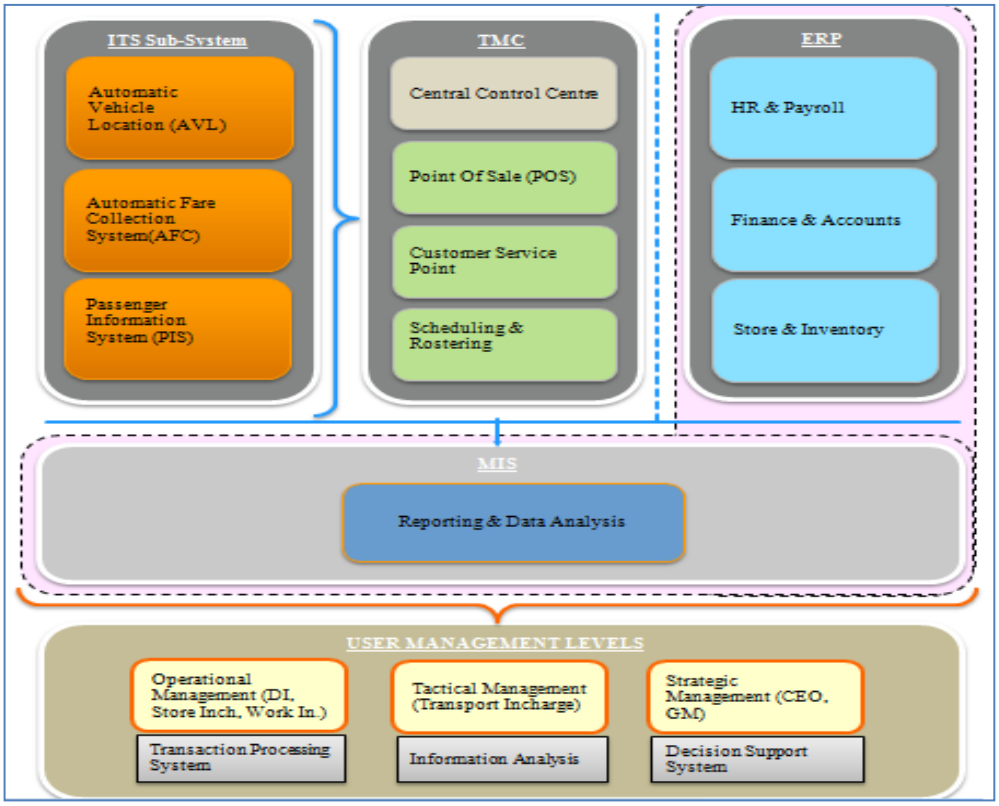


Figure 19: MIS with ITS Sub System

9.2.6_1 Dashboard Capabilities

- Providing holistic, integrated information to the CTU management through detailed MIS reports and user friendly, flexible dash board consisting of tables and graphs.
- Provide ridership and mode share details on a daily, monthly and yearly basis using filters in the dashboard. The information shall also be provided through filters by bus, route, conductor/driver, schedule, origin, destination and various other useful decision making parameters.

- Provide passenger counts and revenue information in real time and/or preset intervals as stated by the CTU during the design phase.
- Provide route and schedule adherence information with various filters for the decision makers to get an understanding of the ground problems.
- Provide bus maintenance information in terms of preventive and reactive maintenance (breakdowns, etc.).
- Provide critical stores & purchase inventory details for decision support.
- Display information in an easy-to understand format and use intuitive and interactive visualization to enable management users within authority to quickly navigate, understand, and investigate data elements to make informed decisions.
- Have a default configuration and landing page for each user or user-group that are editable.
- Allow multiple visual elements to be laid out on the same display.
- Have the ability to display dashboards and reports using different visual elements including charts, maps, calendars, gauges, images, tables, visual and textual lists, and alerts as follows:
    - All visual elements shall have editable titles, labels, legends, axes, icons, and colours, where applicable.
    - Display clickable contextual information related to the metrics being viewed and allows the user to drill down on contextual information as required. Charts shall support at least the following chart types:
        - → Bar Charts
        - → Histograms
        - → Line Charts
        - → Pie Charts
- Maps shall have GIS Maps extension to allow plotting different mark-ups and indications on a map view using base and spatial map layers and allow the user to zoom and pan freely through the map, and be able to present heat map visualizations on GIS map data.
- Calendars shall allow the user to intuitively navigate through calendar fields, such as day, month, and year. Gauges shall have the look and feel of an analog gauge (needle) with configurable level markings that gives a visual display of the amount, level, and measure of defined KPI.

  Tables shall be able to:

    - Hold a large amount of data.
    - Allow the user to scroll through the data in all directions.
    - Freeze the header columns and rows when the user scrolls.
    - Allow the user to enlarge/decrease the font.

  Visual and textual lists shall allow the user to scroll through all of the available list items with smooth scrolling. Allow the user to choose the proper visual element required to display the required KPI data and allow the user to easily switch between alternative visual elements.
- Have view-management tools, allowing the user to move, reorder, enlarge, shrink, open, and close visual elements with intuitive interaction.
- Allow the user to create a new visual element based on the available visual element types and customize an existing visual element with an easy-to-use graphical interface.
- Allow the user to save any customization done on a visual element.

9.2.6_2 Business Intelligence and Reporting

Business intelligence (BI) shall encompasses a wide variety of tools, applications and methodologies that enable CTU to collect data from internal systems and external sources, prepare it for analysis, develop and run queries against the data, and create reports, and data visualizations to make the analytical results available to corporate decision makers as well as operational workers.

BI data shall include historical information, as well as new data gathered from systems as it is generated, enabling BI analysis to support both strategic and tactical decision-making processes.

- Solution shall provide a broad set of data analysis applications, including and querying, enterprise reporting, and online analytical processing.
- Solution shall also include software for designing charts and other, as well as tools for building BI dashboards and that display visualized data on business metrics and in an easy-to-grasp way.
- Solution shall help in optimizing internal business processes.
- Solution shall increase operational efficiency.
- Solution shall driving new revenues.

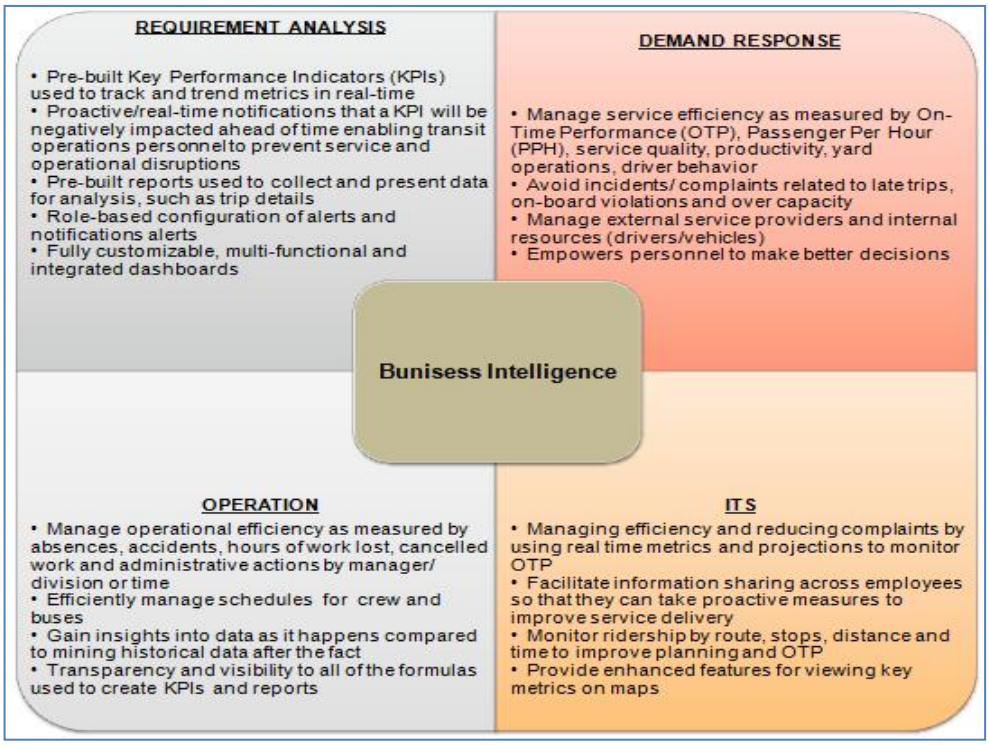


Figure 20: Business Intelligence factors

BI Configuration Management

- The Solution shall allow the authorized user to complete the following functions:
  - Manage the different KPIs available by adding, modifying, or deleting KPIs or KPI groups areas using a GUI.
  - Enable or disable KPI which activates or inactivates it but does not delete it.

- Configure a KPI including its ID, name, description, area, data source, format, unit, frequency, and formula.
- Configure the user access level required to view each KPI.
- Choose the default and alternate views for displaying a KPI.
- Drill down by clicking on a KPI to view its details and edit it.
- Search, sort, and filter KPIs by ID, name, frequency, measure, and indicator area.
- Show/hide disabled KPIs from the KPI management screen.
- Manage data sources for the KPIs easily through a GUI.

- The Solution shall have the ability to present an intuitive GUI allowing the authorized user to configure the threshold values and levels (green, yellow, red, or as defined as per management preference) for a KPI by defining score card algorithms.
- The Solution shall have the ability to clearly present multiple KPIs in the same view.
- The Solution shall have the ability to Configure KPIs that are aggregates of multiple other KPIs from different areas.
- The Solution shall have the ability to instantly and automatically update the other dashboard components with any new KPI or changes to the configuration of current KPI's.
- The Solution shall have the ability to Store each KPIs current and historical measure.
- The Solution shall have the ability to Configure KPIs with multiple data sources.
- The Solution shall have the ability to run algorithms to calculate the measure of a KPI based on data from subset KPIs.
- The Solution shall have the ability to Store the different access levels for each of the authorized users.

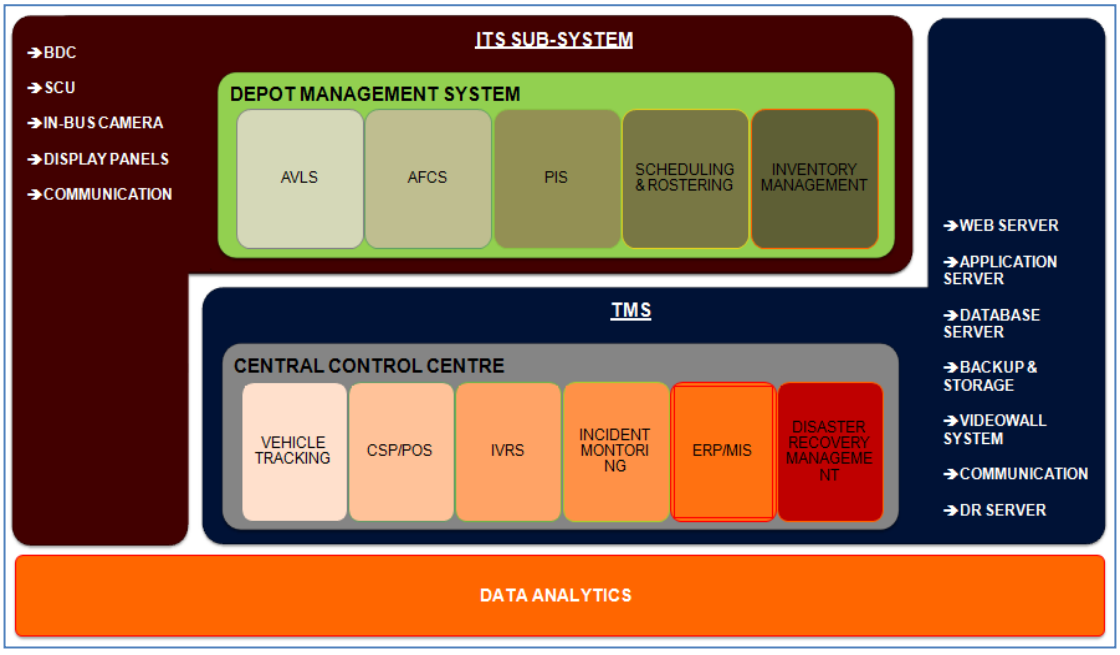


Figure 21: BI Management

9.2.7 Network Management System (NMS)

- Solution shall include all hardware and software required to configure, control and monitor the Ethernet connected SNMP/ICMP based devices.

- The solution shall have an integrated user-friendly application.
- Solution shall provide real-time monitoring for the entire network infrastructure and allow users to easily navigate with graphical and easy to use network management tools.
- Solution shall provide equipment downtime/uptime reports, bandwidth utilization report etc.
- Solution shall support SNMP V2 or higher and shall automatically discover, poll and manage SNMP and ICMP based devices.
- Solution shall provide at a minimum, even alert via email and sms.
- Solution shall monitor the fixed communications network, to report or generate alarms in case of and optical fibre/Cat 6 cable failure or communications failure to any SNMP/ICMP capable field device.
- Solution shall automatically generate reports on a daily, weekly or monthly basis in formats including graphs, bar charts, distribution and summary. The solution shall be capable of printing out reports and also exporting the reports to other systems or web servers.
- The solution shall automatically layout the map network as tree, ring or bus topology. Each map object shall use a device specific or user selected icon and the object colour shall indicate the device status.
- The solution shall display a simple map of the whole network as a tree and shall have to option of direct selection of objects. The solution shall provide a navigation tree to display the current alarm status of each subnet.
- The solution shall provide polling agents to upload status, changes or alerts of the local devices attached with the Ethernet.
- The solution shall provide Real Time Management Information Bases (MIBs) displays and shall provide the MIB variable data in tabular or graphical format. The MIB displays shall provide various expressions like utilization, percentage errors and volume.
- Solution shall be connected with Ethernet backbone at the TMC using at a minimum CAT 6 cable.
- The solution shall provide features for security and accountability and shall generate a log file for any user access to configuration or platform changes.
- Solution shall include all hardware and software required to configure, control and monitor the Ethernet connected SNMP/ICMP based devices.

Integrated Performance Management System

Solution shall provide comprehensive end-to-end performance management across key parts of the IT infrastructure.

- It shall allow identifying trends in performance in order to avert possible service problems and consists of:
    - **Network Performance Monitoring** - The Network Performance Management consoles shall provide a consistent report generation interface from a single central console. This central console shall also provide all required network performance reports (including latency, threshold violations, packet errors, availability, bandwidth utilization etc.) for the network infrastructure.
    - **Integrated Network Traffic Analysis System** – It shall provide details of applications, hosts, and conversations consuming WAN bandwidth to isolate and resolve problems. Traffic monitoring system shall able to track 100% of all flow traffic on the network and identify malicious behaviour with all IP conversations. It shall use non-intrusive monitoring to reduce the impact on the monitored network and improve scalability.
    - **Server Performance Monitoring –** It shall integrate network performance management systems and gives the unified performance state view in a single console. The performance state of the entire network and server infrastructure shall visible in an integrated console.

- **Database Performance Monitoring –** It shall integrate network and server performance management systems and provides the unified view of the performance state in a single console. It shall automate monitoring, data collection and analysis of performance from single point**.**

Application Performance Management System

- **Application Transaction Performance Monitoring System –** It shall determines, if the root cause of performance issues is inside the monitored application, in connected back-end systems or at the network layer from a single console view. It shall proactively monitors 100%of real user transactions; detect failed transactions; gather evidence necessary for triage and diagnosis of problems that affect user experiences and prevent completion of critical business processes.
- **End-user Experience Monitoring System –** It shall measure the end users' experiences based on transactions without the need to install agents on user desktops. It shall detect user impacting defects and anomalies and reports them in real-time: Slow Response Time, Low Throughput, Partial Response, Missing component within transaction.

Integrated Helpdesk Solution

- Helpdesk Management Solution shall improves quality and responsiveness of IT support by automating help desk, self-service, knowledge management and root cause analysis.
- Solution shall provide flexibility of logging, viewing, updating and closing incident manually via web interface.
- The helpdesk solution shall support automatic problem registration, based on predefined policies and supports request management, problem management, configuration management and change order management.

Identity and Access Management

- Solution shall facilitate user security administration activities in terms of creation of user IDs, user profiles, attaching the user profiles to the user IDs, modification of user privileges etc.
- Solution shall have audit trails built in for all the activities performed by the super user in the system for user administration, database management, business rule changes, system upgrades etc. Such audit trails, at a minimum, shall capture the details of name of the user, changes made, time & date of change, name of approver (if applicable), etc.
- Password Management services must enforce password restrictions, which include the criteria and limitations that can be placed on passwords to increase security. It should provide features such as periodic forced changes, not reusable, hard to guess, mixed characters etc.
- Successful user login requests should be logged for investigative purposes in case of a security breach.
- The solution must monitor unauthorized attempts to access the system.
- The solution should be capable of secure, tamperproof auditing and logging which can stand in the court of law through implementation of advanced features.

9.2.8 Grievance Redressal Management System (GRMS)

The scope involves implementing an integrated web based and mobile application platform providing the following set of features:

- User should be able to log grievance through mobile app.

- Grievances should be automatically forwarded to the respective department/official based on the rules that can be configured.
- Based on type of grievance – Every grievance should be linked with respective department/official.
- A web portal for the passenger like the mobile app to register their grievances.
- The portal and the mobile apps should be in synchronization for all the grievances i.e. grievances registered from the mobile app can be seen on the portal too.
- Passenger can call up the Call Centres to register their grievances, these grievances then can be logged into the solution by the call centre operator.
- Passenger can also submit their grievances in writing at the office(s) or via email. These grievances then can be logged into the solution by an operator.
- Admin website for the organization to view, monitor and track all the grievances reported by the passengers.
- Mobile app and website for the passenger to view, track and escalate their grievances.
- A drill down dashboard up to 3 level and MIS reports for the organization to monitor and enable good governance.
- The grievance module should be able to categorize the grievances and should have a built-in escalation framework.

9.3 Integration Requirements

- Integrate with TMC centre for transfer of data: DMS, WMS, Store & Inventory, HR & Payroll, Accounting, ERP/MIS etc. The same integration requirements as indicated in section 7.4 apply.
- Integrate between internal departments of Depots, like Workshop, Store Section, Yard Section, Duty Section, Box Branch, Cash Branch, ITS Cell, PMA Section etc. for transfer of data between them.
- Integrate of TMS with the following existing systems:
  - Biometric Attendance System Details (Refer Annex B.4)
  - Automatic Boom Barrier Gate System Details (Refer Annex B.5)
  - Fuel Pump Station Details (Refer Annex B.6)
- Integration of existing Workshop Management System: CTU is also planning to outsource the Comprehensive Annual Maintenance Contract (CAMC) for Depot-2 in future. (However Integration of TMS with existing modules of Tata Motors of Depot-4 and modules which shall be adopted for CAMC of Depot-2 will be required by the prospective vendor).

10 COMMUNICATIONS

10.1 Architecture

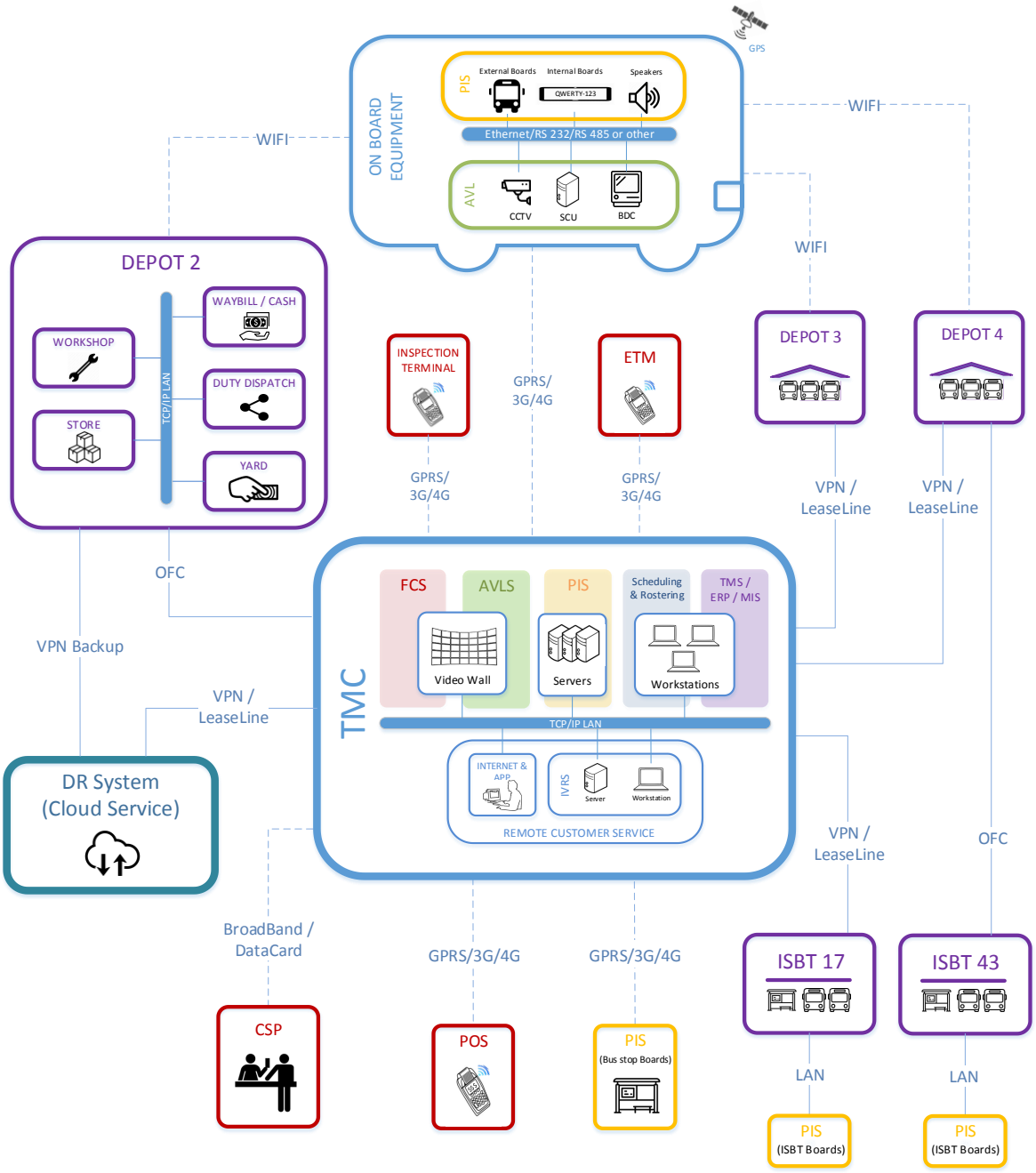


Figure 22: Global Communication Architecture

10.2 Communications between TMC and the buses

There will be two communication means between TMC and buses:

- **3G / 4G mobile communications:** ETM and SCU shall have a SIM module to send and receive transactions and other real-time data from / to AVL, PIS and AFCS systems. These modules shall provide a redundant communications system to guarantee it if one module faults.
- **Wi-Fi in depots:** the buses shall allow communication to TMC through a Wi-Fi connection installed in depots. Data will be submitted from depots to TMC and vice versa. This mean will be used to:
  - Download in buses software updates and other large files that are not required in real time during bus operation.
  - Download in depots CCTV information recorded during the service.
  - Download in depots the transactions that, by failure in the mobile communications systems, could not be sent during the service.

10.3 Communications between TMC and on-street PIS displays

There shall be mobile communication means between TMC and on-street PIS displays:

- **3G / 4G mobile communications:** Led Panels with its controller enabled with mobile SIM card slots for communication shall be used to send real time data like bus arrival information's using AVL. The data shall be sent to PIS displays on periodic intervals, also in case of any emergency operations, message will be communicated to PIS using mobile communication.

10.4 Communications between TMC and sales network, customer service points and inspection equipment

10.4.1 Communication between TMC and POS's

There shall be mobile communication means between TMC and Sales network:

- **3G / 4G mobile communications:** Hand held machines/PDAs enabled with mobile SIM card slots for communication shall be used to recharge smart cards, and shall send and receive smart card recharge transactions data on real-time to server at TMC. The data will also be locally stored in Hand held machines/PDAs, in case of communication failure same will sent to server at TMC later upon network recovery.

Exception: In case of mobile communications failure the information interchange between POS's and TMC can be done by using fixed broad band connection through Internet service providers, via Ethernet and/or WiFi.

10.4.2 Communication between TMC and Customer Service Points

There shall be two communication means between TMC and Customer Service Point:

- **3G / 4G mobile data card communications:** The Customer Service Point will be equipped at least with a computer, receipt printer, smart card label printer, web camera and smart card reader to issue new cards or refund/blacklist card and to solve user incidences. The computer for Customer Service Point will communicate with server at TMC through 3G/4G mobile data card to send and receive smart card sale and recharge transactions data on real-time to server at TMC, configuration data, alarms, commands and software updates.
- **Broadband Connections:** The interchanged information between Customer Service Points and TMC can be done by using fixed broad band connection through Internet service providers. This mean will be used to communicate with TMC for providing customer service.

10.4.3 Communication between TMC and Inspection equipment

There shall be mobile communication means between TMC and Sales network:

- **3G / 4G mobile communications:** Hand held machines/PDAs enabled with mobile SIM card slots for communication shall be used to inspect the onboard smart card commuters and conductor, and shall send and receive data on real-time to server at TMC. The data will also be locally stored in Hand held machines/PDAs, in case of communication failure same will sent to server at TMC later upon network recovery.

Exception: In case of mobile communications failure the information interchange between inspection equipment and TMC can be done by using fixed broad band connection through Internet service providers, via Ethernet and/or WiFi.

10.5 Communications between TMC and depots

There shall be two communication means between TMC and depots:

- **Optical Fibre Cable (OFC):** The OFC based fixed communication system shall be designed to transmit /receive the data traffic from/ to bus-depots to TMC or the Control Centre. The OFC based communication system shall provide connectivity to bus depots and TMC, each of these locations shall have an independent Layer 2 Gigabit Ethernet based switch that shall support 1 Gbps of network bandwidth for backbone communications. The approximate length of OFC required is 1000 mtr, however the SI may obtain the actual length of OFC by visiting the site location mentioned below. The location details of OFC communication are given below:

  1. Depot 1 to TMC (CC + DR)
  2. Depot 2 to TMC (CC + DR)
  3. Depot 4 to ISBT 43

- **IP Virtual Private Network (VPN):** The VPN network shall be used transmit /receive the data traffic from/ to bus-depots to TMC. The VPN network provide secure and fast medium to transfer data between depots and server at TMC. The location details of VPN/Lease line communication are given below:

  1. ISBT 17 to TMC (CC + DR)
  2. Depot 3 to TMC (CC + DR)
  3. Depot 4 to TMC (CC + DR)
  4. VPN to TMC (CC + DR)

11 MAINTENANCE

System Integrator shall provide according to contract material and human resources needed to reparation and proper function of systems object of maintenance and installation.

Maintenance service shall include according to different equipment and systems included in contract scope the following maintenance levels:

- Level I:
  - Preventive maintenance of equipment, communications and systems:
    - → Tasks definition and their periodicity
    - → Inspection performance
    - → Components, elements or installations replacement when they do not pass functional tests
    - → Maintenance monitoring reports
  - Hardware replacement in buses and adapting deteriorated facilities.
  - Corrective reparation of on-board equipment and other HW equipment:
    - → Damage alarms reception occurred in facilities
    - → Damage alarms communication to maintenance team that shall perform the action
    - → Performance of needed reparation tasks
    - → General operation check
    - → If necessary, incidence reporting to Level II team
    - → Maintenance monitoring reports
  - Minor software operations, such as simple common operations in computer equipment (directory management, system restart...), basic configurations (introduction of vehicle identification parameters ...), user-level operation of the software to maintain, etc.

This maintenance will normally be carried out at CTU facilities or the SI facilities, by the staff that the SI adheres to the contract, with sufficient dedication, that guarantees a correct execution of the services contracted, and in the quantity and with the minimum qualification required in the 11.3 section.

- Level II:
  - Assignment and annotation of complex failures in the onboard system.
  - Availability of qualified field technicians.
  - Technical support in TMC and TMS specialized in operations and software processes.
  - Repair of dysfunctions in communications installations.
  - Product support and licenses.
  - System management.

This maintenance will normally be carried out in the CTU facilities or the SI facilities, by the staff that the SI adheres to the contract, with the sufficient dedication, that guarantees a correct execution of the services contracted, and in the quantity and with the minimum qualification required in the 11.3 section.

- Level III:
  - Factory or laboratory repair of the various equipment included in the scope of the contract.
  - Resolution of highly complex incidents of software and hardware.

- Inventory management.

This maintenance will normally be carried out in CTU facilities or the SI facilities, by the staff that the SI adheres to the contract, with the sufficient dedication, that guarantees a correct execution of services contracted, and in the quantity and with the minimum qualification required in the 11.3 section.

In order to facilitate rapid restoration of functionality at the point of use, the design of all equipment, especially on-bus equipment, shall follow the requirements below:

- Protective items designed to fail shall be easy and quick to access and change.
- The mode of connections shall allow equipment to be quickly removed and replaced on buses.
- Where repair is required in-situ,
  - The component shall be easily opened.
  - Boards and sub-assemblies shall be easily removed/ replaced.
- Reboot and self-diagnostic shall be quick.

11.1 Scope of maintenance service

Proposed maintenance service will be considered to the following elements:

- Buses on-board equipment.
- TMC (hardware and software, servers, workstations, communications system, etc.).
- Depots (hardware, software, TMS, servers, workstations, communications system, etc.).
- Software developed for all systems and equipment.
- Licensing of third-party products.
- Communications systems and associated equipment (4G / 3G, Wi-Fi, etc.).
- Alternative and continuous electric power installations included in the scope of the contract. Equipment, terminals and systems in sales network and customer service points (hardware and software).
- Inspection terminals (hardware and software).

In short, services will cover both preventive and corrective maintenance of all equipment and systems included in the scope of the contract.

11.1.1 Maintenance Level I

The work to be carried out in this maintenance plan will be those related to preventive and corrective operations, as well as small software tasks.

11.1.1_1 Preventive maintenance

Preventive maintenance is understood as the set of operation and safety inspections that must be carried out periodically, based on an established plan and not on a user demand caused by malfunction. The main characteristic of this type of maintenance is to detect failures in their initial phase and correct them before they could result in a breakdown or degradation of the installation.

The SI shall design and deliver to the CTU the detailed preventive maintenance plan, which will be reviewed by CTU, and finally approved before updating with CTU's comments and suggestions thereon. This detailed preventive plan shall include, as a minimum, the following actions and periodicity thereof:

- TMC:
  - At least two annual revisions of the TMC equipment will be included. These revisions will include verification of correct operation of communications system and operation management of the different TMC equipment. In these reviews, components shall be also examined for wear, degradation, dust/water ingress, etc.
  - Regarding video surveillance system, the SI will carry out at least a fortnightly review of existing equipment. These revisions will include verification of correct operation of servers and operating stations, as well as the software used for the operation of video surveillance system.
- On-board system:
  - The SI will carry out at least one annual review of on-board equipment of all buses in the fleet, with the exception of a part of the buses (approximately 30 buses) that must be checked on at least three times. These revisions will include checking the correct mechanical fixing of the elements, checking all wiring, verifying correct operation of all equipment, replacement of consumables and correct version control of the different components of onboard software. In these revisions, components shall be also examined for wear, degradation, dust/water ingress, etc.
  - In addition, the SI shall report at least a quarterly remote revision, from TMC, of onboard equipment of the video surveillance system. These revisions will include verification of the correct visualization of images from all cameras of buses.
- Depots:
  - The SI will do at least two annual reviews of the existing facilities, equipment and systems in each CTU depots. These revisions will concern hardware and software elements (maintenance of databases, etc.). It will also include the revision of Wi-Fi communication system. In these reviews, components shall be also examined for wear, degradation, dust/water ingress, etc.

All such revisions will be documented through a proper report.

Implementation of preventive maintenance includes, in addition to revision and inspection, replacement of parts, elements, or installations that do not reach optimum operating levels.

11.1.1_2 Corrective Maintenance

Corrective maintenance is understood to mean any repair of any of the elements of the system that presents failure or incidence.

Corrective maintenance service to be provided by the SI shall comprise at least the following operations:

- Troubleshooting.

The SI will have the following sources of information for detection of failures:

- Driver incident reports.

  They report incidents detected on on-board equipment by drivers during their service.
- Incidents detected by TMC operators.

  Incidents detected by operators of the TMC will be sent to the SI that will appear every working day in the aforementioned place for the compilation of failures.
- Other sources of information.

  The SI shall receive notification of incidents from other sources.

- Distribution of work.

  The SI will be responsible for transferring daily breakdowns to maintenance staff of each depot, managing and planning workload among the staff assigned to the execution of the contract, for the purpose of repairing it within the response and resolution times determined in section 11.2

- Repairing tasks.

  They are the tasks of corrective maintenance, whose final objective is restoration of the correct functioning of equipment or elements in anomalous situation. These tasks will be performed by the SI maintenance technicians. Their work will consist of addressing detected failures, changing elements needed to repair, and verifying that system is fully operational. If it is not possible to solve the incident, it will be escalated to level II team. These interventions will be reflected in the corresponding report.

- Data maintenance.

  All interventions will be introduced by the SI in TMS maintenance management system.

11.1.2 Maintenance Level II

Level II maintenance service provided by the SI shall concern at least the following operations:

- Assignment and annotation of complex failures in on-board system.

  The SI shall be responsible for analysis and resolution of incidents, both hardware and software, in on-board system that cannot be solved by Level I team.

  To this end, it will have three Intelligent Transport Systems (ITS) experts in daytime working day to provide on-site assistance to buses if required.

- Technical support in TMC.

  The SI will be responsible for resolution of software incidents that arise in the TMC and the validation of new software versions that affect the central systems.

  This will provide a personal presence in TMC for eight hours a day on a daytime working day.

  Out of these hours (rest of working day and 24 hours on Saturdays, Sundays and holidays) the SI will provide telephone assistance, providing on-site assistance if required, 24 hours a day 365 days a year, for incidents that impede normal operation of the system.

- Technical support in depots.

  The SI will be responsible for solving hardware and software incidents that arise in the system elements in the CTU depots (video transfer servers, Wi-Fi access points, workstations, etc.).

  To this end, it shall provide telephone assistance, providing on-site assistance if required, 24 hours 365 days.

- Dysfunctions repairing in communications installations.

  The SI will be responsible for resolution of incidents occurring in the communications system and in its associated fixed installations.

  To this end, it will provide telephone assistance, providing on-site assistance if required, 24 hours 365 days.

- Product support and licenses.

  It shall be necessary to update the source code permanently.

  In this respect, the SI will be responsible for the following tasks that affect any software development that is part of the contract or any of the associated subsystems:

  - Installation and start-up of new software versions, updates and product improvements (continuous product update).

- Updating the products for their correct operation through new versions of the OS, libraries and / or compiler versions (both on-board and in fixed installations).
- Verification and check of correct operation of any implemented innovation.
- Training of staff in any system modification.
- Technical assistance to system managers.
- Reduced price in acquisition of functions and options of the product.

- System Management.

  All necessary administrative actions will be carried out to ensure uninterrupted operation of all software components associated with the systems within scope of the contract, i.e. checking status of existing clusters, checking scheduled backups, disaster recovery and security policies, etc.

11.1.2_1 Software developments

For software development, it is estimated to perform 5,000 hours distributed in 1,000 hours / year, which can be used to integrate new incorporated elements into the system in this procedure or to deploy of future functionalities.

The works may be proposed by CTU or by SI, being necessary prior approval of CTU for the SI proposals.

Working hours will be billed according to their consumption. The SI justification will be previously needed.

Intellectual property and all operation and dissemination rights, as well as the source code and documentation of all the software developed under this contract will be property of CTU.

11.1.3 Maintenance Level III

The Level III maintenance service to be provided by the SI shall include at least the following operations:

- Factory and / or laboratory repair of the equipment.

  Any damaged equipment shall be sent to SI's laboratory, where it will be inspected and repaired by specialized staff. After the repair, the equipment must be subjected to a complete functional test and then returned to spare components storage.

- Resolution of high complexity incidents.

  The SI shall be responsible for analyzing and taking the appropriate measures to solve satisfactorily incidents raised from levels of maintenance I and II.

- Inventory management.

  The SI will be responsible for the logistical management. It shall be able to get easily the traceability of the locations, installations and repairs where a system component has been involved. For the registration of this information, a database will be available in the TMS, what will register i.e. the current status (stock, installed, under repair or out of order), the bus or location in which it is located, preventive and corrective interventions it has received and date performed, etc.

- Service reports.

  The SI shall periodically provide CTU with reports that allow the monitoring of the service provided. Content and format of these reports will be agreed by both parties and will include, as a minimum, breakdown of incidents and repairs in equipment, preventive checks carried out, Service Level Agreement compliance, the stock of available spare components, etc.

11.2 Response Time

Response time means the time elapsed since the SI receives a notice of an incident till the telephone attention or physical presence of a qualified person or equipment deployed, with the necessary means and with access to the stock of spare parts.

The maximum response or resolution times to be guaranteed by the SI shall be as follows:

- Level I:
  - Breakdown at bus start-up: 40 minutes.
  - Breakdown in depots at no-working time: resolution of the incident before 5:30 on the next business day.
- Level II:
  - Incidence in communications equipment: immediate telephone assistance with availability 24 hours a day, 365 days a year, providing physical presence if required.
    - → Essential equipment: maximum resolution time will be 10 natural hours.
    - → Non-essential equipment: the maximum resolution time will be 24 hours.
  - Incidence in TMC: immediate telephone assistance with availability 24 hours a day, 365 days a year. If physical presence is required, the maximum presence time will be 1.5 hours. The maximum resolution time will be 4 hours.
  - Incidence in depots:
    - → Immediate telephone assistance with availability 24 hours a day, 365 days a year, with physical presence if required. The maximum resolution time will be 24 hours.

11.3 Maintenance Team

Minimum human resources that the SI shall assign to service provision are listed below. Proper dedication to fulfil the obligations arising from the contract and other related aspects (profiles, working hours, etc.) are also detailed:

Minimum human resources that the SI shall assign to service provision are listed below. Proper dedication to fulfil the obligations arising from the contract and other related aspects (profiles, Working hours, etc.) are also detailed:

- **Project Manager:** one (1), Degree in Engineering (Computer Science/Electronics & Communication) with at least 10 years of experiences, out of which at least 5 years in public transport, ITS in all aspects of project handling and maintenance. Should have excellent project management skills and should be able to communicate effectively in English and preferably in Hindi.
- **Maintenance Manager:** two (2), Degree in Engineering (Computer Science/Electronics & Communication) with at least 5 years of experience in ITS system maintenance activities and performance monitoring in public transport domain. They will be responsible for the daily organization of the service, from 04:00 AM to 11:59 PM in shifts.
- **Data Administrator**: one (1), Degree in Engineering (Computer Science/Information Technology) with at least 5 years of experience in database management. He will be handling the database maintenance and performance monitoring.
- **Software Support Engineer**: one (1), Degree in Engineering (Computer Science/Information Technology) with at least 5 years of experience in software development and in Intelligent Transport Systems (ITS) support. He will be responsible for software troubleshooting and implementation of small software improvements in the system. He will provide his services in CTU facilities.

- **Maintenance Technicians:** seven (7), Diploma in (Computer Science/Electronics & Communication) or equivalent with at least 3 years experience in system maintenance and troubleshooting with technical solution experience. They will be responsible for the daily operation and maintenance, from 04:00 AM to 11:59 PM in shifts.
- **TMC Support Technician**: one (1), Diploma in (Computer Science/Electronics & Communication) or equivalent with at least 3 years experience in system maintenance and troubleshooting with technical solution experience. He will manage resolution of incidences that arise in TMC and validation of new software versions that affect the central systems. He will provide his service in TMC.
- **Field Engineer**: one (1), Diploma in (Computer Science/Electronics & Communication) or equivalent with at least 3 years experience in system maintenance and troubleshooting with technical solution experience. He will manage the analysis of hardware and software failures of onboard system and depot equipments. He will provide his service at depots.

11.4 Material Resources

The SI shall have the necessary facilities to house at least the following functional departments:

- General management and project management.
- Offices that allow the computerized management of the service.
- Technical Office.
- Failure Reception Office.
- Electronics laboratory for repair damaged equipment. This laboratory shall be equipped with the necessary means of measurement and verification.
- Warehouse for the stock of spare components.

Also, for Level I maintenance, the SI will have in CTU depots, at least, the following material means:

- The buses will be equipped with
  - Necessary spare components and auxiliary elements
  - Safety equipment and first aid
  - Signalling required by the CTU prevention department.
- Hand tools for each maintenance technician.
- Electronic measuring equipment, signal verification, etc. Necessary for correct provision of the service.
- A data download station in each depot. Each of these positions will have the necessary elements to allow the maintenance technicians to connect broken SCUs of onboard systems. This connection will allow downloading data that equipment has not downloaded wirelessly. This data downloading will be done before sending broken SCUs to laboratory. These positions shall have a PC where technicians can also receive work orders.
- Four booths located in depots to store tools and stock equipment necessary for daily progress
- A communications system based on mobile phones and e-mail service, allowing constant communication and localization of maintenance staff and online transfer of documentation.

11.5 Stock of spare components

All spares required for the smooth operation of the ITS system shall be maintained by the SI for entire duration of the contract to meet SLA requirements. The cost of spares, repairs, and replacement shall be

deemed to be included in the price quoted by SI. Such spare quantities should however be less than 5% of the procured equipment.

The SI will be responsible for the management of spare components stock.

The SI will include in its proposal the unit costs of each of component. In case of that CTU expands its fleet and is forced to acquire new equipment to SI, it will not be able to apply prices higher than those indicated in his proposal.

12 IMPLEMENTATION PLAN

12.1 Project Implementation Plan

The System Integrator shall deliver an Implementation Plan, identifying all the activities during the project (terms, dates, relationships), that shall include delivering and drafting of the final design, developments software, equipment deployment, test, operation, etc).

Implementation of all the systems and subsystems shall be completed within 11 months, as shown in the following reference Project Implementation Plan.

The SI shall deploy the proposed Expert Manpower in contract, exclusive of Maintenance Team, dedicatedly on-site for complete Implementation Period.

The SI shall maintain and update an online, live version of the project Implementation Plan with status of all activities and dependencies.

Task	Activity	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11
0	**Project planning and design documentation**											
0.1	Initiation, Deployment and Preparation of Detailed Project Plan											
0.2	Site survey											
0.3	Design documentation: hardware and software											
0.4	Design discussions and approval											
0.5	Configuration data gathering (stop names, coodinates, lines, tarifs,...)											
0.6	Quality control Plan											
1	**Fare Collection System (FCS)**											
1.1	Detailed specification of FCS, with SOP											
1.2	Detailed specifications (FCS) discussion and approval											
1.3	Procurement of HW equipment and factory tests											
1.4	Software development and configuration											
1.5	Pilot tests: 1 ETM, 1 Inspection Terminal, 1 POS, 1 CSP, FCS funcionality at TMC											
1.6	Pilot test approval											
1.7	Installation of POS											
1.8	Installation of CSP											
1.9	Installation of communication equipment at depots											
1.10	Installation of FCS HW and applications in TMC premises											
1.11	Set-up of Mobile App with fare collection functionality (initial version)											
1.12	Prelimminary global tests											
1.13	Training (conductors, SOP, CSP and FCS mannegement personnel)											
1.14	Smart Card distribution and Go-live-FCS with Mobile App											
1.15	Operational acceptance tests FCS											
2	**Automatic Vehicle Location, Passenger Information and Transit Management Systems (AVL & PIS & TMC)**											
2.1	Detailed specification of AVL, PIS and TMC, with SOP											
2.2	Detailed specifications discussion (AVL, PIS & TMC) and approval											
2.3	Procurement of HW equipment and factory tests											
2.4	Pre-installations (cabling) on buses											
2.5	Software development and configuration											
2.6	Installation of AVL and on-board PIS HW and applications in TMC premises											
2.7	Pilot tests: 1 bus, AVL and (on-board) PIS funcionality at TMC											
2.8	Pilot test approval											
2.9	Installation of equipment on one line											
2.10	Training (drivers and and AVL operators at TMC)											
2.11	Go-live-AVL first line											
2.12	Prelimminary global tests AVL											
2.13	Go-live AVL all lines (with on-board PIS)											
2.14	Go-live mobile App and on-line Web information with AVL planned information											
2.15	Pre-installation of bus stop pannels											
2.16	Factoy tests of bus stop pannels											
2.17	Installation of bus stop pannels											
2.18	Go-live on street PIS											
2.19	Prelimminary global tests AVL + PIS											
2.20	Go-live mobile App and on-line Web information with AVL real-time information											
2.21	Go-live IVRS with full functionality											
2.22	Operational acceptance tests AVL PIS and TMC											
3	**Scheduling and Rostering**											
3.1	Detailed specification of S&R software											
3.2	Detailed specifications discussion (S&R) and approval											
3.3	Procurement of SW licences and configuration											
3.4	Testing											
3.5	Training											
3.6	Go-live stand-alone S&R											
3.7	Integration with FCS, AVL and TMS system											
3.8	Integration testing											
3.9	Go-live FCS, AVL and TMS integrated S&R											
3.10	Operational acceptance tests S&R											
4	**Transit Management System (TMS)**											
4.1	Detailed specification of TMS, with SOP											
4.2	Detailed specifications discussion (TMS) and approval											
4.3	Software development and configuration											
4.4	Procurement and factory tests											
4.5	Installation of equipment in first depot and configuration											
4.6	Testing											
4.7	Training											
4.8	Go-live TMS first depot											
4.9	Integration with TMC (AVL, FCS) and S&R											
4.10	Installation of equipment in all depots and configuration											
4.11	Testing											
4.12	Training											
4.13	Go-live TMS all depots											
4.14	Acceptance tests TMS											

Figure 23: Reference Project Implementation Plan

12.1.1 General requirements

Within two months after contract signature, the SI shall visit the CTU premises and buses, analyse in detail all the initial conditions affecting the procurement of the different systems and produce a deliverable with the design of the hardware and software solutions. The development of this document shall only encompass the specification of details, without changing the conditions of the technical proposal of the participant. The design will be analysed by the CTU and discussed until mutual agreement is reached, involving the different systems and sub-systems.

The final systems design discussions shall continue for not more than one month and shall be conducted in offices, provided by the CTU.

Following the conclusion of the final design of the systems, the System Integrator of the public procurement shall prepare detailed specifications for all elements of the systems. The delivery, installation and the commissioning of the various elements shall be performed by mutual coordination and an approved by the CTU updated plan for performance of the schedules thereto.

Each detailed specification shall be developed in cooperation with the Project Management Unit (PMU) and the Project Implementation Unit (PIU) of project "Implementation of Intelligent Transportation Systems (ITS) and Modernization and Development of City Bus Transportation in the city of Chandigarh" and all of the stakeholders parties, if necessary.

The documents, containing the detailed specifications, shall be delivered for approval within the regular meetings with PMU and PIU.

The System Integrator of the public procurement shall receive the approval of the CTU/PMU for ordering the components, the delivery of which takes a long time or which they accrue risk. The System Integrator shall not start the building of the systems prior to the respective detailed specifications for the systems to be approved by the CTU.

The documents in relation to the detailed specifications of the systems are an extended description of the proposal of the System Integrator of the procurement in this technical proposal, according to this technical specification.

The prepared final design of the systems shall include as a minimum:

- Report for the developed final design of the systems, with a detailed description of the technical solutions for the separate systems (including the main operational processes and workflow, operative organization of the personnel), functionality of the systems, approaches for their integration, compliance with the project goals and indicators;
- graphic material – plans for the schedule material – schemes designated for the systems provisioned for building, plans for placement of information electronic panels, etc.;
- detailed specifications for all the system elements;
- description of the technological sequence for the installation of all elements of the systems;
- updated plan for performance and schedules for delivery, installation, storage, mounting, power and data supply, integration, testing, commissioning and support of each of the systems, conducting trainings, as well as updated risk matrix;
- strategy for communication and interaction between sub-systems.

12.1.2 Monthly meetings

The System Integrator shall take part in the monthly meetings with the CTU (PMU/PIU) in relation to the performance of the public procurement.

The meetings between the team of the System Integrator and the CTU (PMU/PIU) in relation to the performance of the public procurement shall be conducted in the town of Chandigarh.

The System Integrator of the public procurement shall be represented by the team leader of the System Integrator.

The CTU (PMU/PIU) may require the participation of other experts in the team of the System Integrator.

12.2 Training and knowledge transfer

12.2.1 General requirements

The System Integrator in the public procurement shall provide in their technical proposals training programme for the employees of Chandigarh Transport Undertaking, CTU, and other stakeholders involved in operation. The System Integrator shall use technical experts for training as well as graphic and printed materials, manuals, animation and video etc., to be distributed among attendees. The training shall include any of the aspects of the systems, including training for "first line" of maintenance. The training shall include, but shall not be limited to the following categories:

- Employees operating with the system (users), considering different categories depending on each sub-system:
  - AFCS.
  - AVL.
  - PIS.
  - Scheduling and roster.
  - TMS (Depot system, Stores and inventory system, workshop system, HR and Payroll system, etc.)
- System administrator:
  - Employees who provide software support of the system and maintain configuration parameters.
- Maintenance technicians:
  - Employees supporting the system hardware.
- Bus drivers (by using the "train the trainers" method).
- Conductors.
- Inspectors.
- POS staff.
- Employees generating reports.

12.2.2 Training for employees (operators), operating with the systems

The System Integrator shall prepare and conduct training for operation with all elements of the systems for Control Centre in CTU.

The trainings shall be conducted in the premises for CTU or other places determined by CTU.

Minimum training to be provided shall include:

- Presentation of the systems design
- Communication systems
- Graphic user interface
- Operational characteristics and tool sets of the system
- Reporting requirements
- Operational procedures

The applicants in the public procurement shall outline their proposals for conducting trainings, as well as the conditions to be considered by CTU such as minimum or maximum number of employees to be trained per session.

All employees involved in the systems operations should be trained by the System Integrator.

12.2.3 Training for system administrator who will provide software support for the system

This field of the training shall provide the options for full comprehension of the system and the principles for its functioning, by paying attention to its daily use for their main options for configuration. The training shall be directed toward the employees, which provide support of the system, and place an accent over the configuration of the systems with the purpose of reaching maximum efficiency and providing its daily support.

The training shall be conducted in CTU premises, where in the systems are installed.

The training shall include the following components as a minimum:

- design of the systems
- characteristics and tools for functioning of the systems
- database structure
- preparation and input of data
- administration, configuration and routine support
- systems calibration
- Operating procedures such as create a new line on the AVL system or modify their stops, create new services, etc.

The applicants in the public procurement shall outline the recommended human resources needed for these tasks and shall describe their proposal for training.

12.2.4 Training for hardware maintenance engineers/technicians

The first line maintenance support shall be performed by the employees of CTU.

The System Integrator shall provide training for maintenance engineers and technicians. This training shall include all the required aspects for the performance of such support, as well as methods for utilization of the available diagnostic tools.

The applicants in the public procurement shall outline the recommended human resources needed for these tasks and shall describe proposal for their training.

12.2.5 Training for bus drivers

The System Integrator shall provide training for bus drivers. This training shall include detailed operation of all the functions related the on-board AVL and PIS equipment and shall be conducted under the principle “train the trainers” (a minimum of 10 people), which shall pass the training and consequently the CTU will take the obligation for the training of the remaining drivers.

The applicants to the public procurement shall specify their approach for organization and conducting these training sessions.

12.2.6 Training for bus conductors

The System Integrator shall provide training for bus conductors. This training shall include detailed operation of all the functions related to the on-board AFCS including smart cards, and shall be conducted under the principle “train the trainers” (a minimum of 10 people), which shall pass the training and consequently the CTU will take the obligation for the training of the remaining conductors.

The applicants to the public procurement shall specify their approach for organization and conducting these training sessions.

12.2.7 Training for bus inspectors

The System Integrator shall provide training for bus inspectors. This training shall include detailed operation of all the functions related to the hand-held inspection devices and smart cards, particularly regarding the auditing of bus conductors and commuters on board during the trip.

The training courses shall be conducted under the principle “train the trainers” (a minimum of 10 people), which shall pass the training and consequently the CTU will take the obligation for the training of the remaining bus inspectors.

The applicants to the public procurement shall specify their approach for organization and conducting these training sessions.

12.2.8 Training for POS operators

The System Integrator of the public procurement shall conduct training for the POS operators, who perform the sale/ recharge of smart card at specified locations in the city.

The applicants to the public procurement shall specify their approach for organization and conducting these training sessions.

12.2.9 Training for “Back office” employees

The System Integrator of the public procurement shall conduct training for the respective officials, who operate the back-office applications.

The applicants to the public procurement shall specify their approach for organization and conducting these training sessions.

12.2.10 Training Program

The applicants to the public procurement shall clearly specify the duration of the proposed training programs, as well as the number of employees, which can take part in each training session.

12.3 Test Plan

12.3.1 General information

Before the acceptance of any of the parts of the system, the System Integrator shall demonstrate with the support of an exhaustive selection of tests and operations that all of the elements of the equipment shall function in a satisfactory manner and in compliance with this technical specification. Tests shall be required for the separate components, as well as the system in general.

The whole equipment and software, which will be delivered, shall be subject to Test Plan.

The System Integrator shall provide specifications for the tests to be conducted, which shall be approved in advance by CTU. The specifications shall be collected in the Test Plan. The specifications that shall be described in detail are the purposes, the parameters, the procedures and the expected results. In the cases in which simulations shall be used for any part of the tests, shall be duly described. The Test Plan shall be submitted to CTU at least three weeks in advance of any intended testing. The SI shall submit the Test Plan, for CTU's approval prior to undertake any testing.

The Test Plan shall incorporate the following distinct testing stages for each deployment stage:

- Prototype Approval Tests (PAT).
- Factory Acceptance Tests (FAT).
- Installation Acceptance Tests (IAT).
- Pilot Test.
- System Acceptance Tests (SAT).
- Operational Acceptance Testing (OAT).

The SI shall provide written notice to CTU at least five days in advance of any testing, indicating the specific tests to be completed as well as the date, time and location.

The SI shall provide written Test Results Documentation (TRD) within one week of completing each stage of testing. The TRD must be approved before CTU will grant System Acceptance.

The SI shall be responsible to carry out all the testing as per the satisfaction of CTU and its representatives. All the costs those are associated with any testing are to be borne by the SI including the costs of travel and accommodation of CTU or its representatives from their home locations. In the interest of the SI maximum of three (3) people shall be nominated by CTU to attend any such testing wherever it is carried out.

12.3.2 Prototype Approval Tests (PAT)

Prototype Approval Test to be conducted only on the customized equipment for their design and compliance to functional specifications. PAT shall be completed before conducting FAT and only after approval of PAT by CTU's representatives, the equipment shall go in production. PAT shall be witnessed by CTU's representatives (Purchaser staff and/or designated support consultants).

12.3.3 Factory Acceptance Tests (FAT)

FAT shall be conducted before the equipment and software is shipped to CTU for installation, and deficiencies shall be rectified before shipping to CTU for installation. FAT shall be witnessed by CTU's representatives (CTU staff and/or designated support consultants).

12.3.4 Installation Acceptance Tests (IAT)

IAT shall be conducted after each installation of each equipment type, and deficiencies shall be rectified before the initiation of SAT. IAT may be witnessed by CTU representatives (CTU staff and/or designated support consultants).

12.3.5 Pilot Test

The SI shall conduct pilot testing for meeting CTU business requirements before rolling out the complete system.

The pilot will be run for four weeks to study any issues arising out of the implementation. Based on CTU feedback for incorporating changes as required and appropriate, Routes, schedules, necessary data will be shared by the CTU.

SI shall train staff involved in the Pilot implementation.

The pilot will be evaluated on the following evaluation factors:

- A minimum of 6 buses and 2 different routes.
- Backup ETMs on buses.
- PIS display board at the 3 bus stop locations.
- Smart cards.
- One POS location and Customer Service Point.
- Complete functionality for AFCS, AVL, PIS, TMC, scheduling and roster, TMS, communication system to be demonstrated successfully.
- System integration regarding AFCS.
- System integration for each element (at all levels: on-board, TMC and TMS).

The Pilot shall be demonstrated to the CTU's representatives (CTU staff and/or designated support consultants). If for any reason the pilot is found to be incomplete, these will be communicated to the SI in writing on the lapses that need to be made good. A one-time extension will be provided to the SI for making good on the lapses pointed out before offering the system to CTU for review.

12.3.6 System Acceptance Tests (SAT)

The System Acceptance Tests shall start only after the successful conclusion and acceptance by CTU of the Pilot Test.

The system shall be set in operation mode for the performance of the System Acceptance Tests.

The unsuccessful functioning of the systems to third parties (which are not part of this public procurement) shall not be reviewed as unsuccessfully held testing of the system.

The System Acceptance Tests (SAT) shall include:

- Communication tests.
- Exhaustive operational tests of the system characteristics of the equipment;
- Where necessary, multiple repetitive tests for proving the reliability of the system and/or establishment that the system is functioning according to the requirements.

For the central systems and equipment to be considered as successfully passed the System Acceptance Tests (SAT), they shall function for a specific period of time without exceeding the eligible error thresholds. The operative time for conducting tests for each test element shall not exceed 30 days.

12.3.7 Operational Acceptance Testing (OAT)

The purpose of Operational acceptance testing (OAT) is to test the overall operational capability of a solution. This involves testing aspects of the implemented systems, such as recoverability, stability, operability and supportability using a combination of activities including process reviews, documentation walkthroughs and practical exercises. OAT subsumes all test activities performed by applications and operation teams to arrive at the acceptance decision to operate the systems under agreed Service Level Agreements and Operation Level Agreements (SLAs / OLAs).

The following types of testing shall be performed:

- **Operational Documentation Review**: All documents that are necessary to operate the system. (e.g. architecture overviews, design documentation, operational docs) shall be identified, and checked for completeness, availability and accessibility to the relevant people. Transition, Standard and Crisis mode shall be addressed.
- **Rehearsal testing**: OAT integrates all functions and stakeholders of a production system. A rehearsal or staging environment testing is necessary for bigger changes in production environments, especially when they concern many stakeholders. Objective is to avoid the risks of failures in the process chain and longer system downtimes shall be minimized or avoided.
- **Installation Testing:** This test activity ensures that the applications installs and de-install correctly on all intended platforms and configurations. Objective is to ensure correctness, completeness and successful integration into system management functionality for following: Installation, De-installation, Fallback, Upgrade, Patch.
- **Framework / Platform Upgrade Testing:** This type of testing comprises test activities that ensure successful exchange or upgrade of central components like run time environments, database systems or standard software versions. Objective is to obtain proof of correct functionality, sufficient performance or fulfillment or other quality requirements.

- **Load / Performance Testing**: Performance testing is a technique used to ascertain the parameters of the asset in terms of responsiveness, effectiveness and stability under various workloads. This process involves quantitative tests performed to measure and report on the load, stress, endurance, volume and capacity threshold limits of the asset. Performance testing measures the quality attributes of the system, such as scalability, capacity and resource utilization.
- **SLA / OLA Monitoring Testing**: This test type examines the implemented monitoring functionality in order to measure the service and operation level. Objective is to derive if the monitoring functionality is complete, correct and operable in order to derive the right service and operation level.
- **Security Testing**: ISO defines this as a "type of testing conducted to evaluate the degree to which an asset, and associated data and information, are protected so that unauthorized person or systems cannot use, read or modify them, and authorized persons or systems are not denied access to them." It is a technique used to ascertain if the asset protects the data and maintains the functionalities as intended; in respect to authentication, authorization, availability, confidentiality, integrity and non-repudiation.
- **Backup & Restore Testing**: Backup and restore testing focuses on the quality of the implemented backup and restore strategy. In an expanded test execution, the test objective of a backup includes all the resources, ranging from hardware to software and documentation, people and processes.
- **Failover Testing / Recovery Testing:** The objective of failover testing can be subdivided into two categories:
  - The degree of the quality of fault recognition (technical measures must be implemented to detect the failure event e.g. a heartbeat)
  - The efficiency and effectiveness of the automatic failover reaction in terms of reaction time and data loss.

Operational Acceptance of System shall be provided after three months of continuous (full functionality) fault free running of system after System Acceptance.

12.4 Documents to be delivered

12.4.1 General documents

The System Integrator shall prepare documents for the final design of the systems, tests of the systems, installation, commissioning, for the maintenance and training. The documents shall consist of reports and certificates for systems tests, as well as operation and maintenance manuals.

The System Integrator shall provide the first version of the documents in English language. By request of the CTU, the System Integrator shall also provide the documents in regional language.

12.4.2 Process for approval of the documents by the CTU

All documents filed for approval will be reviewed and commented by the CTU. Systems Integrator shall respond to comments within 2 weeks.

12.4.3 Required documents

The required documents are described in the table herein below.

Sr. No.	Document description	Term	Filing method
1	Systems design	Not later than two months after contract signature	2 pcs. paper and electronic media, PDF format
2	Implementation Plan	Not later than two months after contract signature	2 pcs. paper and electronic media, PDF format
3	Maintenance Plan	Within 4 weeks after preparation of the systems design	2 pcs. paper and electronic media, PDF format
4	Training Program	Within 4 weeks after preparation of the systems design	2 pcs. paper and electronic media, PDF format
5	Detailed specification for all elements of the systems	Within 4 weeks after preparation of the systems design approval	2 pcs. paper and electronic media, PDF format
6	Specification for conducting tests	4 weeks prior to conducting the tests	2 pcs. paper and electronic media, PDF format
7	Results of conducted tests	2 weeks after finalizing the tests	2 pcs. paper and electronic media, PDF format
8	Training documents	2 weeks before starting the trainings	2 pcs. paper and electronic media, PDF format
9	Manuals for operation, support and repair of hardware	Upon delivery	2 pcs. paper and electronic media, PDF format
10	Manuals for operations, support and repair of the systems	4 weeks prior to Site Acceptance Tests	2 pcs. paper and electronic media, PDF format
11	Technical specifications, protocols, SDK, quality certificates, compliance declaration, licenses, etc.	Upon delivery	1 pcs. paper and electronic media, PDF format

Table 3: Documents to be delivered

In the cases in which the system, delivered by the System Integrator shall include equipment from other manufacturers, the System Integrators shall provide copies of the respective guidelines and manuals as parts of the final design of the systems.

13 PROCUREMENT PLAN AND PROJECT FINANCIALS

13.1 Reusability and integration of the current equipment

It has been considered that 85 percentage of the current OBITS equipment installed in the buses as per UBS-II standards may be reused, in the following paragraph Bill of Quantities, the percentage of reusability has been already applied, so the quantities that appear in the bill are the maximum quantities to be supplied. SI can always consider a higher percentage of reusability even up to 100% and quote accordingly. In any case if numbers of faulty equipment are more, the addition quantities shall be treated as additional scope of work and shall be paid to SI as per unit price quoted in the Bid.

So SI, that incorporates new solutions and equipment into the system, shall integrate with existing systems and equipment that we will call pre-existences. The pre-existences can be equipment, protocols, networks, software, etc.

SI is the responsible of integrating the new equipment with pre-existing equipment and systems and its responsibility will be obtaining the necessary information/licenses/protocols of the pre-existences (peripherals, software, communications, etc.)

CTU, who currently owns the pre-existences, will help in what it can, but is not its responsibility to have all the necessary information. SI shall know its needs and shall reach the necessary agreements with suppliers of the current pre-existences.

The ownership of the pre-existing equipment which are not considered for re-use will be CTU's, and SI won't be responsible for maintenance.

SI will be responsible for the maintenance of the new equipment provided by him and pre-existing equipments considered for re-use.

13.2 Bill of Quantities

Sr.No.	Subsystems / Items	Quantity exclusive of spares/ consumables
1	**AUTOMATIC FARE COLLECTION SYSTEM (AFCS)**	
1.1	**Central Hardware & Software inclusive of but not limited to:**	
1.1.1	Primary AFCS Server with Operating System, Database server, Application Software, Anti-Virus Software, AFCS application software (primary + DR) or Any other required COTS software inclusive of requisite licences	2
1.1.2	Automatic Disk Back-up devices and media with Back-up/Archiving software inclusive of requisite licences	1
1.1.3	KVM Switch with LCD Monitor	1
1.1.4	Multi-screen AFCS workstation including monitor and Software inclusive of requisite licences	4
1.1.5	Network All-in-one-printer	2

1.2	**AFCS Sub-System**	
1.2.1	**CSP Hardware & Software inclusive of but not limited to:**	
1.2.1.1	CSP workstation including monitor and Software inclusive of requisite licences	4
1.2.1.2	Smart Card Personalization Printer	4
1.2.1.3	CSP Contactless ISO 14443 A/B module	4
1.2.1.4	Ticket Printer	4
1.2.1.5	Webcam	4
1.2.1.6	Customer display	4
1.2.1.7	Document scanner / printer	4
1.2.1.8	Fare media - Smart Cards	50000
1.2.2	**POS Hardware & Software inclusive of but not limited to :**	
1.2.2.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)	50
1.2.2.2	3G/4G enabled SIM cards	50
1.2.3	**ETM Ticketing Machine Hardware & Software inclusive of but not limited to :**	
1.2.3.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)	784
1.2.3.2	3G/4G enabled SIM cards	784
1.2.4	**Inspection Terminals Hardware & Software inclusive of but not limited to :**	
1.2.4.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)	50
1.2.4.2	3G/4G enabled SIM cards	50
2	**AUTOMATIC VEHICLE LOCATION SYSTEM (AVLS)**	
2.1	**Central System Hardware & Software inclusive of but not limited to:**	
2.1.1	Primary AVL Server with Operating System, Database server, Application Software, Anti-Virus Software, AVL application software (primary + DR) or Any other required COTS software inclusive of requisite licences	2
2.1.2	Automatic Disk Back-up devices and media with Back-up/Archiving software inclusive of requisite licences	1
2.1.3	KVM Switch with LCD Monitor	1
2.1.4	Multi-screen AVL workstation including monitor and Software inclusive of requisite licences	6
2.1.5	Network All-in-one-printer	1
2.1.6	All in One Printer (Colour Print, Copy, FAX)	1
2.1.7	LaserJet Printer	1
2.2	**AVL Sub-System**	
2.2.1	**On-board System Hardware & Software inclusive of but not limited to:**	
2.2.1.1	Single Control Unit (SCU) with software inclusive of requisite licences	173
2.2.1.2	Bus Driver Console (BDC) with software inclusive of requisite licences	173
2.2.1.3	3G/4G enabled SIM Cards	392
2.2.1.4	Multifunction Antenna (3G, WiFi, GPS)	173
2.2.1.5	Cradle, Cabling, connectivity, microphone, speaker	173
2.2.1.6	Alarm Pedal with all accessories	392
2.2.1.7	Panic button with all accessories	392

2.2.1.8	Software licences (including existing SCU + BDC)	392
2.2.2	**CCTV on-board System Hardware & Software inclusive of but not limited to:**	
2.2.2.1	On-board cameras	1736
2.2.2.2	On-board NVRs with software and storage media for camera recording inclusive of requisite licences	392
3	**PASSENGER INFORMATION SYSTEM (PIS)**	
3.1	**Central System Hardware & Software inclusive of but not limited to:**	
3.1.1	PIS workstation including monitor with customized or COTS software inclusive of requisite licences	1
3.2	**PIS Sub-System**	
3.2.1	**Field Information Hardware & Software inclusive but not limited to:**	
3.2.1.1	32" LED Passenger Information Display at Bus Stops with software inclusive of requisite licences	80
3.2.1.2	50" size of Passenger Information Display at ISBT with software inclusive of requisite licences	20
3.2.1.3	48 X 72 inch Customized LED Passenger Information Display with software inclusive of requisite licences	10
3.2.1.4	3G/4G enabled SIM Cards	110
3.2.2	**On-board Information Hardware & Software inclusive of but not limited to:**	
3.2.2.1	Front Destination Boards	88
3.2.2.2	Side Destination Boards	232
3.2.2.3	Rear Destination boards	274
3.2.2.4	Inner Destination boards	88
3.2.2.5	On-board PIS (multi-language TTS vocal announcements)	173
4	**TRANSIT MANAGEMENT CENTRE (TMC)**	
4.1	**TMC Central System Hardware & Software inclusive of but not limited to:**	
4.1.1	Server Rack (includes rack requirements for all systems)	1
4.1.2	Video Wall modules 3x3 50" + controller	1
4.1.3	UPS	1
4.1.4	Other accessories	1
4.2	**TMC Sub-System**	
4.2.1	**Remote Customer Service Point Hardware & Software inclusive of but not limited to:**	
4.2.1.1	CSP Agent Workstation with Software Licence inclusive of requisite licences	4
4.2.1.2	EPABX	1
4.2.1.3	Landline Phones	8
4.2.1.4	Hands free/ Headphone	8
4.2.1.5	KVM Switch with Monitor	2
4.2.1.6	Commuter Website	1
4.2.1.7	Commuter IVR System	1
4.2.1.8	Commuter SMS System	1
4.2.1.9	Commuter Mobile Application	1
5	**TRANSIT MANAGEMENT SYSTEM (TMS)**	
5.1	**TMS Hardware inclusive of but not limited to:**	

5.1.1	Rack Mount Server for TMS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences	1
5.1.2	Rack Mount Server for ERP/MIS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences	1
5.1.3	Rack Mount Server for NMS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences	1
5.1.4	KVM Switch with LCD Monitor	1
5.1.5	42 U Server Rack for TMS and ERP Server	1
5.1.6	External Hard Drives 2 TB	5
5.1.7	Workstation including Monitor for TMS (TMC + HO)	15
5.1.8	Printer Laser	10
5.1.9	Document scanner	2
5.2	**Depot Equipment**	
5.2.1	TMS Server at Depot with Operating System, Database server, Application Software (DMS, WMS, IMS and ERP/MIS), Anti-Virus Software or Any other required COTS software inclusive of requisite licences	3
5.2.2	Workstation including Monitor for TMS	42
5.2.3	Handheld Device for TMS (Workshop/Yard) with software inclusive of requisite licences	12
5.2.4	Printer Laser	20
5.2.5	Document scanner	6
5.2.6	Wifi Network inside the Depot (router/firewall)	3
5.2.7	Crew Kiosk with software inclusive of requisite licences	7
5.3	**Depot Software inclusive of but not limited to:**	
5.3.1	NMS Application Software inclusive of requisite licences	1
6	**COMMUNICATION INFRA (COMM)**	
6.1	**COMM Hardware inclusive of but not limited to:**	
6.1.1	Central System - Network Components and LAN	1
6.1.2	Central System - VPN components and secured internet	1
6.1.3	Central System - Other network accessories	1
6.1.4	WiFi Infrastructure at depots (access points, switches, outdoor antennas, cables etc.)	3
6.1.5	POS VPN access modem	50
6.1.6	CSP VPN access modem	4
6.1.7	Internet Lease line, TMC & Depot Connectivity	4
7	**SCHEDULING & ROSTER (S&R)**	
7.1	S&R workstation including monitor and Software Licence	3
8	**DISASTER RECOVERY SERVICE**	
8.1	Secondary Mirroring Service	1
9	**COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT**	
9.1	Yearly hardware and software maintenance (For 5 years)	5

14 SERVICE LEVEL AGREEMENT

The table below provides the Service Level's (SLA) to be adhered to by CTU during the operational hours of the contract. The preventive maintenance and the scheduled down time shall be carried out by the SI during the non-operational hours of the project. In case of not meeting the SLA's, the corresponding penalties as defined in the table shall apply.

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
TYPE A PARAMETERS: MEASUREMENT & VALIDATION THROUGH AUTOMATED SYSTEM GENERATED REPORTS					
1	Network connectivity uptime availability	99.90%	0.10%	50,000	For every decrease of 0.1% in Network Infrastructure availability with required bandwidth over a period of one month, a penalty of 50,000 shall be imposed.
		"Network connectivity uptime availability" is defined as the uptime of network availability and its related devices responsible for overall communication between all locations connected.			
TYPE B PARAMETERS: MEASUREMENT & VALIDATION THROUGH AUTOMATED SYSTEM GENERATED REPORTS AND MANUAL VERIFICATION BY CTU					
2	AFCS Central System Availability	99.90%	0.10%	2,000	For every decrease of 0.1% in availability in a period of one day, a penalty of 2,000 shall be imposed for each bus that is not operational at the start of the daily transport service, in case the failure is attributable to deficiencies that must be solved by the SI in the scope of the contract.
		"AFCS Central System Availability" is defined as the proper functioning of the AFCS central hardware, application & database as per the functional & technical specifications defined in the bidding documents; this shall also include software license validity of any COTS, Database, Software, Anti-virus etc. which is part of the system.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
3	AVL Central System Availability	99.90%	0.10%	2,000	For every decrease of 0.1% in availability in a period of one day, a penalty of 2,000 shall be imposed for each bus that is not operational at the start of the daily transport service, in case the failure is attributable to deficiencies that must be solved by the SI in the scope of the contract.
		"AVL Central System Availability" is defined as the proper functioning of the AVL central hardware, application & database as per the functional & technical specifications as defined in the bidding documents; this shall also include software license validity of any COTS, Database, Software, Anti-virus etc. which is part of the system.			
4	TMC Availability	99.90%	0.10%	50,000	For every decrease of 0.1% in availability in a period of one month, a penalty of 50,000 shall be imposed.
		"TMC Availability" is defined as the proper functioning of the TMC Central System hardware, application & database as per the functional & technical specifications as defined in the bidding documents; this shall also include software license validity of any COTS, Database, Software, Anti-virus etc. which is part of the system.			
5	TMS Availability	99.90%	0.10%	50,000	For every decrease of 0.1% in availability in a period of one month, a penalty of 50,000 shall be imposed.
		"TMS Availability" is defined as the proper functioning of the TMS hardware for each depot, application & database as per the functional & technical specifications as defined in the bidding documents; this shall also include software license validity of any COTS, Database, Software, Anti-virus etc. which is part of the system.			
6	Missing transactions (specific to AFCS System)	None	One missing transaction	250	For every missing transaction, a penalty of 250 shall be imposed
		"Missing transactions" is defined as the un-availability of any data or file of any nature or type in the system but is found to have transacted.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
7	Addressing Minor Software glitches	To be addressed within 7 calendar days after complaint	One day	20,000	For each day of delay in fixing a minor software glitch a penalty of 20,000 for each glitch per day shall be imposed
		"Minor" is defined as: No effect on normal operations			
8	Addressing Major Software bugs	Restore the previous version of the software within 1 calendar day so that functionality is restored.	One day	50,000	For each day of delay in restoring the previous functional version a penalty of 50,000 per day shall be imposed
		Fix the glitch and release the new version	30 days	50,000	For each day of delay in fixing the major software glitch a penalty of 50,000 per day shall be imposed.
		"Major" is defined as: Noticeable effect affecting normal operations.			
9	Website, IVRS & SMS System uptime with all the features	99.00%	0.50%	5,000	For every decrease of 0.5% in uptime for each system in a period of one month, a penalty of 5,000 shall be imposed
		"Website, IVRS & SMS Uptime" is defined as: The website, IVRS & SMS System at the edge of the SI deployed system shall be up & running with all its related functionalities & desired performance levels. The performance of the website will be measured with a link of 128kbps internet connection & it should display the full website page within 5 seconds for all 5000 concurrent users.			
10	Local distribution/Local Communications Network (LAN) Availability at TMC /POS and Customer Service Points/Depots/ Workshops	99.90%	0.10%	500	For every decrease of 0.1% in Local Network availability for each location in a period of one month, a penalty of 500 shall be imposed
		"Local distribution/Local Communications Network (LAN) Availability" here means the local distribution/network (LAN) including fibre optic drop cable for each location including POS, Customer Service Points, Depots, Workshops, TMC shall be available (up & running) as per the requirements defined in the bidding documents. The availability will be calculated based on each individual sub- area level.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
11	Communication Network Availability between TMC and Buses	98.00%	0.50%	1,000	For every decrease of 0.5% in Network availability between TMC and Buses in a period of one month, a penalty of 1,000 shall be imposed
		"Communication Network Availability" means: The point to point (P2P) communication between TMC & buses shall be up & running with required bandwidth to perform all the functional & technical tasks as defined in bidding documents without affecting the performance of the system/ communication/ data transfer. Reduced bandwidth & any other issue related to network resulting in degraded/reduced performance shall also be considered as unavailability.			
12	Wireless Communication Network Availability (via WiFi) between Depot and Buses	98.00%	0.50%	1,000	For every decrease of 0.5% in Network availability between Depot and Buses in a period of one month, a penalty of 1,000 shall be imposed
		"Wireless Communication Network Availability" means: The WiFi communication between Depot & buses shall be up & running with required bandwidth to perform all the functional & technical tasks as defined in bidding documents without affecting the performance of the system/ communication/ data transfer. Reduced bandwidth & any other issue related to network resulting in degraded/reduced performance shall also be considered as unavailability.			
13	UPS Availability at any single location	99.50%	0.50%	1,500	For every decrease of 0.5% in UPS availability in a period of one month, a penalty of 1,500 shall be imposed
		"UPS Availability" is defined as: When UPS is available in full working condition as defined in bidding documents. UPS running in "Bypass" mode shall also be considered as unavailability. Availability shall be calculated only for power outages that are less than the UPS backup time. Power outages beyond UPS backup time shall be excluded from the SLA calculations.			
14	All Workstations (excluding POS), Printers, Scanners, Monitor Availability	99.00%	0.50%	500	For every decrease of 0.5% in availability for each device in a period of one month, a penalty of 500 shall be imposed
		"All Workstations (excluding POS), Printers, Scanners, Monitor Availability" is defined as: When a device/ equipment is working properly with all its features & functions along with required hardware & software as defined in the bidding documents.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
15	POS and Customer Service Points (E-Sampark Centre) Availability	99.50%	0.50%	2,500	For every decrease of 0.5% in each POS and Customer Service availability for a period of one month, a penalty of 2,500 shall be imposed
		"POS and Customer Service System Availability" is defined as the proper functioning of the POS and Customer Service Points with all applicable features & full functionality along with the required applicable hardware associated with POS/Customer Service Points.			
16	Handheld ETM Machine Availability	99.90%	0.10%	2,000	For every decrease of 0.1% in each ETM availability during operations in a period of one month, a penalty of 2,000 shall be imposed
		"Handheld ETM Machine Availability" is defined as ETM when under operations is fully functional with all its features & functions along with required hardware & software as per the functional & technical specifications defined in the bidding documents. At any given point of time the ETM required for running operations shall be available & in fully functional working condition.			
17	AVL OBU/SCU Availability (provided by supplier)	99.50%	0.50%	1,000	For every decrease of 0.50% in each OBU/SCU availability for a period of one month, a penalty of 1,000 shall be imposed
		"AVL OBU/SCU Availability" is defined as the proper functioning of the AVL OBU with all its features & functions along with required hardware & software as per the functional & technical specifications defined in the bidding documents. 3G/4G/GPRS connection availability is excluded from this.			
18	Expected Travel Arrival Accuracy (AVL System)	99%	1.0%	5000	For any individual stop, each instance of decrease in Expected Time of Arrival (ETA) accuracy by 1.0% (maximum), a penalty of 5,000 shall be imposed.
		"ETA Accuracy" shall be checked under test conditions and by way of sampling. In case of test condition the accuracy shall be 99.0%.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
19	PIS Display Availability (provided by supplier)	99.00%	0.50%	200	For every decrease of 0.5% in each PIS display in a period of one month, a penalty of 200 shall be imposed
		"PIS Display Availability" is defined as the proper functioning of the PIS displays (including on-board/ISBT/Bus stop) with all its features & functions along with required hardware & software in all operational hours. PIS displays showing distorted/ partial/ non-readable messages/ information shall also be considered as unavailable. Insurance shall be taken by SI to accommodate the theft or damage.			
20	Cameras & it's associated components (hardware & software for individual camera) Availability	99.00%	0.50%	500	For every decrease of 0.50% in availability of each device & it's associated component in a period of one month, a penalty of 500 shall be imposed
		"Cameras & it's associated components Availability" is defined as: When the system is working properly with all its features & functions as defined in the bidding documents.			
21	NVR System & CCTV Application Availability	99.00%	0.50%	1000	For every decrease of 0.50% in availability for NVR system or CCTV application in a period of one month, a penalty of 1000 shall be imposed
		"NVR System & CCTV Application Availability" is defined as: When the system is working properly with all its features & functions along with required hardware & software as defined in the bidding documents. NVR system not recording video feeds from cameras shall also be considered as non-availability.			
22	QR Reader Availability	99.00%	0.50%	100	For every decrease of 0.5% in each barcode reader availability in a period of one month, a penalty of 100 shall be imposed
		"QR Reader Availability" is defined as the proper functioning with all its features & functions along with required hardware & software as defined in the bidding documents. QR reader unable to read readable QR coded tickets shall be considered as non-availability.			

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
23	ITS Spares availability for buses	98.00%	0.10%	5,000	For every decrease of 0.1% in availability in a period of one day, a penalty of 5,000 shall be imposed for each bus that is not operational at the start of the daily transport service, for lack of spare, as long as the lack of spare is due to the response times of the equipment.
		"ITS Spares availability for buses" is defined as the existence of spares to make possible to repair the faulty on board components, regardless of the buses fleet operation level.			
24	Disaster Recovery System switch-over (Routing to DR System)	Less than 5 min	1 min	5,000	For each minute of delay in routing field devices to DR System a penalty of 5,000 per minute shall be imposed
		When TMC is not available, field devices shall route to DR System during the restoration of Primary TMC. When TMC is completely restored, system shall switch–over into Primary TMC, updating automatically all needed information. Time of both processes shall be less than 5 minutes			
25	Disaster Recovery System switch-over (Restoring TMC)	Less than 5 min	1 min	5,000	For each minute of delay in switching-over into Primary TMC a penalty of 5,000 per minute shall be imposed
		When TMC is not available, field devices shall route to DR System during the restoration of Primary TMC. When TMC is completely restored, system shall switch–over into Primary TMC, updating automatically all needed information. Time of both processes shall be less than 5 minutes			
TYPE C PARAMETERS: MEASUREMENT & VALIDATION BY MANUAL INSPECTION AND VERIFICATION BY CTU					

S. No.	SLA's	REQUIREMENT	FALLS BY	PENALTY (INR)	CALCULATION (CURRENCY IN INR)
26	Smart Card Reading Failure	99.50%	0.10%	200	For every decrease of 0.1% of smart card reads in a day, a penalty of 200 shall be imposed
		"Smart card reading failure" is defined as: The read accuracy of a readable smart card when a fully functional validator (ETM) or revaluing device is used. Any smart card not read by a validator (ETM) or a POS/Customer Service Point (independently) within the first 2 attempts will be considered as unreadable and the specified penalty is applicable.			

Table 4: Service Level Agreement Performance Parameters

14.1 Analysis of Scenarios

In the following table, three different scenarios have been calculated for each SLA applying the tolerance thresholds and penalties scale proposed in Table 4: Service Level Agreement Performance Parameters.

S. No	SLA's	Sample period	Scenario 1		Scenario 2		Scenario 3		Evaluation (*)
			Score	Penalty	Score	Penalty	Score	Penalty	
TYPE A PARAMETERS: MEASUREMENT & VALIDATION THROUGH AUTOMATED SYSTEM GENERATED REPORTS									
1	Network connectivity uptime availability	Per month	≤99.90%	₹ 50,000	≤95.00%	₹ 500,000	≤80.00%	₹ 2000,000	(1)
TYPE B PARAMETERS: MEASUREMENT & VALIDATION THROUGH AUTOMATED SYSTEM GENERATED REPORTS AND MANUAL VERIFICATION BY CTU									
2	AFCS Central System Availability	Per day/per bus	≤99.90%	₹ 2,000	≤95.00%	₹ 20,000	≤80.00%	₹ 100,000	(1)
3	AVL Central System Availability	Per day/per bus	≤99.90%	₹ 2,000	≤95.00%	₹ 20,000	≤80.00%	₹ 100,000	(1)
4	TMC Availability	Per month	≤99.90%	₹ 50,000	≤95.00%	₹ 500,000	≤80.00%	₹ 2000,000	(1)
5	TMS Availability	Per month	≤99.90%	₹ 50,000	≤95.00%	₹ 500,000	≤80.00%	₹ 2000,000	(1)
6	Missing transactions (specific to AFCS System)	Per missed transaction	≤10	₹ 2,500	≤100	₹ 25,000	≤1000	₹ 250,000	(2)
7	Addressing Minor Software glitches	Per delayed day	≤8	₹ 20,000	≤14	₹ 140,000	≤20	₹ 280,000	(2)
8	Addressing Major Software bugs	Per delayed day	≤2	₹ 50,000	≤7	₹ 300,000	≤15	₹ 700,000	(1)
		Per delayed day	≤32	₹ 100,000	≤37	₹ 350,000	≤45	₹ 750,000	(1)

S. No	SLA's	Sample period	Scenario 1		Scenario 2		Scenario 3		Evaluation (*)
			Score	Penalty	Score	Penalty	Score	Penalty	
9	Website, IVRS & SMS System uptime with all the features	Per month	≤99.90%	₹ 5,000	≤92.00%	₹ 60,000	≤78.00%	₹ 200,000	(2)
10	Local distribution/Local Communications Network (LAN) Availability at TMC / POS and Customer Service Points / Depots/Workshops	Per month	≤99.90%	₹ 2000	≤95.00%	₹ 30,000	≤80.00%	₹ 120,000	(2)
11	Communication Network Availability between TMC and Buses	Per month	≤98.00%	₹ 1,000	≤92.00%	₹ 12,000	≤78.00%	₹ 40,000	(2)
12	Wireless Communication Network Availability (via WiFi) between Depot and Buses	Per month	≤98.00%	₹ 1,000	≤92.00%	₹ 12,000	≤78.00%	₹ 40,000	(2)
13	UPS Availability at any single location	Per month	≤99.50%	₹ 1,500	≤95.00%	₹ 12,000	≤80.00%	₹ 60,000	(2)
14	All Workstations (excluding POS), Printers, Scanners, Monitor Availability	Per month	≤99.00%	₹ 500	≤95.00%	₹ 4,000	≤80.00%	₹ 20,000	(2)
15	POS and Customer Service Points (E-Sampark Centre) Availability	Per month	≤99.50%	₹ 2,500	≤95.00%	₹ 12,000	≤80.00%	₹ 60,000	(2)

S. No	SLA's	Sample period	Scenario 1		Scenario 2		Scenario 3		Evaluation (*)
			Score	Penalty	Score	Penalty	Score	Penalty	
16	Handheld ETM Machine Availability	Per month	≤99.90%	₹ 2,000	≤95.00%	₹ 10,000	≤80.00%	₹ 40,000	(2)
17	AVL OBU/SCU Availability (provided by supplier)	Per month	≤99.50%	₹ 1,000	≤95.00%	₹ 10,000	≤80.00%	₹ 40,000	(2)
18	Expected Travel Arrival Accuracy (AVL System)	Per month	≤98.00%	₹ 400	≤80.00%	₹ 6,000	≤70.00%	₹ 10,000	(2)
19	PIS Display Availability (provided by supplier)	Per month	≤99.00%	₹ 200	≤95.00%	₹ 2,000	≤80.00%	₹ 8,000	(2)
20	Cameras & it's associated components (hardware & software for individual camera) Availability	Per month	≤99.00%	₹ 500	≤95.00%	₹ 4,000	≤80.00%	₹ 20,000	(2)
21	NVR System & CCTV Application Availability	Per month	≤99.00%	₹ 1,000	≤95.00%	₹ 8,000	≤80.00%	₹ 40,000	(2)
22	QR Reader Availability	Per month	≤99.00%	₹ 100	≤95.00%	₹ 1000	≤80.00%	₹ 4,000	(2)
23	ITS Spares availability for buses	Per day/per bus	≤98.00%	₹ 5,000	≤85.00%	₹ 50,000	≤75.00%	₹ 100,000	(1)
24	Disaster Recovery System switch-over (Routing to DR System)	Per switching-over (Routing to DR System)	≥5min	₹ 20,000	≤11	₹ 140,000	≤27	₹ 280,000	(1)

S. No	SLA's	Sample period	Scenario 1		Scenario 2		Scenario 3		Evaluation (*)
			Score	Penalty	Score	Penalty	Score	Penalty	
25	Disaster Recovery System switch-over (Restoring TMC)	Per switching-over (Restoring TMC)	≥5min	₹ 20,000	≤11	₹ 140,000	≤17	₹ 280,000	(1)
TYPE C PARAMETERS: MEASUREMENT & VALIDATION BY MANUAL INSPECTION AND VERIFICATION BY CTU									
26	Smart Card Reading Failure	Per day	≤99.50%	₹ 1000	≤95.00%	₹ 4,000	≤80.00%	₹ 16,000	(2)

(*)Evaluation analysis:

- (1) The defined SLA is sufficient to stimulate SI to avoid their non-compliance through good design/component quality and to rectify defects quickly post-deployment
- (2) Non-compliance of this SLA will cause relatively-minor problems. An excessively punitive penalty has been avoided

15 RISK MANAGEMENT PROCESS

15.1 Objectives

- The objectives of the risk management approach in the ITS Project in CTU to identify, assess and mitigate risks where possible and to continually monitor risks throughout the remainder of the project as other risks or threats emerge or a risk's impact or likelihood changes.
- Risk management is to ensure levels of risk and uncertainty are identified and then properly managed in a structured way, so any potential threat to the delivery of outputs (level of resourcing, time, cost and quality) and the realization of outcomes/benefits by CTU is appropriately managed to ensure the project is completed successfully.
- As risk management is an ongoing process over the life of a project, this Risk Management Plan and Risk Register must be considered a 'snap shot' of relevant risks at one point in time.
- Where required, the process of risk identification, assessment and the development of counter measures will involve consultation with the ITS consultant and Project management committee, and other relevant stakeholders.

15.1.1 Risk Assessment - Identification

Risk identification involves determining which risks or threats are likely to affect the project. It involves the identification of risks or threats that may lead to project outputs being delayed or reduced, outlays being advanced or increased and/or output quality (fitness for purpose) being reduced or compromised.

For this kind of projects, a number of high level risks should have been identified during the project initiation stage – these should be used as the basis for a more thorough analysis of the risks facing the project.

One of the most difficult things is ensuring that all major risks are identified. A useful way of identifying relevant risks is defining causal categories under which risks might be identified.

The wording or articulation of each risk should follow a simple two-step approach:

Consider what might be a 'trigger' event or threat (eg. 'Poor quality materials causes costs to rise') – several triggers may reveal the same inherent risk; then

Identify the risk - use a 'newspaper headline' style statement – short, sharp and snappy (eg. 'Budget blow out') then describe the nature of the risk and the impact on the project if the risk is not mitigated or managed (eg. project delayed or abandoned, expenditure to date wasted, outcomes not realized, government embarrassed etc).

It can prove to be beneficial to use an outside facilitator who can conduct a meetings or brainstorming sessions involving (as a minimum) the Project Team members, Project Management Committee members and external key stakeholders. Preparation may include an environmental scan, seeking views of key stakeholders etc.

It is very easy to identify a range of risks that are outside the project and are actually risks to the business area during output delivery, transition or once operational mode has been established. These are not project risks and should not be included in the Project Risk Register, but to be referred to CTU. It may be appropriate to submit an Issues Paper to the Project management Committee formal acceptance by CTU for ongoing monitoring and management of specific risks.

15.1.2 Analysis and Evaluation

Once risks have been identified they must be analyzed by determining how they might affect the success of the project. Generally the impact of a risk will realize one or any combination of the following consequences:

- Project outcomes (benefits) are delayed or reduced;
- Project output quality is reduced;
- Timeframes are extended;
- Costs are increased.

15.2 Risk Mitigation

Mitigation of risks involves the identification of actions to reduce the likelihood that a threat will occur (preventative action) and/or reduce the impact of a threat that does occur (contingency action). This strategy also involves identifying the stage of the project when the action should be undertaken, either prior to the start of project or during the project.

Risk mitigation strategies to reduce the chance that a risk will be realized and/or reduce the seriousness of a risk if it is realized have been developed. The following table is useful to determine how risks will be treated in terms of preparation and/or deployment of mitigation strategies during the life of the Project.

Below table provides a roadmap for key risks identification, monitoring and mitigation for this project.

Sr. No.	Component	Sub-Component	Risk	Mitigation
1	Hardware equipment	AVL, PIS, AFCS, TMC, TMS etc.	Loss or damage	SI shall cover such equipment during the project phase under insurance. After handover, such equipment will be under scope of CTU.
2	Loss of or Damage to Property; Accident or Injury to Workers; Indemnification	Installation of equipment. Negligence	Loss or damage of property or harm to employee.	SI shall be solely responsible for any such incidents, and cannot raise any claim to CTU during the project period.
3	Insurances	Cargo Insurance During Transport	Goods in a freely convertible currency, covering the Goods from physical loss or damage during shipment through receipt at the Project Site	SI shall cover all such aspects during the project phase under insurance. CTU shall be named as co-insured under all insurance policies taken out by the SI
4		Installation “All Risks” insurance	Physical loss or damage occurring prior to Operational Acceptance of the System.	
5		Third-Party	Any physical injury or	

Sr. No.	Component	Sub-Component	Risk	Mitigation
		Liability Insurance	death suffered by third parties (including the CTU's personnel) and loss of or damage to property (including the CTU's property and any Subsystems that have been accepted by the CTU) occurring in connection with the supply and installation of the Information System	
6		Automobile liability insurance	Vehicle used by SI and its subcontractor shall be fully covered under comprehensive insurance.	
7		Other Insurance (if any).	Loss, theft or harm to any associated work.	
8	AVL System	Accurate Schedules & Routes	Lack of accurate schedules and routes mapped out by the agency leads to inaccuracies in the AVL software, which leads to route deviation errors. Also drivers following the daily schedule are another concern.	CTU Staff to freeze all the routes, signoff and share with the SI. Clear SOPs should be provided for operations will mitigate the risk.
9		Bus Stop Locations	If all the bus stops are not properly mapped, skipping of bus stops will occur in voice announcements. In addition, the ETA information will not be provided for these bus stops.	CTU Traffic Department Staff to travel the routes and get inputs from the conductors. Bus Stop locations where no physical shelter is present should be marked by paint for the SI. This will ensure that the geo-fencing locations are fixed in one go.
10		Bus Installations	Voltage spikes, installation issues were common problems faced in other cities for ITS implementation.	SI shall conduct a detailed study of operating buses using voltmeters to measure spikes in voltage. In addition, bus body shall be studied and installation diagrams shall be provided for CTU approval.
11		Integration	The new JnNURM buses have installed UBS-II	CTU to ensure that all OBITS equipment is fully

Sr. No.	Component	Sub-Component	Risk	Mitigation
			OBITS equipment, while the older buses require SCU & BDC. Integration shall be a challenge.	compliant with UBS-II, AIS-140 and IS-16490 standards and protocols. CTU should test the equipment for conformity. SI to tailor/develop APIs, etc, to integrate the system.
12	PIS System	Installations	Security and maintenance issues have been principal concerns for PIS display boards.	PIS installations should occur where security can be provided by CTU or any other government agency. It should be clearly understood that the SI cannot provide security for the display board. However, the SI should provide casing around the display boards where required to ensure its safety. The SI should have automated alerts for maintenance issues of the remote PIS displays. CTU should have log sheet and a process to keep track of the working of the displays on a daily basis.
13	Fare Collection System	Acceptance by CTU drivers and conductors	ETM is critical element of the ITS system and needs to be accepted immediately before the rest of the system.	Adequate training should be provided. Speakers from other STUs where ETMs are used should be bought to CTU to give confidence that the system is friendly and helpful to the employees.
14	TMS	Application Development	The Software Application correctly representing the processes of CTU.	SOPs on all the processes before implementation can mitigate this risk.
15	CTU ITS	Data Integration	Data transfers are not seamless resulting in various subcomponents not providing the expected benefits.	Detailed design stage with the SI to ensure that the design documents and SRS are in line with the requirements of the project and the data transfer needs.

Table 5: Risk Mitigation Parameters

15.3 Risk Monitoring

Risk Management is an iterative process that should be built into the management processes for any project. It must be closely linked with Issues Management, as untreated issues may become significant risks. If prevention strategies are being effective, some of the risks should be able to be downgraded soon into the project.

15.4 Roles and Responsibilities

Ultimate responsibility for ensuring appropriate risk management processes are applied rests with the Project Management Committee, and they should be involved in the initial risk identification and analysis process. The Risk Management Plan and the Risk Register should provide the Project Management Committee with clear statements of the project risks and the proposed risk management strategies to enable ongoing management and regular review.

15.4.1 Management Committee

The Management Committee will review the project risks on a <specify frequency, eg. Monthly> basis via updated information provided in the Project Status Reports and provide advice and direction to the Depot Head. They will also be provided with an updated Risk Register for consideration, as required, when additional threats emerge or the likelihood or potential impact of a previously identified risk changes.

15.4.2 Project Team

All members of the Project Team will be responsible for assisting the Depot Head in the risk management process. This includes the identification, analysis and evaluation of risks and continual monitoring throughout the project life cycle.

Annex A. TECHNICAL SPECIFICATIONS

A.1 AUTOMATIC FARE COLLECTION SYSTEM (AFCS)

A.1.1 Smart cards (SC)

- Card dimensions: according to ISO-7810 (type ID-1).
- Physical material of the cards: PVC or higher.
- Serial number printed on the outside of the laser engraving card. This number shall correspond to an identical number electronically stored on the card.
- All printing (if used) shall be with laser marking or similar latest technology without any visible degradation for 5 years as the cards shall be used over an extended period.
- The card shall be printed with content to be provided by CTU which may include but not limited to:
  - Standard graphics or images developed by CTU (e.g. logos, promotions, etc.)
  - Standard text developed by CTU (e.g. Terms of use)
- Minimum resolution of information printed on the outside of the card: 300 dpi (dots per inch).
- Compliance with ISO-14443, parts 1, 2, 3 and 4, type A.
- Verification of compliance with the ISO-7810 and ISO-14443 standards by conducting tests according to ISO-10373.The SI shall provide factory test info on cards (i.e. proof of durability) and chip OEM Certificate for authenticity of cards.
- Arsenal Research Certificate and / or the equivalent for the card to use.
- Integrated circuit of the card: MIFARE DESFire EV1, with memory of 4K or higher, or another chip of similar and / or higher performance.
- The integrated supplied circuits shall be less than 1 year old when they are purchased by the SI.
- Expected transaction time: less than 300 ms. (Higher times may be authorized)
- Number of minimum write cycles: 100,000
- Operating distance with the reader: up to 10 cm.
- The SI shall supply an interface control document for ensuring integration between the smart cards and any hardware for reading and/or writing to the smart cards as per CTU's requirement.
- The SI shall submit the smart card specifications which would include details on card programming and data structure.
- Reliability of cards including manufacturing and initialization processes:
  - Duration of 9 years under normal conditions of use.
  - Acceptable Quality Level according to MIL-STD-105 standard: 0.65.

CTU will be allowed to require the proper certificates to ensure the compliance with the standards mentioned above, as well as require the performance of tests needed to check the compliance of the technical characteristics.

A.1.2 Electronic Ticketing Machine (ETM)

- The terminal shall be work under an operating temperature range of -5 to +70 °C.
- The terminal shall be work under an operating humidity of 95% RH non condensing.

- The terminal shall have a compact and durable design, for indoor and outdoor use.
- The terminal shall be designed to operate from an internal, battery source which can be charged and re-charged.
- The terminal battery shall utilize "no memory" battery technology which is state-of-the-art, commercially available and common for use with such equipment.
- The terminal shall operate continuously for minimum 12 (Twelve) hours without any disruption to the Operations at any given instance during the shifts. The bidder shall ensure that appropriate back-up arrangements are made for the handhelds to cover the entire operating shift without disrupting normal Operations.
- The battery shall be field replaceable without any loss of data, with field replacement time (from end of operation with previous battery to beginning of operation with new battery) not to exceed three minutes.
- The battery shall be recharged to a full charge from a completely discharged state in less than four hours.
- The battery shall have a life of at least 500 recharging cycles with not more than 20% loss of efficiency over that lifetime of the battery.
- The terminal shall have a Power Adaptor of AC input 100 - 240V, 50/60Hz DC output to fully recharge the battery in less than 4 hours.
- The terminal shall have an alphanumeric keypad through which the operator can perform tickets sale and enter destinations.
- The terminal shall have a LCD display of
    - Sufficient brightness and clarity according to the conditions of location of the equipment in external sales points.
    - 128 x 64 pixel Graphic FTSN LCD with backlight, or superior
- The terminal shall have a high-speed thermal printer for the issuing of tickets. This same printer shall print the sales and validations summaries, if required.
    - The ticket printer shall be a compact thermal printer able to print, as a minimum, tickets (text and graphics), barcodes, and system status information.
    - The print speed shall not be less than 150 mm/s for both text and graphic and at a minimum resolution of 203 dpi (8 dots/mm).
    - The ticket printer shall use readily available paper rolls of standard size.
    - The ticket printer shall provide low paper and out of paper indication.
    - The ticket printer shall have an automatic cutter with a self-sharpening ceramic rotary knife.
    - The auto-cutter shall have a reliability of at least 1.5 million cuts.
    - The ticket printer head shall have a Mean Cycle between Failure (MCBF) of at least 50 million print lines.
    - The ticket printer shall have a Mean Time between Failure (MTBF) of at least 360,000 hours.
    - The terminal shall generate and the printer shall print QR codes
- The terminal shall have QR code reader.
- The terminal shall have at least 3 SAM slots.
- The terminal shall be capable of hosting smartphone payment mean by NFC technology in a future implementation.
- The terminal shall have built-in buzzer for audio indication and LED for visual indication of card acceptance/rejection.
- The terminal shall have a Contactless card reader complying with ISO 14443 parts 1, 2, 3 and 4, types A and B.

- The terminal shall process at least the following cards: MIFARE UltraLight, MIFARE Classic, MIFARE Plus, MIFARE DESFire and MIFARE DESFire EV1, or other similar cards used in this project.
- The terminal shall have an anti-collision system according to ISO 14443 and handle multiple cards in the reader field at the same time.
- The terminal shall have a maximum time to transaction completion, since the card is placed in front of the reader's surface until the transaction is recorded in the terminal and the receipt is issued, of 3 seconds.
- The terminal shall be able to manage blacklists and white lists of SCs.
- The terminal shall be capable of storing sufficient information to:
  - Save information for at least 30 days of operation.
  - Store blacklists and white lists of SCs (at least 750,000 records)
- The terminal shall have a Processor: ARM11 32-bit Core CPU @ 400Mhz or superior
- The terminal shall have a RTC: high-precision real-time clock synchronized with the rest of the system.
- The terminal shall have the following Interface / Connectors:
  - 2 x RS-232 (Serial / Console)
  - 1x USB Device
  - 1x USB Host
  - 1x LAN (RJ45 connector)
  - Micro SD (up to 16 GB)
- The terminal shall have an integrated antenna to allow GSM / 3G / 4G / GPRS (or 2G).
- WiFi and Bluetooth connectivity shall be optional.
- The terminal shall be homologated with EMV at Level 1 and 2 approved PCI, PTS 3.0 and NCMC compliance.

A.1.3 Inspection Terminal

This device shall have the same technical specifications as the ETM, according to section A.1.2 .

A.1.4 Customer Service Points (CSP)

- The CSP shall have a Workstation.
  - The workstation shall at least use Core i7, 4th Generation processors at minimum 3.0 GHz with a minimum of 2MB secondary level cache.
  - The workstation Random Access Memory (RAM) shall be at least 8 GB.
  - The workstation HDD shall have a capacity of at least 500GB.
  - The workstation shall be equipped with a media storage device capable of CD/DVD RW with read & write speeds in accordance with the latest industry standards.
  - The workstation shall be equipped with at least 2 spare USB 2.0 ports in addition to the ports required.
  - The workstation shall be equipped with a TFT LCD monitor that 19” or larger and having SVGA quality or better & keyboard & mouse.
  - The workstation shall be equipped with a 10/100/1000 MB Ethernet card.

  - The workstation shall be equipped with sound card.
  - The workstation shall be equipped with integrated speakers.
- The CSP shall have a camera
  - The photograph of the user shall be captured using a camera with a resolution of at least 2 mega pixel.
  - The camera shall have a flash which shall be automatic depending on the ambient light.
- The CSP shall have a document scanner
  - The scanner shall be of Flat Bed Type.
  - The scanner shall be a network scanner and support communication on Ethernet 100/1000 BaseT port or/and USB 2.0 port.
  - The scanner shall support maximum size of document: 22 x 30 cm
  - The scanner shall support scaling of 10-1000%.
  - The scanning resolution shall be up to 4800 dpi.
  - The scanning speed shall be 15 sec or lesser for a 10 x 15 cm colour document to file.
  - The scanner shall support the standard image / photo file format like PDF, TIFF, TIFF compressed, JPG, BMP, PNG, GIF, etc.
- The CSP shall have a smart card printer
  - The supported card physical format shall be ISO CR-80 - ISO 7810 (53.98 mm x 85.60 mm - 3.375" x 2.125").
  - The smart card printer unit shall be capable of printing in both colour and monochrome mode.
  - The smart card printer unit shall have a printing speed of at least 150 cards/ hour in full colour and up to 500 cards/ hour in monochrome.
  - The smart card printer unit shall have a mean time between failures (MTBF) for the print head of at least 3 years.
  - The smart card printer unit shall have single and dual sided printing capability.
  - The smart card printer unit shall be able to print at a minimum resolution of 300dpi.
  - The smart card printer unit shall print on cards with a thickness from 0.25 mm to 1 mm including support for the smart card supplied for this system.
  - The smart card printer unit shall have card feeder capacity of a minimum of 250 cards (at 0.25 mm - 10 mil thickness) or 75 cards (at 0.76 mm - 30 mil thickness).
  - Card output hopper capacity shall be a minimum of 100 cards (at 0.25 mm - 10 mil thickness) or 50 cards (at 0.76 mm - 30 mil thickness).
- The CSP shall have an utility document printer
  - It will allow the issuance of purchase receipts, as well as summaries of shift operations and other accounting documents.
- The CSP shall have an NFC reader complying with ISO 14443 parts 1, 2, 3 and 4, types A and B.
- The CSP shall have an user display
  - LCD based display shall be provided to display the transaction details to the customer.
  - The display size shall be a minimum of 7”.
  - The display design shall be made in consultation with purchaser during design stage.
- The CSP shall have an security box to save money
- The CSP shall have an UPS connected to PC with 30 minutes autonomy.

- The CSP shall have a POS terminal, with similar characteristics as those described for Multi-use handheld machines, or superior.

A.1.5 Point of Sale (POS)

- The terminal should be able to work smoothly under an operating temperature range of -5 to +50 °C.
- The terminal shall be work under an operating humidity of 95% RH non condensing
- The terminal shall have a compact and durable design, for indoor and outdoor use.
- The terminal shall be designed to operate connected to the power supply or from an internal, battery source which can be charged and re-charged.
- The terminal battery shall utilize "no memory" battery technology which is state-of-the-art, commercially available and common for use with such equipment.
- The terminal shall operate continuously for minimum 2 (two) hours without any disruption to the operations at any given instance during the shifts.
- The battery shall be field replaceable without any loss of data, with field replacement time (from end of operation with previous battery to beginning of operation with new battery) not to exceed three minutes.
- The battery shall be recharged to a full charge from a completely discharged state in less than four hours.
- The battery shall have a life of at least 500 recharging cycles with not more than 20% loss of efficiency over that lifetime of the battery.
- The terminal shall have a Power Adaptor of AC input 100 - 240V, 50/60Hz DC output to fully recharge the battery in less than 4 hours.
- The terminal shall have an alphanumeric keypad through which the operator can perform tickets sale and enter destinations.
- The terminal shall have a LCD display of
    - Sufficient brightness and clarity according to the conditions of location of the equipment in external sales points.
    - 128 x 64 pixel Graphic FTSN LCD with backlight, or superior
- The terminal shall have a high-speed thermal printer for the issuing of tickets. This same printer shall print the sales and validations summaries, if required.
    - The ticket printer shall be a compact thermal printer able to print, as a minimum, tickets (text and graphics), barcodes, and system status information.
    - The print speed shall not be less than 150 mm/s for both text and graphic and at a minimum resolution of 203 dpi (8 dots/mm).
    - The ticket printer shall use readily available paper rolls of standard size.
    - The ticket printer shall provide low paper and out of paper indication.
    - The ticket printer shall have an automatic cutter with a self-sharpening ceramic rotary knife.
    - The auto-cutter shall have a reliability of at least 1.5 million cuts.
    - The ticket printer head shall have a Mean Cycle between Failure (MCBF) of at least 50 million print lines.
    - The ticket printer shall have a Mean Time between Failure (MTBF) of at least 360,000 hours.
    - The terminal shall generate and the printer shall print QR codes
- The terminal shall have at least 3 SAM slots.
- The terminal shall have a magnetic stripe reader and chip for payment with bank cards.

- The terminal shall be homologated with EMV at Level 1 and 2, approved PCI and PTS 3.0 and NCMC compliance.
- The terminal shall be capable of hosting smartphone payment mean by NFC technology in a future implementation.
- The terminal shall have built-in buzzer for audio indication and LED for visual indication of card acceptance/rejection.
- The terminal shall have a Contactless card reader complying with ISO 14443 parts 1, 2, 3 and 4, types A and B.
- The terminal shall process at least the following cards: MIFARE UltraLight, MIFARE Classic, MIFARE Plus, MIFARE DESFire and MIFARE DESFire EV1, or other similar cards used in this project.
- The terminal shall have an anti-collision system according to ISO 14443 and handle multiple cards in the reader field at the same time.
- The terminal shall have a maximum time to transaction completion, since the card is placed in front of the reader's surface until the transaction is recorded in the terminal and the receipt is issued, of 3 seconds.
- The terminal shall be able to manage blacklists and white lists of SCs.
- The terminal shall be capable of storing sufficient information to:
  - Save information for at least 30 days of operation.
  - Store blacklists and white lists of SCs (at least 750,000 records)
- The terminal shall have a Processor : ARM11 32-bit Core CPU @ 400Mhz or superior
- The terminal shall have a RTC: high-precision real-time clock synchronized with the rest of the system.
- The terminal shall have the following Interface / Connectors:
  - 2 x RS-232 (Serial / Console)
  - 1x USB Device
  - 1x USB Host
  - 1x LAN (RJ45 connector)
  - Micro SD (up to 16 GB)
- The terminal shall have an integrated antenna to allow GSM / 3G / 4G / GPRS, WiFi and Bluetooth 2.1 connectivity.

A.2 AUTOMATIC VEHICLE LOCATION (AVL)

A.2.1 Single Control Unit (SCU)

- SCU shall work under an operating temperature range of -10 to +85 °C.
- SCU shall work under an operating humidity upto 95%.
- SCU shall be specially designed to work in an automotive environment, with the appropriate certifications for use in said environment.
- SCU shall have a variable power range, from 16 to 32VDC. Power to ITS equipments will be available even when the engine is not running.
- SCU shall have electrical and mechanical protection against surges and radio effects generated by other onboard elements or itself by bus. Likewise, it should not generate interference on other equipment on board, as for UBS-II and AIS 140.
- SCU shall have a 32/ 64 bit processor

- SCU shall have a 1 GB RAM or higher
- SCU shall have a 2 Gb of Flash memory or higher
- SCU shall have a high-precision real-time clock synchronized with the rest of the system (drift < 10 sec.)

- SCU shall have a GPS (12 minimum channels) module with:
  - 2.5 m CEP or 6 m 2DRMS
  - Device shall have an acquisition sensitivity of minimum (-) 148 dBm.
  - Device shall have a tracking sensitivity of minimum (-) 165 dBm.
  - Update rate 1 Hz(configurable 10 Hz)
  - External antenna
- SCU shall have 2G/3G/4G modules, and also SMS and GSM speech communications capability.
- SCU shall have a SIM card slot.
- SCU shall have WiFi connectivity
- SCU shall have 3 axis accelerometer and 3 axis gyroscope and it shall be used for enhanced location in areas where satellite GPS coverage does not provide a good location.
- Device shall be capable of transmitting data to minimum 2 different IP addresses.
- SCU shall have communication ports: minimum 1 Ethernet port, 1 CAN 2.0 and a minimum of 2 serial ports (at least 1 RS-232 and 1 RS-485, WLAN, audio input output).
- SCU shall have USB 2.0 connector.
- SCU shall support over the air software and configuration updates.
- SCU shall have a minimum of 4 digital inputs/outputs and 2 analogue inputs.
  Minimum digital inputs:
  - Driver's alarm pedal
  - Contact key
  - Front door
  - Rear door

  Others (optional)
  - Passengers emergency button (to be connected, if available)
  - Odometer (to be used for enhanced location algorithm)
  - Future use (2)
- SCU shall have in built /external two channel amplifier minimum 10 Watts rms each suitable for 4~8 Ohm impedance with input for external microphone.
- SCU shall have a unique identifier for identifying the unit and data from the unit. The unique ID shall be stored in a read only memory area so that it cannot be altered or overwritten by any person. IMEI (International Mobile Station Equipment Identity) Number shall be the unique identifier.
- SCU shall have connectors for GPS, GSM / GPRS / UMTS and WiFi antennas as per UBS-II and power connector as per AIS 140.
- SCU shall store/write the registration number of the bus in the internal non-volatile memory.
- In absence of both GPRS and GSM networks and on pressing of Emergency Button, the system implementing AVL function shall store the emergency Alert. Once the GPRS or GSM is available, this alert information shall be sent on high priority to the configured IP addresses as per the communication protocol mentioned, as per AIS 140.

- SCU shall be fitted in a way to minimize unintentional damage, shielded from direct engine heat, protected from water splash and dust, and it shall be mounted in a suitable location such a way that it is not easily accessible /exposed to passengers.

A.2.2 Audio devices

A.2.2.1 Driver microphone

- Gooseneck microphone, unidirectional
- Electric condensed microphone
- 50-12,000 Hz
- Sensitivity: -48dB (V/Pa) at 1 Hz
- Phantom: 1.5 – 9 Vcc
- The wiring harness used in the device should be tested for flammability as per IS 2465.

A.2.2.2 Driver loudspeaker

- Output power: 10 W
- The loudspeaker shall have a compact and durable design.
- The wiring harness used in the device should be tested for flammability as per IS 2465.

A.2.3 Alarm pedal

- Operating temperature range of -5 to +70 °C.
- IP67.
- Normally closed.
- No mechanical lock.
- The form factor will be such that the pedal is easy to press in the case of an emergency, and simultaneously also minimizes the possibility of accidental or unintended press thereby causing a false alert.
- On pressing of alarm pedal, the system shall send emergency Alert to the configured IP addresses. In the absence of GPRS network, the alert shall be send as SMS message along with bus location data to configured control centre number(s).
- The wiring harness used in the device should be tested for flammability as per IS 2465.

A.2.4 Bus Driver Console (BDC)

- BDC shall work under an operating temperature range of -25 to +80 °C.
- BDC shall work under an operating humidity of 95%.
- The display shall be full colour graphic TFT 640 x 480 dots minimum, capable of showing 20 lines in English.
- The screen shall have a viewing angle (horizontal) 60°/75° (right/left)/ (vertical) 60°/75° (up and down).
- The screen shall have a minimum size of 5.7 " diagonal
- BDC shall have a screen and alphanumeric keypad for driver interaction.

- The screen shall have adjustable back lighting.
- In case of physical keyboard, it shall have 4 keys minimum.
- BDC shall have a guided menu system for easy and intuitive use.
- BDC shall be small sized and have appropriate mounting characteristics for installation in buses.
- The wiring harness used in the device should be tested for flammability as per IS 2465.

A.2.5 On board CCTV

- On board CCTV elements shall work under an operating temperature range of -5 to +70 °C.
- On board CCTV elements shall work under an operating humidity of 95% RH non condensing.

A.2.5.1 IP Camera

- Fixed lens 3.6 mm
- Resolution 1280 x 720 pixels
- Picture sensor =1/3"" CCD or 1/3"" CMOS or better.
- The camera shall support H.254 Video Compression
- The camera shall support G.711 or G726 Audio Compression
- The IP camera shall support 1 to 30 fps for different resolutions
- The camera shall have minimum illumination of 0.01Lux/F1.2 with IR Off and 0.0 Lux with IR On
- The IP camera shall have shutter time of 1/50 sec to 1/100,000 sec.
- The IP camera shall have Built-in Infrared LEDs with range of minimum 10 meters, Auto Day/Night
- The camera shall have ruggedness of:
  - Rugged, vibration, shock and tamper proof metal housing
  - nti-vibration installation with locking mechanism
  - Vibration resistance as per /IS 9000-part 7
  - Shock resistant as per /IS 9000-part 8
- Ingress protection rating IP65
- The camera shall have a -10 to 70 degree Celsius operating temperature
- The camera shall have operating humidity of 0% to 95%
- The camera shall have built-in microphone
- The camera shall support image enhancement of Auto-tracking White Balance (ATW), Automatic Gain Control, Wide Dynamic Range (WDR) and Automatic Backlight Compensation.
- The camera shall support to power to NVR through Power-over-Ethernet
- The camera shall support RJ45 10/100 M Ethernet Interface
- Flammability/burning tests HB as per UL 94-1998 Clause 7 (for wire harness) or IS2465

A.2.5.2 NVR Recorder

- 8 input /1 output video channels
- 8 input /1 output audio channels

- H.264 video compression standards
- G.711 or G.726 audio compression standards
- Dual streams, both streams independently configurable for each camera resolution and frame rate.
- Shall support 720p/4CIF/2CIF/CIF/QCIF (can be set independently for each channel, for both streams) recording resolutions
- Shall support 1 to 30 fps for all channels at 720p – resolution and frame rate can be set independently for each camera
- 1 TB, Solid State Drive with suitable anti-vibration mechanism, Storage to be pluggable and easily removable, secure and protected by lock
- It shall support event based recording and tagging:
  - Pre-recording – 1 to 30 minutes
  - Post-recording – 1 to 30 minutes
- Shall have 9 to 32 volts, spike/surge protection
- It shall have facility of Integrated PoE switch supporting peak power requirement for 8 CCTV cameras with infrared on.
- 1 x RJ45 LAN interface (additional to those of the cameras)
- It shall support the external interface 1 RS232 and USB 2.0
- It shall be capable to work on -10 to 70 degree Celsius
- It shall be capable to handle 0% to 95% humidity
- Ingress protection IP54 or better
- It shall have Minimum 5 configurable image settings (1 to be the best quality)
- It shall have Tamper-proof Watermark
- It shall have ability for video over-written to be configurable to support:
  - Cyclic overwriting (oldest recording to be overwritten)
  - Event tagged recording not to be overwritten.
- It shall have LED indicators for Power, Recording, Network
- Capable of sending images (of configurable resolution, 720p, 4CIF, CIF, 2CIF, QCIF) from each camera to the server at specified frequency (configurable).
- It shall provide video and audio download facility for the desired date/time and duration.
- Flammability/burning tests HB as per UL 94-1998 Clause 7 (for wire harness) or IS2465.

A.2.6 Dual antenna GPS-GSM/3G/4G

- System shall be capable to work on -25° C to 85° C of temperature
- Waterproof IP66
- Low profile antenna (exterior mounting)
- It shall have been specially designed to work in a hostile and mobile environment, and it is necessary to have the appropriate accreditation for use in said environment through the corresponding tests.
- Cable RG 174
- GPS module:
  - Frequency range: 1575.42 +/-1.042 MHz

- Peak gain: 28 dB with LNA
- Polarization: RHCP
- Impedance: 50 Ohm
- Connector: Fakra C female or SMA (M) ST plug type

- GSM/2G/3G/4G Module:
  - Frequency range: 824-960/1710-2170 MHz
  - Peak gain: 3 dBi
  - Polarization: Linear
  - VSWR: <2.5:1
  - Impedance: 50 Ohm
  - Connector: Fakra D female or jack type 1/4"-36UNS

A.3 PASSENGER INFORMATION SYSTEMS (PIS)

A.3.1 On board passenger information panels

- On board displays shall work under an operating temperature range defined by IS16490.
- On board displays shall work under an operating humidity upto 95%.
- LED and display quality front, side and rear signs:
  - Amber LED, dominant wave length 591~595nm (colour matched and bin graded).
  - UV resistant, diffused lens 4 mm (minimum) or 'SMD PLCC2 standard package
  - Wide viewing angle 120^0 horizontal & 60^0 Vertical
  - Ensure enhanced readability with full clarity on scrolls and long life usage by incorporating non multiplexed system (constant current drive circuit) with typical LED Intensity 400~700 mCd at If =20 mA, alternatively multiplexed design (maximum 4:1) with typical LED intensity 950~1150 mCd at 20 ma
- The controller system shall have provision for a communication port namely RS232/RS485/USB etc.
- Displays shall have a light sensor with continuously variable brightness control to enable the display intensity to change based on outside light conditions.
- LED and display quality inner sign:
  - LED amber dot matrix viewing angle 45^0 all around, intensity minimum 40 mCd, dominant wave length 590 ~595 nm.
- Structure
  - Front side and rear signs: light weight structure with toughened glass fixed with UV resistant adhesive in front.
  - Inner sign: light weight structure with poly glass /acrylic/toughened glass.
  - Electronic devices used to be 'automotive grade' rated for temperature -25° C to +85°C with conformal coated PCB boards.
- Displays shall pass tests described in IS 16490
- The wiring harness used in the device should be tested for flammability as per IS 2465.
- Minimum display size and resolution detail provided in Annexure B.12

A.3.2 Bus stop boards

- Display units shall work under an operating temperature range of -5 to +70 °C.
- Display units shall work under an operating humidity of 95% RH non condensing
- Display units shall be mounted on a rugged enclosure to withstand harsh environmental conditions with reasonable physical security.
- Display will be located at a convenient height to have a clear view of the message of next arrival bus.
- Fitment provision will have to be provided in the Bus stations. The power supply (240V, 50Hz) shall be made available by CTU.

Passenger Information Display at Bus Stops:

- The passenger information displays at bus stops shall have a graphic matrix with a minimum of 128 x 24 LEDs (pitch =<5mm), 5000 mcd.
- Display shall be alphanumeric with graphic capability in English/Hindi/Punjabi, and should be visible in fixed, scrolling and flashing mode.
- When showing the information in English about next buses, the information shall be organized in three lines with at least 21 characters per line, including at least route number, destination and estimated time of departure.
- Amber coloured LED, dominant wave length 591~595nm.
- Displays shall have a light sensor with continuously variable brightness control to enable the display intensity to change based on outside light conditions.
- UV resistant, diffused lens 4 mm (minimum) or 'SMDPLCC2 standard package'
- Wide viewing angle 120^0 horizontal & 60^0 Vertical
- Anti-reflecting, anti-condensating and UV metacrytate screen protected with 2+2 mm thick laminated glass.
- One integrated tamper proof casing for complete PIS Unit addressing physical security considerations. IP 55 or higher protection.
- Alarm signal sent to centre when casing is open.
- Remote RESET functionality
- Front opening with clamping mechanism for maintenance
- Safety locks.
- Integrated GSM antenna
- 110-240 VAC, 50 Hz with overvoltage protection, thermal and differential circuit breaker

Passenger Information Display at ISBT

- The passenger information displays at bus stops shall be LED technology with minimum size of 50"
- One Integrated tamper proof casing for complete PIS Unit addressing physical security considerations.
- Provide any hardware like PC, networking, etc. required to run the PIS Display Units.

Customized Passenger Information Display at Designated Locations

- The Customized passenger information displays at bus stops shall be LED technology with minimum size of 48" X 72".
- One Integrated tamper proof casing for complete PIS Unit addressing physical security considerations.
- Provide any hardware like PC, networking, etc. required to run the PIS Display Units.

A.4 TRANSIT MANAGEMENT CENTRE (TMC)

A.4.1 General

The TMC shall allow the administration, consultation, maintenance and accounting management of all the field equipment. The communications maintained with the equipment system shall allow to TMC to know the status of all the field equipment.

The necessary HW equipment shall include at least (in rack cabinet):

- Database servers.
- Application servers.
- Web servers.
- Communication servers.
- Operating stations: terminals with access to the system required to manage the information (at least 5).

Similarly, the SI shall supply and install:

- All needed elements for the configuration of the TMC network (CAT 6 or higher).
- UPS equipment that guaranties a minimum time of 120 minutes of work at full load.
- There shall also be a generator set that allows the TMC to carry out its activity autonomously, at least 24 hours, without refuelling. Solutions of systems of generating sets, of at least 2 units, that allow to operating of autonomous form at least 24 hours without refuelling will be admitted.
- All commercial licenses required in the name of Chandigarh Transport Undertaking (CTU): Microsoft Windows Server type, DB-SQL Server / Oracle license, etc.

In addition to this, the SI shall supply, install and maintain (corrective and preventive) UPS equipment and electrical contingency, ensuring that its capacity is sufficient to provide the necessary power to all equipment running at full load and considering additional power for future enlargements of 50%. The architecture to be proposed shall be modular and scalable in order to allow the system to grow in volume and in future functionalities, with modular growth capacity at the physical level: Memory, CPU and storage, and software level as a consequence of the use of greater benefits and growth of the services offered in the maintenance horizon. All of these elements involved should be easy of managing, updating and have contingency system for Application and Database servers.

At least the following equipment shall be considered:

- Database servers: they will be the equipment responsible for supporting the service of the database constituting the core of the entire information system. The equipment must comply with the following minimum characteristics:
  - High availability redundant systems (7x24).
  - Dual next-generation processor.
  - RAM memory with a minimum of 32 GB.
  - Storage capacity of at least 1 TB.
  - Dual Gigabit Ethernet network card.
  - Redundant hot-plug power supply.
  - OS Microsoft Windows Server 2012 standard or higher License or Linux server grade operating system
  - License manager of the Database.

- Communications / Applications / Web Servers: this equipment shall host the processes that are responsible for establishing communications with the system's equipment; the size of the equipment will depend on the size of the fleet and the sales and recharge network. The equipment must comply with the following minimum characteristics:
  - High availability redundant systems (7x24).
  - Dual next-generation processor.
  - RAM memory with a minimum of 32 GB.
  - Storage capacity of at least 1 TB.
  - Dual Gigabit Ethernet network card.
  - Redundant hot-plug power supply.
  - OS Microsoft Windows Server 2012 standard or higher License or Linux server grade operating system
  - License manager of the Database.
- Centralized Storage Unit:
  - It shall have at least two disk expansions (one for storing critical high-speed reading / writing applications and one for half-speed historical information - 10K RPM).
  - It shall have intelligent management of storage space.
  - It shall be connected via high-speed channel to a backup unit.
  - Modular growth at both the controller and disk levels.
  - It shall have a minimum installed capacity of 100 effective TB.
- Backup System:
  - Library of 24 minimum LTO-5 backup tapes
  - LTO-5 tape drive (recorder)
  - Automatic rotation of tapes for backup
  - Management System of backups in tapes, for archives and specialized by service.
- Backup software functionality:
  - It shall allow local backups or any mounted device in the system that was accessible like a local disk.
  - It shall have schedule functionality.
  - It shall have a command line interface (CLI)
  - It shall support backups in many file systems: add support of SMB, NFS, EBS, S3, etc
  - It shall do backups (size and date information), file system (show remaining space in the selected device), filter (add a filter) of backups by month and day.
  - It shall be able to do automated backups: for example before install a module.
  - It shall be able to be downloaded and uploaded in an easy way the backups from the interface.
  - It shall improve the backups of database using redo-logs functionality.
  - It shall store the backup data based on double the size of current fleet, and storage demand of detailed information for a period of at least 24 months.
- KVM - IP, with corresponding accessories.
- Switches: 02 switches of 24 ports, L3, 100 / 1000 Gb, stackable.
- UPS system:

  - It shall support the equipment of the TMC, and of the workstations and luminaries of the TMC that the SI considers in its offer;
  - The minimum autonomy should be 120 minutes.
  - The UPS system shall allow modular growth and hot-swap installation, both in controllers and in the power
- Other equipment and additional features of the TMC:
  - Rack cabinets shall be used for communications, UPS, collection system and SAE. All IT services must have their contingency, continuity, backup and backups infrastructure.
  - CTU shall provide an area to allocate the TMC, It will be up to the SI to implement the precision air conditioning system and biometric access control system and Video-surveillance cameras for registration of visits and supervision of personnel, the SI can consider if it seals the assigned part within the area of the TMC, or consider adapting the entire Centre with the requested elements. SIs will be offered the possibility of carrying out a technical visit programmed by CTU to this area, in order to be able to know the characteristics of the space.
  - The SI should consider in its offer, a system of monitoring and supervision of all the components installed in the TMC, under a single platform.
  - The proposal of the SI should consider indicators of energy efficiency in all the elements involved.
- System access terminals. From these workstations, the TMC's applications shall be able to be accessed (central monitoring of the collection system and the different management applications of the system). The access will be made through the web server, using a next-generation browser compatible with the required functionalities. The equipment shall comply with the following minimum characteristics:
  - Next-generation dual processor
  - RAM memory with a minimum of 16 GB.
  - Storage capacity of at least 500GB capacity.
  - Dual Gigabit Ethernet network card.
  - OS as compatible with Server Operating System but with the friendly User Interface preferably in Microsoft Windows OS.
  - TFT flat monitor of at least 21".
  - Mouse and keyboard.

A.4.2 Videowall

- The SI shall implement in TMC: one Video Wall (of 3x3 panels of 50" each), structured wiring for needed positions, according to dimensions, with the corresponding accessories and corresponding luminaries.
- Concerning electrical wiring, the network shall converge on a separate power board connected to the central UPS.
- In the TMC, the Video Wall system shall be anchored to the Floor or Ceiling, it shall be a Video Wall of 3 x 3, each cube is a 50-inch LED type monitor and 2 mm bezel. Interconnected with the workstations, with video controller with the characteristics so that each terminal launches the corresponding display to the layout. It shall also allow the layout changes, by size.
- Videowall controller: Requirements
  - Virtual matrix shall allow users to quickly and easily place video sources.
  - Videos sources shall be able to be reproduced in one module or any part of the 3x3 video wall.

- It shall have a video recording capability.
- Videowall controller shall contain configurable “carousels” of video sources playing one after the other at definable intervals.

A.4.3 Remote Customer Support Centre

A.4.3.1 Website and Mobile App

The SI shall propose a website design that must be approved by CTU. The main features of this website will be the following:

- Domain name: at the proposal of the SI, it shall be approved by CTU.
- Accessibility features: Certificate attesting to compliance with the World Wide Web Consortium (WCAG) Web Content Accessibility Guidelines 1.0, at its AA level.
- Languages: Hindi, Punjabi and English.
- The web display shall accommodate the device from which it is being accessed. At least the following types of devices will be considered: PC and mobile phone or Smartphone.
- The introduction of any personal data shall be done under the HTTPS protocol. To ensure the integrity and confidentiality of the information, a secure environment for the user will be created, using asymmetric encryption implicit in the Secure Sockets Layer (SSL) protocol that web browsers support.
- Means of payment accepted: debit or credit card and bank transfer.

A.4.3.2 Customer Support Centre (IVRS)

- A system with integrated Call Centre functionality shall be designed and it shall have at least:
  - PABX-PBX (Private Automatic Branch Exchange), to manage internal, incoming and outgoing calls, meaning outgoing calls to other areas associated with the service and / or calls specific to users of the complaint tracking service or complaints.
  - CTI (Computer Telephony Integration), so that there is an interaction between telephone and computer calls in a coordinated way.
  - IVR (Interactive Voice Response), to interact with the user through voice recordings and recognition of responses, and to allow access to information services or other operations of an IVR, such as call transfers to a consultant, navigation in a pre-recorded menu.
- The IVR system shall be able to recognize the language used in a normal conversation for access to information. An interface that integrates voice and data shall be implemented.

The customer service system shall have the necessary operating stations, equipped with a computer and a telephone terminal.

A.5 TRANSIT MANAGEMENT SYSTEM (TMS)

A.5.1 General

A.5.1.1 TMS server

- The server shall have processor with minimum of Intel Xeon E5 Series with 6 cores, 2.2GHz with at least 15MB cache.
- The server shall be scalable to 2 processors with each having a minimum of 6 cores per processor.
- The server shall have minimum of 32 GB RAM and shall be scalable to 256GB RAM.
- The server shall include a Network Controller, 2 Gigabit Server Adapters with TCP/IP Offload Engine one standalone and one embedded on the motherboard.
- The Server shall include (6) PCI-Express x4 and (2) PCI-X 64-Bit/133MHz.
- The Server shall include at least 5 - USB 2.0 compatible ports.
- Storage capacity of at least 1 TB.
- The Server shall include 2-Hot plug redundant power supplies and cooling fans.
- The Server shall have an Optical Drive 48x SATA CDRW/DVD Combo Drive.
- The Server shall include 1 Serial port and 1 VGA (+1 front VGA on rack models).
- The Server chassis shall be rack mountable and include rack mounting hardware.
- The Server shall include hard drives based on volume of data to be stored. The transaction data storage requirements shall be estimated based on total transactions & related calculations as per the functional requirements.
- The Operating System shall be Microsoft Windows 2012 Server Edition or latest as available in the industry.
- Suitable commercial off-the-shelf antivirus software shall be provided for the duration of the contract.
- Server shall be designed to provide a fully redundant and fault tolerant system and shall be available for 99.99% or greater. The unscheduled down time shall be less than 0.01%.
- The central system server shall have a hot standby to mitigate any risk of failure in central system which halts the system performance. The vendor/SI shall submit the appropriate design/solution in the technical proposal.

A.5.1.2 ERP/MIS server

Same as TMS Server (Refer A.51.1).

A.5.1.3 NMS server

- High availability redundant systems (7x24).
- Dual next-generation processor.
- RAM memory with a minimum of 16 GB.
- Storage capacity of at least 500 GB.
- Dual Gigabit Ethernet network card.
- Redundant hot-plug power supply.
- OS Microsoft Windows Server 2012 standard or higher License

- License manager of the Database.

A.5.1.4 TMS server (Depot Level)

- High availability redundant systems (7x24).
- Dual next-generation processor.
- RAM memory with a minimum of 16 GB.
- Storage capacity of at least 500 GB.
- Dual Gigabit Ethernet network card.
- Redundant hot-plug power supply.
- OS Microsoft Windows Server 2012 standard or higher License
- License manager of the Database.

A.5.1.5 TMS workstation

- The TMS workstation shall be loaded with all the required software, GUI interface, antivirus, etc. to enable the operators to perform their functions.
- The workstation shall at least be of a Core i7, 6th Generation processor at minimum 3.0 GHz with a minimum of 2MB secondary level cache.
- The workstation Random Access Memory (RAM) shall be 8 GB or better.
- The workstation hard drive (SATA) shall have a capacity of 500 GB or better.
- The workstation shall be equipped with a media storage device capable of CD/ DVD RW with a read & write speeds that are in accordance with the latest industry standards.
- The workstation shall be equipped with an integrated 10/100/1000 MB Ethernet NIC.
- The workstation shall be equipped with at least 3 USB 2.0 spare ports in addition to the ports required.
- The workstation shall be connected with a TFT LCD monitor that shall be 19” or larger and have SVGA quality or better & keyboard & mouse.

A.5.1.6 Laser printer

- The printer shall be network laser printer and support communication on Ethernet 100/1000 BaseT port and USB 2.0 port.
- The printer shall at least have a 500 MHz processor.
- The printer shall at least have a minimum 128 MB standard memory.
- The printer shall have at least 250 sheets input tray.
- The printer shall have a monochrome speed up to 25 A4 ppm
- The printer resolution shall be at least 600 x 600 dpi
- The toner shall be of standard size, off-the-shelf and easily available in the local computer market.

A.5.1.7 Document scanner

- The scanner shall be a network scanner and support communication on Ethernet 100/1000 BaseT port or/and USB 2.0 port.
- The scanner shall support maximum size of document: 22 x 30 cm
- The scanner shall support scaling of 10-1000%
- The scanning resolution shall be up to 4800 dpi
- The scanning speed shall be 15 sec or lesser for a 10 x 15 cm colour document to file
- The scanner shall be support the standard image / photo file format like PDF, TIFF, TIFF compressed, JPG, BMP, PNG, GIF, etc.

A.5.1.8 Barcode reader

- Scanner Type: Bi-directional
- Light Source: 650 nm visible laser diode
- Scan Element Frequency: 50Hz
- Scan Rate: 100 scans per second typical
- Roll (Tilt): 1 +/- 30 degrees
- Pitch: 2 +/- 65 degrees

A.5.1.9 Portable drive

In the scenario that Wi-Fi network is not working at the depots for downloading OBITS video data, two 1 TB Portable Drive shall be provided at each depot.

A.6 COMMUNICATIONS

A.6.1 Wi-Fi Network - Depot

- The depot shall have a Wireless Network (Wi-Fi) Gateway for facilitating bulk data transfer between all SCU/SCN and the Video/Image software, from DMS to SCU to update the firmware, voice files for stop announcement, and SCU/VHMD to DMS to transfer VHMD log files
- Wi-Fi access points shall be secured with authentication
- The depot Wi-Fi Gateway shall utilize a secure communications firewall.
- All Wi-Fi communications shall be compatible with Access Points using the IEEE 802.11b/g/n standard and WAP2 network protocol.
- At a single time Wi-Fi shall be capable to transfer the data from multiple fleet and minimum of 50.

A.6.2 OFC Network – TMC & Depot

- The OFC based fixed communication system shall be designed to transmit /receive the data traffic from/ to Depot 1(Store, Waybill & Cash section of Depot-2 is located at Depot-1) to TMC, Depot 2 to TMC, Depot 4 to ISBT 43 bus terminal.

- The OFC based communication system shall provide connectivity to these locations and shall have an independent Layer 2 Gigabit Ethernet based switch that shall support 1 Gbps of network bandwidth for communications.
- SI shall ensure that the proposed network meets the bandwidth requirements of the network for both normal case and worst case. Worst case means all field devices working at maximum bandwidth. SI has to provide a detailed bandwidth calculation as part of the submission.
- Single Mode Optical fibre cable (OFC) shall provide a minimum of 12 cores.
- Each locations, depot, terminal, TMC and workshop shall have an environmentally rugged, Layer 2, Gigabit Ethernet switch that shall support single mode fibre optic based backbone communications in a full duplex mode.
- All transmission and switching equipment shall be SNMP/ ICMP enabled for alarm /fault reporting to the Network Management System (NMS) at the TMC.
- The transmission & switching equipment shall have hot standby functionality to enable uninterrupted system operation.

A.6.3 Server rack

- The rack shall be of capable of accommodating all the servers as per the SI design and shall be of at least size 42U.
- Shall have open able side panels with slam latches.
- Shall have provision for cable entry from top & bottom of rack with knock-off, pre-punched marked openings
- Shall have vertical cable managers in front with suitable accessories on each side of the rack with covers for concealed wiring within the rack.
- Front door shall be made of Tinted toughened glass and should be lockable
- Shall have spring loaded locking arrangement for front & rear door.
- Shall have equipment mounting frame (rail notches) for mounting of equipment's.
- Horizontal shelves for equipment placement shall be provided as required.
- The rack shall have ventilation louvers or uniform perforations on side panel & rear door & equipment cooling with fans (4nos.) housed in fan trays.
- Two strips each with 8 nos. of 5A/15A, 230 VAC power outlets with MCB, inbuilt surge suppressor & line filter for conditioned power output shall be provided.

A.6.4 Switches

- Each Depot, terminals, workshop shall have an environmentally rugged, Layer 2, Gigabit Ethernet switch.
- The Ethernet switches shall be compliant with IEEE 802 specification family for hardware features implemented.
- The Ethernet switches shall provide connectivity to the field devices either via 100BaseFX single mode or multi-mode ports or via 10/100BaseTX ports, based on the specified distance requirements.100BaseFX ports shall be ST type female optical connectors.10/100BaseTx connections shall be connected via Cat6 cable. Details regarding proposed ports for the switches shall be provided in details.

- The Ethernet switches shall be interoperable with other manufactured Ethernet switches while still achieving all common Ethernet standards.
- The device's management functionality shall be SNMP v2 or higher.
- It shall enable security features in the network switches to disallow any unauthorized access to the port / network.
- Field switches shall be environmentally rated to operate in a temperature range from 0°C to +60°C.

A.6.5 Cables

- For all inside building horizontal and vertical cabling from the Data points to the Server Rack Fire retardant rated CAT 6 FT4 cables shall be used.
- Socket outlet faceplate, SI to verify the exact count of TP/DP points and to provide socket outlet face plate.
- Telephone Cables (CAT3): Telephone cables within the building shall be Cat 3 or better.

A.6.6 Uninterrupted Power Supply (UPS)

- The SI shall supply a compatible 100% redundant online UPS at Transit Management Centre for the equipment supplied under this contract based on SI's own load calculations having a back-up of at least 4 hrs.
- The UPS unit shall be provided with external batteries as needed to support the run-time requirements. The quantity of batteries required for the UPS, shall be calculated based on the equipment load and run-time The SI shall provide the calculations to support the UPS rating and number of batteries as part of the Bid submission.
- The UPS unit shall include separate, sealed, maintenance-free batteries with a typical lifetime of five (5) years and minimum reserve time of four (4) hours under full load conditions.
- All the Input and output cabling and related ancillary works (civil/electrical, etc.) shall be in the scope of the SI, however required support will be provided by CTU.
- The batteries shall be rack mountable & the enclosure shall be under lock & key, utilising the minimum possible space and arranged in an aesthetic manner to minimise any possibility of inconvenience to the commuters.
- The UPS shall be of True online with double conversion topology.
- The UPS shall have a microprocessor-based unit status and control display with the status and alarm indicators displayed on the status LED indicator and LCD display.
- The UPS shall have self-diagnostic functionality to detect any failure/fault in the UPS system and shall display the same on the LCD display of the UPS.
- The UPS unit shall have minimum of the following audible alarms:
    - Line Failure: This will be audible when required input electrical supply to UPS is not available;
    - Battery Low: This will be audible when battery voltage falls below the threshold value;
    - Bypass Mode: This will be audible when UPS is running on bypass mode; and
    - System Fault: Audible alarm will be generated when any fault is detected in the UPS system.
- The UPS unit shall include full-time protection from sudden voltage increase with inrush protection and AC line filtering.

- The UPS unit shall be capable of starting without input power. The unit shall start up and operate from the battery, with output frequency same as the last operating frequency.
- The UPS unit shall include automatic restart. Upon restoration of utility AC power after complete battery discharge, the UPS shall automatically restart and resume operation.
- The UPS unit shall provide short circuit shutdown protection.

A.6.7 Crew Kiosk

- 19” Projected capacitive touch screen
- Active Area: 376 (H) x 301 (V) mm
- Screen Resolution: 1280 x 1024
- Touch Screen Type : Vandal Resistant Glass
- Processor : Intel Core i5 or higher
- Memory : 4GB
- Storage : 500GB HDD
- Integrated webcam
- Response Time: 14ms
- Viewing Angle: 178° (H) x 178°(V)
- Temperature: 0°C ~ 50°C
- Humidity: 20% ~ 80%
- Height: 1320mm
- Width: 525mm
- Safety approvals : TUV, CE, UL, CUL, FCC-B and RoHS
- Connectivity : LAN / WiFi
- Robust Enclosure IP65 rating with cooling system
- Amplified Speakers
- USB external access

Annex B. CTU Data Summary

B.1 Office Details

OFFICE DETAILS		
Sr. No.	**Office**	**Location**
1	CTU Head Office	Industrial Area, Phase-1, Chandigarh
2	CTU Office (General Manager Office)	Sec-25, Chandigarh

B.2 Depot & Terminal Details

1	Depot-2	Industrial Area, Phase-1, Chandigarh
2	Depot-3	Sec-25, Chandigarh
3	Depot-4	Sec-43, Chandigarh
4	ISBT-17	Sec-17, Chandigarh
5	ISBT-43	Sec-43, Chandigarh

B.3 Reusable IT Equipment Details

Below are the IT equipments which will be used for ITS project, the following paragraph Bill of Quantities, does not apply the reusability of these IT equipments, so the quantities that appear in the bill will be reduced.

REUSABLE IT EQUIPMENT DETAILS				
Sr. No.	**Equipment**	**Make/Model**	**Qty.**	**Year of Purchase**
1	Server	HP - Proliant DL560 9th Generation	4	2017
2	Printer	Samsung - M2830DW	24	2017

B.4 Biometric Attendance System Details

Integration of DMS with existing Biometric Attendance system as per below mentioned details.

BIOMETRIC ATTENDANCE SYSTEM DETAILS			
Sr. No.	**Location**	**Make**	**No. of Biometric Machines**
1	Depot-2	Penta-Konfidance	4
2	Depot-3	Penta-Konfidance	3
3	Depot-4	Penta-Konfidance	3

B.5 Automatic Barrier Gate System Details

Integration of DMS with existing Automatic Barrier Gate system as per below mentioned details.

AUTOMATIC BARRIER GATE SYSTEM DETAILS		
Sr. No.	**Location**	**System Description**
1	Depot-2	Automatic Electromechanical Boom Barrier integrated with RFID reader and ANPR Camera installed at depot/ISBT gate to capture the entry and exit of vehicle
2	Depot-3	
3	Depot-4	
4	ISBT-43	

B.6 Fuel Pump Station Details

Integration of DMS with existing Fuel Management system as per below mentioned details.

FUEL PUMP STATION DETAILS		
Sr. No.	**Location**	**System Description**
1	Depot-2	Every bus is assigned a unique RFID tag tied along the Fuel tank inlet pipe, this RFID tag is read by the RFID reader fitted on the Fuel dispenser nozzle and details of bus and fuel are captured in the system
2	Depot-3	
3	Depot-4	

B.7 Installed OBITS Equipment Details

INSTALLED OBITS EQUIPMENTS QTY.							
Sr. No.	**EQUIPMENT NAME**	**SML**	**TATA (MIDI)**	**CORONA**	**ASHOK LEYLAND (MIDI) (nos.)**	**TATA**	**TOTAL (nos.)**
		CASTMASTER (nos.)	**KPIT (nos.)**	**CASTMASTER (nos.)**		**CASTMASTER (nos.)**	

No of Buses			**170**	**49**	**39**	**34**	**100**	**392**
1	SCU		170	49	39	0	0	258
2	AVL		170	49	39	0	0	258
3	BDC		170	49	39	0	0	258
4	DISPLAY PANELS	Front	170	49	39	0	100	358
5		Inner	170	49	39	0	100	358
6		Side	0	49	39	0	100	188
7		Rear	0	0	39	0	100	139
8	CAMERA	Front (saloon)	170	0	39	0	0	209
9		Rear (saloon)	170	49	39	0	0	258
10		Parking (rear)	170	49	39	0	0	258
11	DVR		170	49	39	0	0	258

B.8 Manpower Details

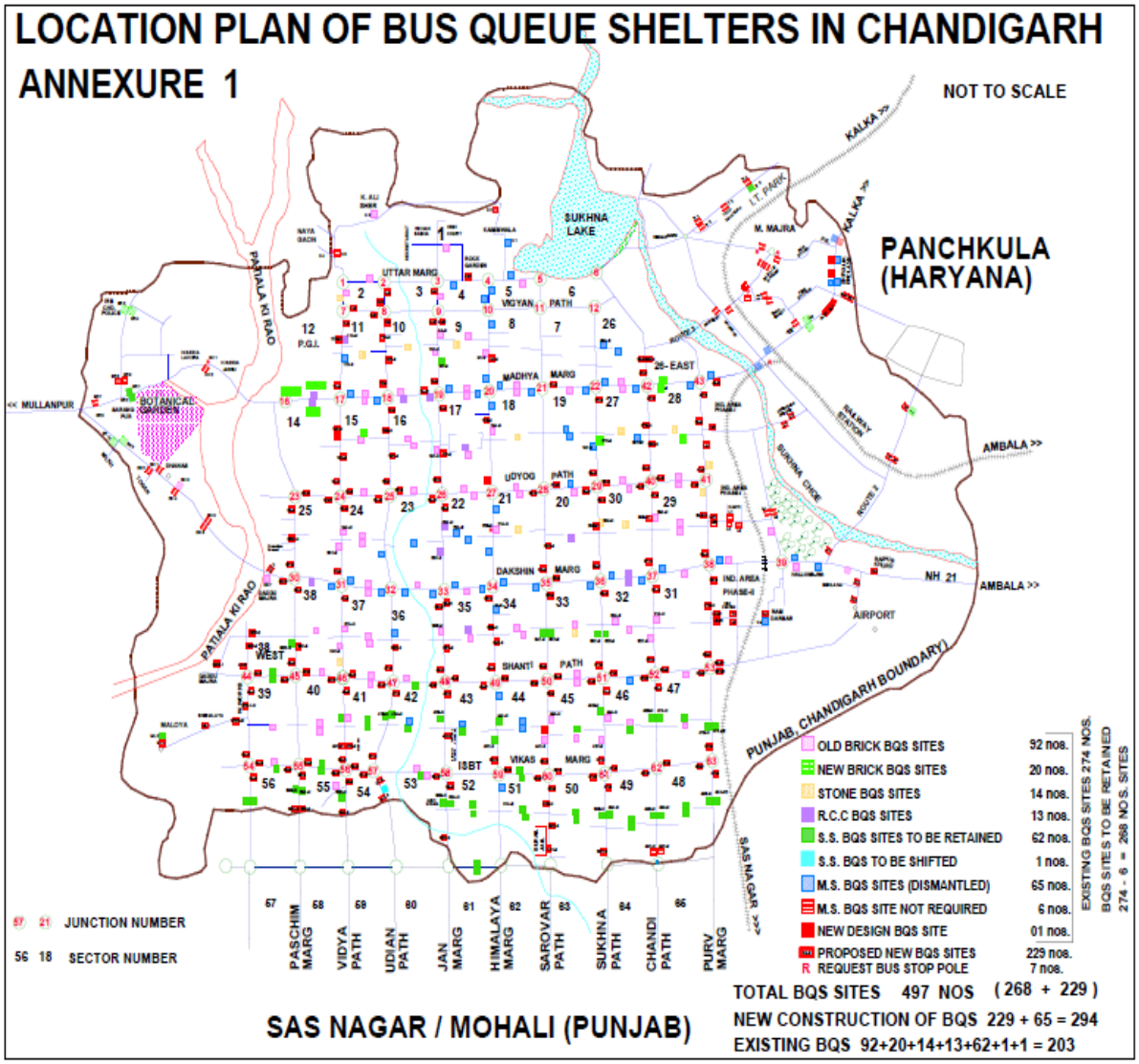
DEPOT WISE MANPOWER DETAILS					
Sr. No.	**Depot No.**	**No. of Driver (A)**	**No. of Conductor (B)**	**Other Staff (C)**	**Total Staff (A+B+C)**
1	Depot-1	184	177	199	560
2	Depot-2	318	307	189	814
3	Depot-3	256	220	188	664
4	Depot-4	154	168	24	346

B.9 Location Details for CSP

LOCATION DETAILS FOR CSP		
Sr. No.	**Centre Name**	**Location/Address**
1	e-Sampark-07	Near maintenance Office, opp. Nand Sweet, Sec-7A, Chandigarh
2	e-Sampark-10	Electricity Operation Sub Division Number 2, opp. Govt Model Senior Sec School, Sector 10A, Chandigarh
3	e-Sampark-15	Electricity Operation Sub Division Number 4, behind Patel Market, Sector 15C, Chandigarh
4	e-Sampark-17	Central Treasury, opp. Hotel Shivalik View, Sector 17F, Chandigarh
5	e-Sampark-18	Electricity Operation Sub Division Number 4, behind Govt press, Sector 18A, Chandigarh
6	e-Sampark-21	Near Govt Model Senior Secondary School, opp. Market, Sector 21B, Chandigarh
7	e-Sampark-23	Opp. City Banquet (Jhanj Ghar), Sector 23C, Chandigarh
8	e-Sampark-40	Opp. Sharda Public School, Sector 40D, Chandigarh
9	e-Sampark-43	Electricity Operation Sub Division Number 9, Sector 43A, Chandigarh
10	e-Sampark-47	66KV Grid Station, Sector 47C, Chandigarh
11	e-Sampark-Industrial Area	Electricity Operation Sub Division Number 5, Industrial Area Phase 1, Chandigarh
12	e-Sampark-Manimajra	NAC Building, opp. Fun Republic, Manimajra, Chandigarh
13	e-Sampark-High Court	Near State Bank of Patiala, Punjab and Haryana High Court, Sector 1, Chandigarh
14	e-Sampark-Mouli Jagran	Anganwari Centre, Near Post Office, Village Mouli Jagran
15	e-Sampark-Daria	Near Govt High School, Village Daria
16	e-Sampark-Raipur kalan	Panchayat Bhawan, Gurudwara Gali, Village Raipur Kalan

Sr. No.	**Centre Name**	**Location/Address**
17	e-Sampark-Behlana	Anganwari Centre, Near Dispensary, Village Behlana
18	e-Sampark-Hallo Majra	Anganwari Centre, Old Patwari Office, Village Hallomajra
19	e-Sampark-Palsora	Anganwari Centre, Near Dharamshala, Village Palsora
20	e-Sampark-Daddu Majra	Dronacharya Stadium, Near Govt High School, Village Daddu Majra
21	e-Sampark-Dhanas	Panchayat Bhawan, Near Aman Chaman Colony, Village Dhanas
22	e-Sampark-Khudda Jassu	Govt Model Middle School, Village Khudda Jassu
23	e-Sampark-Khudda Ali Sher	BSNL Building, Near Anganwari Centre, Village Khudda Ali Sher
24	e-Sampark-Kaimbwala	Anganwari Centre, Near Animal Dispensary, Village Kaimbwala
25	e-Sampark-ISBT-17	ISBT, Sector-17
26	e-Sampark-ISBT-43	ISBT, Sector-43

B.10 Bus Stops Details



B.11 Bus Routes Details

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)**	**No. of Buses**
		Clock Wise & Anti Clock Wise	
1	1A	**PGI to PGI** via 15/14, 15mkt, 16 mkt, 17/16, ISBT-17, 18 mkt., 19 mkt, 27 mkt,28 mkt, CTU w/s, R/Station, R/Crossing, H/B Chowk, M/Majra, M/Majra Town, M/Complex, R/Crossing, 28/26, SGGS College, 7 mkt, 8 mkt, 9 mkt, 10 mkt, 11mkt, OPD.	5
	1C	**PGI to PGI** via OPD, 11 mkt, 10 mkt, 9 mkt, 8 mkt, 7 mkt, SGGS College, Sec-26/28, R/Crossing , M/Complex, M/Majra Town, M/Majra, H/B Chowk, R/Crossing, R/Station, CTU w/s, Sec-28 mkt, 27 mkt, 19 mkt, 18 mkt, 22/17, 16, 15 mkt.	5
	2A	**Mani Majra to Mani Majra** Via – Indira Colony, M.M. Town, M/Complex, R/Crossing, Sec-28/26 G. Mkt, 19/7, 18/8, 22/17, 16/10, 15/11, PGI, Khuda Lahora, S/P Barrier, Dhanas, DMC, CTU Workshop, Sec-25/38, 25/24, 24/15, 23/16, ISBT-17, 18/21, 19/20, 27/30, 28/29, Elante Mall, Colony No.-4, CTU Workshop, R/Station, R/Crossing, H.B. Chowk.	6
	2C	**Mani Majra to Mani Majra** Via –H.B. Chowk, R/Station, CTU w/shop,Colony.No-4, Elante Mall, Sec-29/28, 30/27, 20/19, 21/18, 22/17, 16/23, 15/24, 24/25, 38/25, CTU w/shop, DMC, Dhanas, SP Barrier, K.Lahora, PGI, 11/15, 10/16, ISBT-17, 8/18, 7/19, 26/28 G.Mkt. R/Crossing, M/Complex, M.M. Town, Indra Colony.	6
	4A	**ISBT-43 to ISBT-43** via 43/44, 35/34, Aroma, 22/17, 16/17, R/Garden, 16/10 Hospital, OPD, PGI, K/Lahora, S/P/Barrier, Dhanas, DMC, CTU Depot-III. 38west, Maloya, Ph-6, Old Barrier, Frenko Hotel, Badeheri Chowk, 40/41, 41 mkt, 42 mkt.	4
	4C	**ISBT-43 to ISBT-43** via Sec-43/44, 42 mkt, 41mkt, 41/40, Badheri Chowk, Frenko Hotel, O/Barrier, Ph-6, Maloya, 38west, CTU Depot-III, DMC, Dhanas, S/P/Barrier, K/Lahora, PGI, OPD, 10/11, 10/16, 17/16, ISBT-17, Aroma, 34/35, 44/43.	4
	5A	**Ram Darbar to Ram Darbar** via Sec-47 mkt, 46/47, 31/32, 30/29, 27/28, 27/26, 19/7, 18/8, 17/9, 16/10, 15/11, PGI, Uni., 15/14, 24/25, 37/38, 40/38, 39/38west, Maloya, 39, 40, 41, 42 mkts, ISBT-43, 44, 45, 46, 47 mkts, Ram Darbar.	8
	5C	**Ram Darbar to Ram Darbar** via Sec-47 mkt, 46, 45, 44 mkts, ISBT-43, 43/44, 42, 41, 40, 39 mkts, Maloya, 38/39, 38/40, 38/37, 25/24, 14/15, Uni., PGI, 11/15, 10/16, 9/17, 8/18, 19/7, 26/27, 28/27, 29/30, 31/32, 47/46, 47 mkt.	8

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)** **Clock Wise & Anti Clock Wise**	**No. of Buses**
9	7A	**ISBT-17 to ISBT-17** via Sec-22/17, 22/23, 23, 24 mkts, 24/25, 38/25, 38west, Maloya, 38/39, 38 mkt, 37 mkt, 36/37, 42/41, ISBT-43, Attawa, 35mkt, 34 mkt, 34, 33, 32, 31mkts, Ram Darbar, Indl.Area Ph-II, Tribune Chowk, 29, 30, 20, 21 mkts, 22 mkt, 23/22.	4
10	7C	**ISBT-17 to ISBT-17** via 22/23, 22 mkt, 21, 20, 30, 29 mkts, Tribune, Ram Darbar, 31, 32, 33, 34, 35 mkts, Attawa, ISBT-43, 43/44, 42 mkt, 41/42, 37/36, 37, 38 mkts, 39/38west. Maloya, 38west, 25/38, 25/24, 24, 23 mkts, 23/22.	4
	9A	**Mansa Devi to Mansa Devi** Via M/Majra, H.Board, R/Cross., 28/26G/Mkt. 27/26, 27/19, 30/20, 32/33, 46/45, 50/49, 64/63, 68/67, Sec-67, Mandikaran Houses, Sec-66 P/Chowki, Ph-11, Jagatpura, 47 outer, R/Darbar, Ind.Area Ph-2, Trib.Chowk, 29 Nursery, 28 P/Pump, CTU w/s, R/S, R/C, H.Board, M/Majra.	4
	9C	**Mansa Devi to Mansa Devi** Via –M.majra, H.B Chowk, R.Crossing, R.Station, CTU W/Shop 28 P.Pump, Indl. Area ph-1, Tribune Chowk, Indl. Area Ph-2, Ramdarbar, Outer 47, Jagatpura, Ph-11, Police Chowki Sec-66, Mandikaran Houses, Sec-67, 67/68, 63/64,49/50, 45/46, 33/32, 20/30, 27/19, 26/27,26/28, TPT/C, R.Crossing, H.B.C,Manimajra	4
	28	**ISBT-43 to ISBT-43** via Sec-42/43, Atawa, Sec-36/35, 37/24, 38/25, CTU w/s, Dadu Majra, Dhanas, S/P Barrier, IRB, Khuda Lahora, PGI, OPD, Sec-10/16, ISBT-17, Aroma, Sec-34/35, Sec-44/43. .(vice versa)	3
	28A	**ISBT-43 to ISBT-43** via Sec-35/34, Aroma, Sec-22/17, 16/10, OPD, PGI, Khuda Lahora, IRB Camp, S.P. Barrier, Dhanas, Dadu Majra, Sec-25/38, 24/37, Kissan Bhawan, Sec-35/36, Atawa, Sec-43/42.	3
	239A	**ISBT-43 to ISBT-43** via ISBT-43, 43/44, 35/34, 22/21, ISBT-17, 17/18, 9/8, 9 mkt, UT.Sectt, MLA Flat, H/Cout, Pb.Civil Sectt, 3/2, PEC, N/OPD, PGI, 15/14, 24/25, 37/38, 41/40, 41mkt, 42mkt, ISBT-43.	3
	239C	**ISBT-43 to ISBT-43** via ISBT-43, 43/44, 42, 41 mkts, 40/41, 38/37, 25/24, 14/15, Uni., PGI, N/OPD, PEC, Pb.Civil Sectt, H/Court, MLA Flat, UT.Sectt, 17/16, ISBT-17, Aroma, 34/35, 44/43.	3

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)** **Clock Wise & Anti Clock Wise**	**No. of Buses**
Point To Point			
17	2B	**PGI to Pkl Bus stand** via OPD, PEC, 10/16, 9/17, 8/18, 7/19, 26/27, 26/28 G/Mkt, Railway Crossing, Kalagram, H.B. Chowk, 09/16, 10/15, 11/12 (vice versa)	4
18	2D	**PGI to IT Park** via- New OPD, 10/11,10/16,ISBT-17, 8/18, 7/19, 26/27, Grain Market, CTU Workshop, R. Station, R. Crossing, H.Board, Manimajra, Indira Colony, Kishangarh.	4
19	2F	**PGI to Dhakoli Border** via New OPD, 10/11, 10/16, 17/16, ISBT-17, 17/18, 8/18, 7/19, 26/27, 26/28 G. Mkt., CTU w/s, R/S, H.B. Chowk, Panchkula Sector -8/17, 9/16, 10/15, 10/11, 11/4, Sec-4 Pkl., Sec-21 Pkl., Sec-20 Pkl.(vice versa)	6
20	3	**Mauli Jagran to PGI** via Sec- 18/19 Pkl, H.B. Chowk, R/Crossing, R/S, CTU w/s, 28/26 Grain Mkt, 19/7, 18/8, 22/17, 16/10 Hospital, 11/10, PEC, OPD. .(vice versa)	2
21	8	**Mohali Ph-XI to PGI** via Sec-65 Mkt, 65/64, 49/48, 48 Mkt., 47 Mkt., 46Mkt., 45 Mkt., 44 Mkt., ISBT-43, 43/44, 35/34,. 22/17, 16/10 (Hospital), New OPD. .(vice versa)	4
22	10	**ISBT-43 to Mansa Devi** via. Sec-44/51, 45, 46, 47mkts, Ram Darbar, Tribune Chowk, H/Majra Chowk, Colony No.-4, CTU w/s, R/Station, H/B Chowk, M/Majra. .(vice versa)	5
23	11	**ISBT-17 to Pb. Civil Sectt.** via. Sec-17/18, 9/8, 9mkt, MLA Flat, H/Court, Pb. Civil. Sectt & vice versa Spl. Trip School Sec-18 From Ramdarbar.	1
24	12	**Manimajra to Mata Mansa Devi** via Bhainsa Tibba (Vice Versa)	2
25	17	**ISBT-43 to Air Port** via – Attawa, Sec-36/35, 23/22, ISBT-17, Aroma, 21, 20, 30, 29 mkts, Elante Mall, H/Majra, Behlana. .(vice versa)	6
26	18	**ISBT-43 to Kaimbwala** via Sec-42/43, Sec-36/35, 23/22, 17 Bus Stand, 17 Mkt, Sec-9 U.T. Sectt., Mini Sectt., MLA Flat, H/Court, Lake, Kaimbwala & same route back. .(vice versa)	4
27	18-B	**ISBT-43/Session Court to H/Court** via Sec-42 Mkt, 41/42, 37/36, 37 Mkt, 38/37, 24/37 Consumer/Court , 23/36, 23/22, Sec-17 CAT, ISBT-17, 17/18, 9/8, 9 Mkt, MLA/F, High Court.(vice versa).	4
28	20	**Chd to Kharar** via Aroma, Sec-21 Mkt, 20/21 divided, 33/34, 44/45, ISBT-43, YPS, 69/70, Ph-7, Sohana, Lakhnaur, Landran, Chappar Chiri, Sante Majra. .(vice versa).	6

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)**	**No. of Buses**
		Clock Wise & Anti Clock Wise	
29	20A	**Chd to Kharar** via Aroma, Sec-21 Mkt, 20/21 divided, 33/34, 44/45, ISBT-43, YPS, Ph-7, PSEB, Sec-68/69 Sohana, Lakhnaur, Landran, Chappar Chiri, Sante Majra. .(vice versa).	6
30	22	**ISBT-43 to Mansa Devi** via Sec-43/44, 42/43, 36/35, 23/22, ISBT-17, 18, 19, 27, 28 mkts, CTU w/s, R/Station, R/Crossing, H/B Chowk, M/Majra, Kishangarh, I.T.Park (vice versa).	10
31	23	**ISBT-43 to Khuda Ali Sher** via Sec-43/44, 35/34, Aroma, 22/17, Hospital16/10, 15/11, PGI, New OPD, PEC, Naya Gaon. .(vice versa)	8
32	24A (Night/ S)	**ISBT 43 to PGI** via-Sec- 43/44, 35/34, Aroma, 22/17, 16/10 (Hospital), 15/11 vice versa **(Total Time).**	1
33	24C (Night/ S)	**ISBT 43 to ISBT-17** via-42/43, Attawa, Sec-36/35 23/22, ISBT-17 vice versa **(Total Time)**.	2
34	25	**Chd to Khizrabad** via Sec-16/10, 15/11, PGI, K/Lahora, S/P Barrier, Mullanpur, Parol, Majra, Balock, Sialwa	3
35	25A	**Chd to Khizrabad** via Sec-16/10, 15/11, PGI, K/Lahora, S/P Barrier, Mullanpur, Parol, Majra, Balock, Sialwa.	3
36	26	**Dhanas to Dhakoli** via S.P.Barrier, K.Lahora, PGI, OPD, 10/11, 10/16, ISBT-17, 19/20, 27/30, 28/29, 28 P.P., CTU w/s, R/S, Colony No. 4, Hallo Majra, Airport, Zirakpur, Dhakoli. (vice versa)	4
37	28	**Maloya to Mansa Devi** via DMC, 38w, 38 Mkt, 37 Mkt, 36 Mkt, 36/35, 23/22, ISBT-17, 8/18, 7/19, 26/27, 26/28 G/Mkt, CTU/w/s, R/Station, H.B, M/Majra.	4
38	30	**ISBT-43 to Nada Sahib** via Attawa, 23/22, ISBT-17, Aroma, 21, 20 Mkts., 19/27, 26/27, 26/28 G.Mkt, R/C, H. Board, Manimajra, Command Hospital, Majri Chowk. .(vice versa)	4
39	30A	**ISBT-43 to Cantonment** via. Attawa, Sec-36/35, K/Bhawan, 22/35, 21/34, 20/33, 30/32, 29/31 Tribune , H/Majra, Colony No.4, CTU w/s, R/Station, H.B Chowk, M/Majra, Command Hospital. Tank Chowk. .(vice versa)	5
40	30B	**ISBT-43 to Panchkula Sec-4** via 42/43, Attawa, 36/35, 23/22, ISBT-17, Aroma, 21 Mkt., 20 Mkt., 19/27, 27 Mkt., 26/28 Grain Mkt., Railway Crossing, H. B. Chowk, 9/16 Pkl, 10/15, 11/12, Raily Chowk, Sector-4 Panchkula. .(vice versa)	6
41	32	**ISBT-17 to Derabassi** via Sec-8/18, 7/19, 26/27, G.Mkt,-26/28, H/B, M/Majra, Old Pkl, Nada Sahib, Ramgarh, Mubarakpur. .(vice versa)	6
42	32A	**New ISBT-Mohali to Mansa Devi** via Ph-6, Frenko, Sec-40/41, 41 Mkt, 42 Mkt, ISBT-43, 42/43, 36/35, 23/22, ISBT-17, 8/18, 7/19, 26/27, 26 G/Mkt, R/Crossing, H/B, M/Majra. (vice versa)	4
43	34	**PGI to Derabassi** via OPD, 10/16, ISBT-17, Aroma, Piccadly Chowk, 21/34, 20/33, 30/32, 29/31, Hallomajra, Airport, Zirakpur, Bhankarpur, Mubarakpur. .(vice versa)	9

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)**	**No. of Buses**
		Clock Wise & Anti Clock Wise	
44	35	**ISBT-17 to Kharar** via Aroma, Sec-35/22, Kissan Bhawan, 35/36, Atawa, 41/37, 41/40, F/Chowk, Ph-2, Ph-6, Balongi, Daun, Desu Majra, Mundi Kharar. .(vice versa)	6
45	35A	**High Court to Kharar** via Pb. Civil. Sectt., PEC, OPD, PGI, Sec-11/15, 16/15, 24/15, 25/14, 25/25, 38/38W, 40/39, 55/56, Ph-6, Balongi, Daun, Desu Majra, Mundi Kharar. .(vice versa)	5
46	35B	**ISBT-17 to Kharar** via Aroma, Sec-35/22, Kissan Bhawan, 35/36, Atawa, ISBT-43, 53/42, F/Chowk, Ph-2, Ph-6, Balongi, Daun, Desu Majra, Mundi Kharar. .(vice versa)	6
47	36	**PGI to New Airport** via Sec-11/15, 10/16 (Hospital), ISBT-17, Aroma, 21 mkt, 20 mkt, Sec-30/20 divided, 30/32 Hospital, 29/31, Tribune Chowk, Hallo Majra, old Airport Chowk, Zirakpur, Nabha Sahib, Dialpura outer. .(vice versa).	4
48	37 (Night/ S)	**ISBT 43 to Railway Station** via Attawa, Sec-36/35 23/22, ISBT-17, 18/21, 19/20, 19/27, 27 mkt, 28 mkt, CTU w/s vice versa **(Total Time).** .(vice versa)	1
49	38	**ISBT-17 to New Airport** via Sec-22/23, 35/36, 43/42, ISBT-43, 51, 50, 49, 48 mkts, Jagatpura, 65 mkt outer, White House, Indl.Area Ph-9, Sec-82 mkt, Airport. .(vice versa)	3
50	38A	**ISBT-17 to New Airport** via Sec-22/23, 35/36, 43/42, ISBT-43, YPS Chowk, Ph-7, Sec-69/70, Sohana Gurdwara Sahib, 69/79, 68/80, 67/81, 82 mkt, Airport Chowk. .(vice versa)	3
51	39	**Mohali Ph-11 to PGI** via Indl.Area Ph-9, Mohali Sec-66/67, 67/68, 68 outer, 69/68, Kumbra, Edu.Board Pb., Forties, B/S Mohali, Ph-7, Chawla Chowk, Ph-3/7, 52/61, YPS Chowk, ISBT-43, 43/44, 42/43, 36/35, 23/22, ISBT-17, 22/17, 16/10, 11/10, 11/2, OPD. .(vice versa)	11
52	40	**Chd to Khizrabad** via Sec-16/10, PGI, K/Lahora, S/P Barrier, Mullanpur, Parol, Majra, Balock, Manakpur, Sangatpura, Kubaheri. .(vice versa)	3
53	71	**ISBT-43 to Saketri (Kaimbwala)** via. Sec-43/44, 35/34, K.Bhawan, 23/22, ISBT-17, 18, 19, 27 mkts, G/Mkt, R/Crossing, M/M Complex, M/M Town, M/Majra, Mansa Devi, Saketri. .(vice versa)	6
54	79	**PGI to Chhattbir Zoo** via OPD, 10/16, ISBT-17, Aroma, Sec-21, 20 Mkt., Sec-20/30, 32 Hospital, Tribune Chowk, Hallo Majra, Airport, Zirakpur, Dayalpura. .(vice versa)	4
55	80	**Zirakpur to PGI** via Baltana, Raipur Kalan, Mouli Jagaran, Hallo Majra, Colony No.4, Elante Mall, Sec-29 mkt, 30 mkt, 20 mkt, Aroma, 22/17, 16/10, PEC, New OPD. .(vice versa)	5
56	123A	**Mohali R/Station to PGI** via Sec-65 mkt, 64 mkt, 63 mkt, 51/63, 51 mkt, ISBT-43, Sec-43/44, 35/34, Aroma, 22/17, 16 Hospital, Sec-11 mkt, OPD, PGI	5
57	143	**Dhanas to Airport** via SP Barrier, Khuda Lahora, PGI , New OPD, GH – 16 , ISBT –17, Aroma, Sec-21 Mkt. Sec-20-Mkt,Sec – 30 Mkt. , SEC-29 Mkt., Elante Mall, Poultry Farm, Ind. Area Ph-I, Hallo majra, (vice versa)	2

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)**	**No. of Buses**
		Clock Wise & Anti Clock Wise	
58	202	**ISBT-43 to Pb. Civil. Sectt. (High Court)** via Sec-43/44, 42/43, 36/35, 23/22, ISBT-17, 17/18, K.C, U.T.Sectt, MLA Flat, H/Court, Pb civil. Sectt.	6
59	203	**ISBT-43 to Mansa Devi** via Sec-43/44, 42/43, 36/35, 23/22, ISBT-17, 17/18, 18, 19, 27, 28 mkts, CTU w/s, R/Station, R/Crossing, H/B Chowk, M/Majra .(vice versa)	4
60	205	**ISBT-43 to PGI** via Sec-43/44, 35/34, Aroma, 22/17, 16/10, 11/10, 11/2, OPD. .(vice versa)	6
61	206	**ISBT-43 to Mansa Devi** via Sec-43/44, 42/43, 36/35, 23/22, ISBT-17, 17/18, 8/18, 7/19, 26/27, G/Mkt, R/Crossing, H/B Chowk, M/Majra, Kishangarh, I.T.Park. .(vice versa)	7
62	211	**PGI to Cantonment** via -OPD, 16/10 Hospital, 17 B/Stand, Aroma, 21, 20 mkts, 19/27, 27 mkt, 28 mkt, CTU w/s, R/S, H/B, M/Majra, Commantd Hosp. .(vice versa)	4
63	212	**PGI to Zirakpur (Singhpura Bhuda)** via OPD, 10/16, ISBT-17, Aroma, Piccadly Chowk, 21/34, 20/33, 30/32, 29/31, Hallomajra, Airport, Zirakpur. .(vice versa)	6
64	213	**Landran to Derabassi** via – Dc.office/ Lakhnour, Sohana, Sec-69/68, Fortis/ PSEB, Ph-7/8, Yps Chowk , ISBT-43, Sec-44, Sec-45, Sec-46/47, Sec-32/31(Hospital), Tribune Chowk , Hallo Majra, Airport Chowk , Zirakpur, Singhpura, Bhankharpur, And Vice Versa	7
65	214	**ISBT-43 to Nada Sahib** via 44/43, 35/34, 23/22, ISBT-17, 18 Mkt., 19 Mkt., 27 Mkt., 28 Mkt., Indl. area/Ph.1, Rly. Station, Rly. Crossing, H/B. Chowk, M. Majra, M. Hospital, old P.Kula, Majri chowk. .(vice versa)	4
66	216	**ISBT-43 to Derabassi** via Attawa, 36/35, Kisan Bhawan, 23/22, ISBT-17, Aroma, Sec-21/34, Sec-20/33, Sec-30/32, Tribune Chowk, Hallomajra, Airport Chowk, Zirakpur, Bhankharpur. .(vice versa).	8
67	218	**IT Park to Singhpura Bhudda** via Kishangarh, Manimajra, Housing Board, Kalagram, Railway Station, CTU Workshop, Colony No. 4, Poultry Farm, Hallo Majra, Airport Chowk, Zirakpur (Vice Versa)	4
68	240	**ISBT-43 to Mansa Devi** Sec-43/44, 35/34, Sec 22 mkt, 23/22, ISBT-17, Aroma, 21, 20, 30, 29 mkts, Elante Mall, Colony No.-4, CTU w/s, R/Station, H/B Chowk, M/Majra. .(vice versa)	5
69	241	**ISBT-43 to Mansa Devi** via Sec-52/51, 51 mkt, Sec-51/50, 45 mkt, 45/46, 33/32, 20/30, 19/27, 27 mkt, G/Mkt, TPT Chowk, CTU w/s.Indl.Area.Ph-1, R/Station, R/Crossing, H/B Chowk, M/Majra. .(vice versa)	7
70	242	**Landran to PGI** via Lakhnaur, Sohana, R/Swami/71, SCL, 71, IVY, Ph-5/3 B-II, Ph-4/3 B-I, Ph-2/3A, F/Chowk, 42/53, ISBT-43, 43/44, 35/34, 22/21, 17/22, 16 Hospital, 11/10, 11/2, PEC, N/OPD. .(vice versa)	8

BUS ROUTE DETAILS			
Sr. No.	**Route No.**	**(Description/Destination)**	**No. of Buses**
		Clock Wise & Anti Clock Wise	
71	254 (Night/ S)	**ISBT-43 to IT Park** via-44/43, 42/43, 36/35, 23/22, ISBT-17, 18 mkt., 19 mkt., 27 mkt., 27/28, 28 Mkt., CTU workshop, Railway Station, H/B, M/Majra, Kishangarh. .(vice versa).	2

Note:- Bus route and time table are subject to change as per the purchaser requirement.

B.12 Minimum display size and resolution

Location	Minimum Height	Minimum Length	Row	Column
	(mm)	(mm)	(Min)	(Min)
Front	220	1800	16	140
Front (Mini/Midi)	220	900	16	96
Rear	220	900	16	96
Side	220	900	16	96
Inner	100	800	16	112

SECTION VII. SAMPLE FORMS

Table of Sample Forms

1. BID SUBMISSION FORM (SINGLE-STAGE BIDDING)

Date: *[Bidder insert: **date of bid**]*

Loan/Credit No.: *[Purchaser insert: **number**]*

IFB: *[Purchaser insert: **IFB title and number**]*

Contract: *[Purchaser insert: **name of Contract**]*

To: *[Purchaser insert: **name and address of Purchaser**]*

Dear Sir or Madam:

Having examined the Bidding Documents, including Addenda Nos. *[insert **numbers],*** the receipt of which is hereby acknowledged, we, the undersigned, offer to supply, install, achieve Operational Acceptance of, and support the Information System under the above-named Contract in full conformity with the said Bidding Documents for the sum of:

	*[insert: **amount of local currency in words**]*	*([insert**: amount of local currency in figures from corresponding Grand Total entry of the Grand Summary Cost Table**])*
plus	*[insert: **amount of foreign currency A in words**]*	*([insert: **amount of foreign currency A in figures from corresponding Grand Total entry of the Grand Summary Cost Table**])*
[as appropriate, add the following]		
plus	*[insert**: amount of foreign currency B in words**]*	*([insert: **amount of foreign currency B in figures from corresponding Grand Total entry of the Grand Summary Cost Table**])*
plus	*[insert: **amount of foreign currency C in words**]*	*([insert: **amount of foreign currency C in figures from corresponding Grand Total entry of the Grand Summary Cost Table**])*

or such other sums as may be determined in accordance with the terms and conditions of the Contract. The above amounts are in accordance with the Price Schedules attached herewith and made part of this bid.

We undertake, if our bid is accepted, to commence work on the Information System and to achieve Installation and Operational Acceptance within the respective times stated in the Bidding Documents.

If our bid is accepted, and if these Bidding Documents so require, we undertake to provide an advance payment security and a performance security in the form, in the amounts, and within the times specified in the Bidding Documents.

[As appropriate, include or delete the following paragraph]

"We accept the appointment of *[Purchaser insert:* ***name of proposed Adjudicator from the Bid Data Sheet*** *]* as the Adjudicator."

[and delete the following paragraph, or, as appropriate, delete the above and include the following, or, if no Adjudicator is stated in the Bid Data Sheet, delete both the above and the following]

"We do not accept the appointment of *[Purchaser insert:* ***name of proposed Adjudicator from the Bid Data Sheet*** *]* as the Adjudicator, and we propose instead that *[insert:* ***name*** *]* be appointed as Adjudicator, whose résumé and hourly fees are attached."

We hereby certify that the Software offered in this bid and to be supplied under the Contract (i) either is owned by us, or (ii) if not owned by us, is covered by a valid license from the proprietor of the Software.

We agree to abide by this bid, which, in accordance with ITB Clauses 13 and 16, consists of this letter (Bid Submission Form) and the enclosures listed below, for a period of *[Purchaser insert:* ***number from Bid Data Sheet*** *]* days from the date fixed for submission of bids as stipulated in the Bidding Documents, and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

Commissions or gratuities, if any, paid or to be paid by us to agents relating to this Bid, and to Contract execution if we are awarded the Contract, are listed below:

Name and Address of Agent	Amount and Currency	Purpose of Commission or Gratuity
Etc.	*[if none, state:* ***"none"****]*	

Until the formal final Contract is prepared and executed between us, this bid, together with your written acceptance of the bid and your notification of award, shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this *[insert:* ***ordinal*** *]* day of *[insert:* ***month],*** *[insert:* ***year*** *]*.

Signed:

Date:

In the capacity of *[insert:* ***title or position*** *]*

Duly authorized to sign this bid for and on behalf of *[insert:* ***name of Bidder*** *]*

ENCLOSURES:

Price Schedules

Bid-Securing Declaration or Bid-Security (if and as required)

Signature Authorization *[plus, in the case of a Joint Venture Bidder, list all other authorizations pursuant to ITB Clause 6.2]*

Attachment 1. Bidder's Eligibility

Attachment 2. Bidder's Qualifications (including Manufacturer's Authorizations and Subcontractor agreements if and as required)

Attachment 3. Eligibility of Goods and Services

Attachment 4. Conformity of the Information System to the Bidding Documents

Attachment 5. Proposed Subcontractors

Attachment 6. Intellectual Property (Software and Materials Lists)

[if appropriate, specify further attachments or other enclosures]

Bid Table of Contents and Checklist

Note: Purchasers should expand and modify (as appropriate) the following table to reflect the required elements of the Bidder's bid. As the following note to Bidders explains, it is in both the Purchaser's and Bidder's interest to provide this table and accurately fill it out.

Note: Bidders should expand and (if appropriate) modify and complete the following table. The purpose of the table is to provide the Bidder with a summary checklist of items that must be included in the bid as described in ITB Clauses 13.1 and 16, in order for the bid to be considered for Contract award. The table also provides a summary page reference scheme to ease and speed the Purchaser's bid evaluation process.

Table- 1(a)

S. No.	Item		RFP Reference Clause/ Page	Provided (Yes/No/NA)	Page No.
1	JV / Consortium	Joint Venture Summary			
2		Financial Form			
3		JV/Consortium Agreement			
4		MoU for JV/Consortium			
5		Sub-Contracting Agreements			
6	PoA	PoA by Lead Partner to Signing Authority			
7		PoA by Partner 1 to Lead Partner			
8		PoA by Partner 2 to Lead Partner			
9		PoA by Partner 3 to Lead Partner			
10	Company Details	Certificate of Incorporation - Lead Partner			
11		Financials - Lead Partner			
12		Certificate of Incorporation - Partner 1			
13		Financials - Partner 1			
14		Certificate of Incorporation - Partner 2			
15		Financials - Partner 2			
16		Certificate of Incorporation - Partner 3			

S. No.	Item		RFP Reference Clause/ Page	Provided (Yes/No/NA)	Page No.
17		Financials - Partner 3			
18	Technical Bid	Contract Agreement - Bidder & Client			
19		Section VII (Required Format of Technical Bids)			
20		General Information Form			
21		Systems Experience Record			
22		Client Certificates for qualifying projects			
23		Details of Contracts of Similar Nature and Complexity			
24		Current Contract Commitments / Work in Progress			
25		Manufacturer Authorizations			
26		List of Approved Subcontractors			
27		List of Custom Materials			
28		Software List			
29		Revised Price Schedules			
30		Bank Guarantee - EMD			
31		Bank Guarantee - Performance Guarantee			
32		Customs/Excise Duty Exemption Form			
33		Personnel Capabilities - Key Staff			
34		Key Staff CVs			
35		LOA for independent staff			
36	Financial Bid	Grand Summary Cost Table			
37		Price Schedule			
38		Supply and Installation Cost Summary Table			
39		Recurrent Cost Summary Table			

S. No.	Item		RFP Reference Clause/ Page	Provided (Yes/No/NA)	Page No.
40		Supply and Installation Cost Sub-Table(s)			
41		Recurrent Cost Sub-Tables(s)			
42		Deviation Cost Table			
43		Country of Origin Code Table			
44	Others	Bid Processing fee			
45		Bid Security			
46		Attested RFP document			
47		Technical responsiveness Checklist			

Table- 1(b)

28.5.1 Automatic Fare Collection System (AFCS)						
		Project 1	Project 2	Project 3 (If applicable)	Project 4 (If applicable)	Project 5 (If applicable)
Project Name						
1	Location of Project	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*
2	Contractor part of Present JV/ Consortium	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*
3	Completed in last 7 years	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*
4	≥1 Year Commercial Operation	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*
5	≥1 Year Maintenance	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*
6	≥100 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
7	≥200 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
8 (a)	Smartcard	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
8 (b)	ETM / POS Machine	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
8 (c)	Mobile App	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
9	Whether Urban Bus Transit	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
10	Bid Document Reference/ Page No.	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*
28.5.2 Automatic Vehicle Location (AVL) / Passenger Information System (PIS)						
		Project 1	Project 2	Project 3 (If applicable)	Project 4 (If applicable)	Project 5 (If applicable)
Project Name						
1	Location of Project	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*
2	Contractor part of Present JV/ Consortium	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*

3	Completed in last 7 years	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*
4	≥1 Year Commercial Operation	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*
5	≥1 Year Maintenance	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*
6	≥100 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
7	≥200 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
8 (a)	AVL	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
8 (b)	PIS Integration with screen/display board	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
8 (c)	PIS Integration with mobile app	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
9	Whether Urban Bus Transit	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
10	Bid Document Reference/ Page No.	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*
28.5.3 Transit Management System (TMS)						
		Project 1	Project 2	Project 3 (If applicable)	Project 4 (If applicable)	Project 5 (If applicable)
Project Name						
1	Location of Project	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*
2	Contractor part of Present JV/ Consortium	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*
3	Completed in last 7 years	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*
4	≥1 Year Commercial Operation	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*
5	≥1 Year Maintenance	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*
6	≥100 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
7	≥200 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*

8	TMS comprising of Depot Management System (including Workshop/ Store and Inventory management system) integrated with Scheduling and Roster system	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
9	Whether Urban Bus Transit	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
10	Bid Document Reference/ Page No.	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*
28.5.4 Scheduling and Roster (S&R)						
		Project 1	Project 2	Project 3 (If applicable)	Project 4 (If applicable)	Project 5 (If applicable)
Project Name						
1	Location of Project	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*	*(Name of the city/state/country)*
2	Contractor part of Present JV/ Consortium	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*	*(Name of the Firm)*
3	Completed in last 7 years	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*	*(Date of completion*
4	≥1 Year Commercial Operation	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*	*(Date since operational)*
5	≥1 Year Maintenance	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*	*(Date since being maintained)*
6	≥100 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
7	≥200 Buses	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*	*(No. of buses)*
8	Integration with TMS	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
9	Whether Urban Bus Transit	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*	*Yes/No*
10	Bid Document Reference/ Page No.	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*	*(Document Name, Page No.)*
28.5.5 Domain Experts						
28.5.5.1 Project Manager						
1	Name					

2	Computer Science/ Electronics (4(four) years regular) Engineering Degree	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
3	Masters in Business Administration (2(two) years regular)	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
4	At least 10(ten) years of relevant project management experiences	*Number of years (from – to)*
5	Handled at least two ITS projects as project manager	*Yes/No*
6	Communicate effectively in English and Hindi	*Yes/No*
7	Bid Document Reference/ Page No.	*(Document Name, Page No.)*
28.5.5.2 AFCS Expert		
1	Name	
2	Engineering Graduate with Computer Science/ Electronics (4(four) years regular)	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
3	At least 8(eight) years of experience in designing and implementing AFCS systems for Public transit	*Number of years (from – to)*
4	Experience in working on any of the qualifying AFCS project as an AFCS Expert	*Yes/No*
5	Bid Document Reference/ Page No.	*(Document Name, Page No.)*
28.5.5.3 AVL Expert		
1	Name	
2	Engineering Graduate with Computer Science/ Electronics (4(four) years regular)	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
3	At least 8(eight) years of experience in designing and implementing AVL systems for Public transit	*Number of years (from – to)*
4	Experience in working on any of the qualifying AVL project as an AVL Expert	*Yes/No*
5	Bid Document Reference/ Page No.	*(Document Name, Page No.)*
28.5.5.4 TMS Expert		
1	Name	
2	Engineering Graduate with Computer Science/ Electronics (4(four) years regular)	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
3	At least 5 (five) years of experience in designing and implementing TMS systems for Public transit	*Number of years (from – to)*
4	Experience in working on any of the qualifying TMS project as an TMS Expert	*Yes/No*
5	Bid Document Reference/ Page No.	*(Document Name, Page No.)*
28.5.5.5 Maintenance Team		

1	Name	
2	Engineering Graduate with Computer Science/ Electronics (4(four) years regular)	*(a) Name of degree* *(b) Period of degree (from – to)* *(c) Name of the institution*
3	At least 5 (five) years of experience in ITS system maintenance activities and performance monitoring in public transport domain	*Number of years (from – to)*
4	Experience in ITS system maintenance activities and performance monitoring in public transport domain	*Yes/No*
5	Bid Document Reference/ Page No.	*(Document Name, Page No.)*
28.5.6 Proposed Solution		
28.5.6.1 Proposed Solution for AFCS System		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.6.2 Proposed Solution for AVL and PIS Systems		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.6.3 Proposed Solution for Scheduling and Roster Systems		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.6.4 Proposed Solution for Transit Management System (TMS)		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.6.5 Proposed Solution for Communications Systems		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*

2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.6.6 Innovation in Technology, Design and overall Technical Proposal		Bid Document Reference/ Page No.
1	Innovation in Technology, Design and overall Technical Proposal	*Yes/No, (Document Name, Page No.)*
28.5.6.7 Implementation Plan Relation of internal and external dependences and Critical Path identification		Bid Document Reference/ Page No.
1	Relation of internal and external dependences and Critical Path identification	*Yes/No, (Document Name, Page No.)*
2	Improvement of final deadline of submission within 1(one) month	*Yes/No, (Document Name, Page No.)*
3	Detailed explanations of the implementation plan and consistency of the duration and sequence of the tasks	*Yes/No, (Document Name, Page No.)*
28.5.7 Maintenance and Quality Assurance		
28.5.7.1 Scope of maintenance service adequacy		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.7.2 Response time adequacy		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.7.3 Human and Material Resources adequacy		Bid Document Reference/ Page No.
1	Provides detailed descriptions of the SW functionalities proposed data models and HW specifications to be implemented	*Yes/No, (Document Name, Page No.)*
2	Solution significantly improves the requirements in ToR	*Yes/No, (Document Name, Page No.)*
28.5.7.4 Quality Assurance Plan		Bid Document Reference/ Page No.
1	At least one of the partners complies ISO 9001-2015	*Yes/No, (Document Name, Page No.)*
2	Number of partners complying with ISO 9001-2015	*Number (Document Name, Page No.)*

2. PRICE SCHEDULE FORMS

Note: in information systems procurement, the Contract Price (and payment schedule) should be linked as much as possible to achievement of operational capabilities, not just to the physical delivery of technology.

2.1 Preamble

Note: Purchasers should highlight any special requirements of the System and Contract in a Preamble to the Price Schedules. The following is an example of one such preamble.

General

1. The Price Schedules are divided into separate Schedules as follows:

   2.2 Grand Summary Cost Table

   2.3 Supply and Installation Cost Summary Table

   2.4 Recurrent Cost Summary Table

   2.5 Supply and Installation Cost Sub-Table(s)

   2.6 Recurrent Cost Sub-Tables(s)

   2.7 Deviation Cost Table

   2.8 Country of Origin Code Table

   [insert: ***any other Schedules as appropriate*** *]*

2. The Schedules do not generally give a full description of the information technologies to be supplied, installed, and operationally accepted, or the Services to be performed under each item. However, it is assumed that Bidders shall have read the Technical Requirements and other sections of these Bidding Documents to ascertain the full scope of the requirements associated with each item prior to filling in the rates and prices. The quoted rates and prices shall be deemed to cover the full scope of these Technical Requirements, as well as overhead and profit.

3. If Bidders are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Bidders in the Bidding Documents prior to submitting their bid.

Pricing

4. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Bidder. As specified in the Bid Data Sheet, prices shall be fixed and firm for the duration of the Contract.

5. Bid prices shall be quoted in the manner indicated and in the currencies specified in ITB Clauses 14 and 15 (ITB Clauses 27 and 28 in the two-stage SBD). Prices must correspond to items of the scope and quality defined in the Technical Requirements or elsewhere in these Bidding Documents.

6. The Bidder must exercise great care in preparing its calculations, since there is no opportunity to correct errors once the deadline for submission of bids has passed. A single error in specifying a unit price can therefore change a Bidder's overall total bid

price substantially, make the bid noncompetitive, or subject the Bidder to possible loss. The Purchaser will correct any arithmetic error in accordance with the provisions of ITB Clause 26.2 (ITB Clause 38.2 in the two-stage SBD).

7. Payments will be made to the Supplier in the currency or currencies indicated under each respective item. As specified in ITB Clause 15.1 (ITB Clause 28.1 in the two-stage SBD), no more than three foreign currencies may be used. The price of an item should be unique regardless of installation site.

2.2 Grand Summary Cost Table

Sr.No.		*[insert: **Local Currency**]* Price	***[insert: Foreign Currency A]*** *Price*	***[insert: Foreign Currency B]*** *Price*	***[insert: Foreign Currency C]*** *Price*
1.	Supply and Installation Costs (from Supply and Installation Cost Summary Table)				
2.	Recurrent Costs (from Recurrent Cost Summary Table)				
3.	Grand Totals (to Bid Submission Form)				

Name of Bidder:		
Authorized Signature of Bidder:		

2.3 Supply and Installation Cost Summary Table

System : *"**Entire System Procurement** [as necessary for supply, installation, and achieving Operational Acceptance of the System, specify items in the Table below, modifying, deleting, or expanding the sample line items and sample table entries as needed.]*

Costs MUST reflect prices and rates quoted in accordance with ITB Clauses 14 and 15 (ITB Clauses 27 and 28 in the two-stage SBD).

S.No.	Subsystems / Items	Description	Supply & Installation Prices				
			Locally supplied items	Items supplied from outside the Purchaser's Country			
			INR Price	**INR** Price	*[insert: **Foreign Currency A]** Price*	*[insert: **Foreign Currency B]** Price*	*[insert: **Foreign Currency C]** Price*
1	Automatic Fare Collection System (AFCS)	From Supply and Installation Cost Sub-Table 1					
2	Automatic Vehicle Location System (AVLS)	From Supply and Installation Cost Sub-Table 1					
3	Passenger Information System (PIS)	From Supply and Installation Cost Sub-Table 1					
4	Transit Management Centre (TMC)	From Supply and Installation Cost Sub-Table 1					
5	Transit Management System (TMS)	From Supply and					

		Installation Cost Sub-Table 1					
6	Communications System (COMM)	From Supply and Installation Cost Sub-Table 1					
7	Scheduling & Roster	From Supply and Installation Cost Sub-Table 1					
Grand Total							

Name of Bidder:		
Authorized Signature of Bidder:		

2.4 Recurrent Cost Summary Table

System : "***Entire System procurement"*** *[as necessary for the operation of the System, specify items in the Table below, modifying the sample line items and sample table entries as needed.]*

Costs MUST reflect prices and rates quoted in accordance with ITB Clauses 14 and 15 (ITB Clauses 27 and 28 in the two-stage SBD).

Line Item No.	Subsystem / Item	Recurrent Cost Sub-Table No.	*[insert:* ***Local Currency*** *]* Price	***[*** *insert:* ***Foreign Currency A]*** *Price*	***[*** *insert:* ***Foreign Currency B]*** *Price*	***[*** *insert:* ***Foreign Currency C]*** *Price*
z	Recurrent Cost Items					
z.1	Headquarters Recurrent Cost Items					
z.2	Region 1 Recurrent Cost Items					
	Subtotals (to Grand Summary Table)					

Note: Refer to the relevant Recurrent Cost Sub-Tables for the specific components that constitute the Subsystem or line item in this summary table.

Name of Bidder:		

Authorized Signature of Bidder:		

2.5 Supply and Installation Cost Sub-Table

System : ***"Entire System Procurement"*** *]*

Line item number: *[specify:* ***relevant line item number from the Supply and Installation Cost Summary Table (e.g., 1.1)]***

[as necessary for supply, installation, and achieving Operational Acceptance of the System, specify: ***the detailed components and quantities in the Sub-Table below for the line item specified above, modifying the sample components and sample table entries as needed.*** *Repeat the Sub-Table as needed to cover each and every line item in the Supply and Installation Cost Summary Table that requires elaboration.]*

Prices, rates, and subtotals MUST be quoted in accordance with ITB Clauses 14 and 15 (ITB Clauses 27 and 28 in the two-stage SBD). Unit prices for the same item appearing several times in the table must be identical in amount and currency.

Item Code	Subsystems / Items	Country of Origin Code	Quantity exclusive of spares/ consumables	Unit Prices / Rates						Total Prices						Total Supply + Installation Prices
				Supplied Locally	Supplied from outside the Purchaser's Country				Installation/ Services	Supplied Locally	Supplied from outside the Purchaser's Country				Installation/Services	
				INR	INR	[insert: Foreign Currency A]	[insert: Foreign Currency B]	[insert: Foreign Currency C]	INR	INR	INR	[insert: Foreign Currency A]	[insert: Foreign Currency B]	[insert: Foreign Currency C]	INR	INR
				Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price	Price
1	**AUTOMATIC FARE COLLECTION SYSTEM (AFCS)**															

1.1	**Central Hardware & Software inclusive of but not limited to:**															
1.1.1	Primary AFCS Server with Operating System, Database server, Application Software, Anti-Virus Software, AFCS application software (primary + DR) or Any other required COTS software inclusive of requisite licences		2													
1.1.2	Automatic Disk Back-up devices and media with Back-up/Archiving software inclusive of requisite licences		1													
1.1.3	KVM Switch with LCD Monitor		1													
1.1.4	Multi-screen AFCS workstation including monitor and Software inclusive of requisite licences		4													
1.1.5	Network All-in-one-printer		2													
1.2	**AFCS Sub-System**															
1.2.1	**CSP Hardware & Software inclusive of but not limited to:**															
1.2.1.1	CSP workstation including monitor and Software inclusive of requisite licences		4													
1.2.1.2	Smart Card Personalization Printer		4													
1.2.1.3	CSP Contactless ISO 14443 A/B module		4													
1.2.1.4	Ticket Printer		4													
1.2.1.5	Webcam		4													
1.2.1.6	Customer display		4													
1.2.1.7	Document scanner / printer		4													
1.2.1.8	Fare media - Smart Cards		50000													
1.2.2	**POS Hardware & Software inclusive of but not limited to :**															
1.2.2.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)		50													

1.2.2.2	3G/4G enabled SIM cards		50													
1.2.3	**ETM Ticketing Machine Hardware & Software inclusive of but not limited to :**															
1.2.3.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)		784													
1.2.3.2	3G/4G enabled SIM cards		784													
1.2.4	**Inspection Terminals Hardware & Software inclusive of but not limited to :**															
1.2.4.1	Multiuse handheld hardware with software inclusive of requisite licences (sales/validation/control)		50													
1.2.4.2	3G/4G enabled SIM cards		50													
2	**AUTOMATIC VEHICLE LOCATION SYSTEM (AVLS)**															
2.1	**Central System Hardware & Software inclusive of but not limited to:**															
2.1.1	Primary AVL Server with Operating System, Database server, Application Software, Anti-Virus Software, AVL application software (primary + DR) or Any other required COTS software inclusive of requisite licences		2													
2.1.2	Automatic Disk Back-up devices and media with Back-up/Archiving software inclusive of requisite licences		1													
2.1.3	KVM Switch with LCD Monitor		1													
2.1.4	Multi-screen AVL workstation including monitor and Software inclusive of requisite licences		6													
2.1.5	Network All-in-one-printer		1													
2.1.6	All in One Printer (Colour Print, Copy, FAX)		1													
2.1.7	LaserJet Printer		1													
2.2	**AVL Sub-System**															
2.2.1	**On-board System Hardware & Software inclusive of but not limited to:**															

2.2.1.1	Single Control Unit (SCU) with software inclusive of requisite licences		173													
2.2.1.2	Bus Driver Console (BDC) with software inclusive of requisite licences		173													
2.2.1.3	3G/4G enabled SIM Cards		392													
2.2.1.4	Multifunction Antenna (3G, WiFi, GPS)		173													
2.2.1.5	Cradle, Cabling, connectivity, microphone, speaker		173													
2.2.1.6	Alarm Pedal with all accessories		392													
2.2.1.7	Panic button with all accessories		392													
2.2.1.8	Software licences (including existing SCU + BDC)		392													
2.2.2	**CCTV on-board System Hardware & Software inclusive of but not limited to:**															
2.2.2.1	On-board cameras		1736													
2.2.2.2	On-board NVRs with software and storage media for camera recording inclusive of requisite licences		392													
3	**PASSENGER INFORMATION SYSTEM (PIS)**															
3.1	**Central System Hardware & Software inclusive of but not limited to:**															
3.1.1	PIS workstation including monitor with customized or COTS software inclusive of requisite licences		1													
3.2	**PIS Sub-System**															
3.2.1	**Field Information Hardware & Software inclusive but not limited to:**															
3.2.1.1	32" LED Passenger Information Display at Bus Stops with software inclusive of requisite licences		80													
3.2.1.2	50" size of Passenger Information Display at ISBT with software inclusive of requisite licences		20													
3.2.1.3	48 X 72 inch Customized LED		10													

	Passenger Information Display with software inclusive of requisite licences															
3.2.1.4	3G/4G enabled SIM Cards		110													
3.2.2	**On-board Information Hardware & Software inclusive of but not limited to:**															
3.2.2.1	Front Destination Boards		88													
3.2.2.2	Side Destination Boards		232													
3.2.2.3	Rear Destination boards		274													
3.2.2.4	Inner Destination boards		88													
3.2.2.5	On-board PIS (multi-language TTS vocal announcements)		173													
4	**TRANSIT MANAGEMENT CENTRE (TMC)**															
4.1	**TMC Central System Hardware & Software inclusive of but not limited to:**															
4.1.1	Server Rack (includes rack requirements for all systems)		1													
4.1.2	Video Wall modules 3x3 50" + controller		1													
4.1.3	UPS		1													
4.1.4	Other accessories		1													
4.2	**TMC Sub-System**															
4.2.1	**Remote Customer Service Point Hardware & Software inclusive of but not limited to:**															
4.2.1.1	CSP Agent Workstation with Software Licence inclusive of requisite licences		4													
4.2.1.2	EPABX		1													
4.2.1.3	Landline Phones		8													
4.2.1.4	Hands free/ Headphone		8													
4.2.1.5	KVM Switch with Monitor		2													
4.2.1.6	Commuter Website		1													
4.2.1.7	Commuter IVR System		1													
4.2.1.8	Commuter SMS System		1													
4.2.1.9	Commuter Mobile Application		1													

5	TRANSIT MANAGEMENT SYSTEM (TMS)															
5.1	**TMS Hardware inclusive of but not limited to:**															
5.1.1	Rack Mount Server for TMS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences		1													
5.1.2	Rack Mount Server for ERP/MIS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences		1													
5.1.3	Rack Mount Server for NMS with Operating System, Database server, Application Software, Anti-Virus Software or Any other required COTS software inclusive of requisite licences		1													
5.1.4	KVM Switch with LCD Monitor		1													
5.1.5	42 U Server Rack for TMS and ERP Server		1													
5.1.6	External Hard Drives 2 TB		5													
5.1.7	Workstation including Monitor for TMS (TMC + HO)		15													
5.1.8	Printer Laser		10													
5.1.9	Document scanner		2													
5.2	**Depot Equipment**															
5.2.1	TMS Server at Depot with Operating System, Database server, Application Software (DMS, WMS, IMS and ERP/MIS), Anti-Virus Software or Any other required COTS software inclusive of requisite		3													

	licences															
5.2.2	Workstation including Monitor for TMS		42													
5.2.3	Handheld Device for TMS (Workshop/Yard) with software inclusive of requisite licences		12													
5.2.4	Printer Laser		20													
5.2.5	Document scanner		6													
5.2.6	Wifi Network inside the Depot (router/firewall)		3													
5.2.7	Crew Kiosk with software inclusive of requisite licences		7													
5.3	**Depot Software inclusive of but not limited to:**															
5.3.1	NMS Application Software inclusive of requisite licences		1													
6	**COMMUNICATION INFRA (COMM)**															
6.1	**COMM Hardware inclusive of but not limited to:**															
6.1.1	Central System - Network Components and LAN		1													
6.1.2	Central System - VPN components and secured internet		1													
6.1.3	Central System - Other network accessories		1													
6.1.4	WiFi Infrastructure at depots (access points, switches, outdoor antennas, cables etc.)		3													
6.1.5	POS VPN access modem		50													
6.1.6	CSP VPN access modem		4													
6.1.7	Internet Lease line, TMC & Depot Connectivity		4													
7	**SCHEDULING & ROSTER (S&R)**															
7.1	S&R workstation including monitor and Software Licence		3													
8	**DISASTER RECOVERY SERVICE**															

8.1	Secondary Mirroring Service		1													
9	**COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT**															
9.1	Yearly hardware and software maintenance (For 5 years)		5													

Name of Bidder:		
Authorized Signature of Bidder:		

2.6 Recurrent Cost Sub-Table

Lot number: ***"Single Lot Procurement"*** *]*

Line item number**:** *[specify:* ***relevant line item number from the Recurrent Cost Summary Table (e.g., z.1)*** *]*

Currency: ***The currency of the Recurrent Costs in which the costs expressed in this Sub-Table are expressed has to be in INR***

[as necessary for operation of the System, specify: ***the detailed components and quantities in the Sub-Table below for the line item specified above, modifying the sample components and sample table entries as needed.*** *Repeat the Sub-Table as needed to cover each and every line item in the Recurrent Cost Summary Table that requires elaboration.]*

Costs MUST reflect prices and rates quoted in accordance with ITB Clauses 14 and 15 (ITB Clauses 27 and 28 in the two-stage SBD). Unit prices for the same item appearing several times in the table must be identical in amount and currency.

Component No.	**Component**	**Maximum all-inclusive costs (for costs in *[insert : currency]*)**					
		Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Sub-Total for [insert:**

							currency])
1	Annual Comprehensive Maintenance Contract						
2							
3							
4							
5							
Grand Total							

NOTES:

1. Bidders to refer Page 262. Bill of Quantity for accessing the quantities in the 2.6 Recurrent Cost Sub-table.
2. The financial evaluation would however be done basing on the Net Present Value (NPV) concept for the entire contract period. Discount rate of NPV will be 7.5% per annum.
3. The above costs should be inclusive of all expenses, over-heads, GPRS communication, etc and covering the entire scope as per the tender document during the Maintenance Period (60 months).
4. The recurrent costs shall also be calculated to meet the SLA's specified in the Section VI- Technical Requirements – Chapter 14: Service Level Agreement for the Contract Period.
5. The bidder should indicate supply and installation/ services cost separately wherever applicable for each line item of the "2.6 Recurrent Cost Sub-Table " in the same table.

Name of Bidder:		
Authorized Signature of Bidder:		

2.7 Deviation Cost Table

Item No.	Clause No.	Details of Deviation	Cost for Increase or Decrease for Unconditional Withdrawal of each Deviation				
			Locally supplied items	Items supplied from outside the Purchaser's Country			
			INR	*INR*	*[insert: Foreign Currency A]*	*[insert: Foreign Currency B]*	*[insert: Foreign Currency C]*
Total for Prices Quoted for Unconditional Withdrawal of the deviation Given in Form 3.5.11 (b)							

Notes:

1. The Bidder shall quote the price for unconditional withdrawal of each deviation given in the Form 3.5.11 (b).
2. The deviation mentioned in the form of the Statement of Deviation (3.5.11 b), but not quoted the price in Price Schedule No. 2.7 above for unconditional withdrawal of such deviation, shall be considered as unconditionally withdraw with no financial and time implications.
3. The Purchaser reserves the right to accept or reject any deviation proposed by the Bidder at the price quoted by the Bidder above. Then the Contract price will be adjusted accordingly.

Name of Bidder:		
Authorized Signature of Bidder:		

2.8 Country of Origin Code Table

Country of Origin	Country Code		Country of Origin	Country Code		Country of Origin	Country Code

3. OTHER BID FORMS AND LISTS

3.1 Manufacturer's Authorization

Invitation for Bids Title and No.:
[If applicable:] Lot, Slice, Subsystem No(s).:

To: _____

WHEREAS _____ who are official producers of _____ and having production facilities at _____ do hereby authorize _____ located at _____ (hereinafter, the "Bidder") to submit a bid and subsequently negotiate and sign a Contract with you for resale of the following Products produced by us:

.

We hereby confirm that, in case the bidding results in a Contract between you and the Bidder, the above-listed products will come with our full standard warranty.

Name In the capacity of

Signed

Duly authorized to sign the authorization for and on behalf of : _____

Dated on _____ day of _____, _____.

Note: This authorization should be written on the letterhead of the Manufacturer and be signed by a person with the proper authority to sign documents that are binding on the Manufacturer.

3.2 List of Proposed Subcontractors

	Item	Proposed Subcontractor	Place of Registration & Qualifications

3.3 Software List

	(select one per item)			(select one per item)	
Software Item	System Software	General-Purpose Software	Application Software	Standard Software	Custom Software

3.4 List of Custom Materials

Custom Materials

3.5.1 General Information Form

All individual firms and each partner of a Joint Venture that are bidding must complete the information in this form. Nationality information should be provided for all owners or Bidders that are partnerships or individually owned firms.

Where the Bidder proposes to use named Subcontractors for highly specialized components of the Information System, the following information should also be supplied for the Subcontractor(s), together with the information in Forms 3.5.2, 3.5.3, 3.5.3a, 3.5.4, and 3.5.5. Joint Ventures must also fill out Form 3.5.2a.

1.	Name of firm	
2.	Head office address	
3.	Telephone	Contact
4.	Fax	Telex
5.	Place of incorporation / registration	Year of incorporation / registration

Nationality of owners[1]		
Name		Nationality
1.		
2.		
3.		
4.		
5.		
1/	To be completed by all owners of partnerships or individually owned firms.	

3.5.2 General Information Systems Experience Record

Name of Bidder or partner of a Joint Venture

All individual firms and all partners of a Joint Venture must complete the information in this form with regard to the management of Information Systems contracts generally. The information supplied should be the annual turnover of the Bidder (or each member of a Joint Venture), in terms of the amounts billed to clients for each year for work in progress or completed, converted to U.S. dollars at the rate of exchange at the end of the period reported. The annual periods should be calendar years, with partial accounting for the year up to the date of submission of applications. This form may be included for Subcontractors only if the Bid Data Sheet for ITB Clause 6.1 (a) explicitly permits experience and resources of (certain) Subcontractors to contribute to the Bidder's qualifications.

A brief note on each contract should be appended, describing the nature of the Information System, duration and amount of contract, managerial arrangements, purchaser, and other relevant details.

Use a separate page for each partner of a Joint Venture, and number these pages.

Bidders should not enclose testimonials, certificates, and publicity material with their applications; they will not be taken into account in the evaluation of qualifications.

Annual turnover data (applicable activities only)		
Year[1]	Turnover	US$ equivalent
1.		
2.		
3.		
4.		
5.		
1/ Commencing with the partial year up to the date of submission of bids		

3.5.2a Joint Venture Summary

Names of all partners of a Joint Venture
1. Partner in charge
2. Partner
3. Partner
4. Partner
5. Partner
6. etc.

Total value of annual turnover, in terms of Information System billed to clients, in US$ equivalent, converted at the rate of exchange at the end of the period reported:

Annual turnover data (applicable activities only; US$ equivalent)						
Partner	Form 3.5.2 page no.	Year 1	Year 2	Year 3	Year 4	Year 5
1. Partner in charge						
2. Partner						
3. Partner						
4. Partner						
5. Partner						
6. Etc.						
Totals						

3.5.3 Particular Information Systems Experience Record

Name of Bidder or partner of a Joint Venture

On separate pages, using the format of Form 3.5.3a, the Bidder is requested to list contracts of a similar nature, complexity, and requiring similar information technology and methodologies to the contract or contracts for which these Bidding Documents are issued, and which the Bidder has undertaken during the period, and of the number, specified in the BDS for ITB Clause 6.1 (a). Each partner of a Joint Venture should separately provide details of its own relevant contracts. The contract value should be based on the payment currencies of the contracts converted into U.S. dollars, at the date of substantial completion, or for ongoing contracts at the time of award.

3.5.3a Details of Contracts of Similar Nature and Complexity

Name of Bidder or partner of a Joint Venture

Use a separate sheet for each contract.

1.	Number of contract	
	Name of contract	
	Country	
2.	Name of Purchaser	
3.	Purchaser address	
4.	Nature of Information Systems and special features relevant to the contract for which the Bidding Documents are issued	
5.	Contract role (check one) ☐Prime Supplier ☐ Management Contractor ☐ Subcontractor ☐ Partner in a Joint Venture	
6.	Amount of the total contract/subcontract/partner share (in specified currencies at completion, or at date of award for current contracts) Currency Currency Currency	
7.	Equivalent amount US$ Total contract: $_____; Subcontract: $_____; Partner share: $_____;	
8.	Date of award/completion	
9.	Contract was completed _____ months ahead/behind original schedule (if behind, provide explanation).	
10.	Contract was completed US$ _____ equivalent under/over original contract amount (if over, provide explanation).	
11.	Special contractual/technical requirements.	
12.	Indicate the approximate percent of total contract value (and US$ amount) of Information System undertaken by subcontract, if any, and the nature of such Information System.	

3.5.4 Summary Sheet: Current Contract Commitments / Work in Progress

Name of Bidder or partner of a Joint Venture

Bidders and each partner to an Joint Venture bid should provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Name of contract	Purchaser, contact address/tel./fax	Value of outstanding Information System (current US$ equivalent)	Estimated completion date	Average monthly invoicing over last six months (US$/month)
1.				
2.				
3.				
4.				
5.				
etc.				

3.5.5 Financial Capabilities

Name of Bidder or partner of a Joint Venture

Bidders, including each partner of a Joint Venture, shall provide financial information to demonstrate that they meet the requirements stated in the BDS for ITB Clause 6.1 (a). Each Bidder or partner of a Joint Venture shall complete this form. If necessary, separate sheets shall be used to provide complete banker information. A copy of the audited balance sheets shall be attached.

Autonomous subdivisions of parent conglomerate businesses shall submit financial information related only to the particular activities of the subdivision.

Banker	Name of banker	
	Address of banker	
	Telephone	Contact name and title
	Fax	Telex

Summarize actual assets and liabilities in U.S. dollar equivalent (at the rates of exchange current at the end of each year) for the previous five calendar years. Based upon known commitments, summarize projected assets and liabilities in U.S. dollar equivalent for the next two calendar years, unless the withholding of such information by stock market listed public companies can be substantiated by the Bidder.

Financial information in US$ equivalent	Actual: Previous five years					Projected: Next two years	
	5	4	3	2	1	1	2
1. Total assets							
2. Current assets							
3. Total liabilities							
4. Current liabilities							
5. Profits before taxes							
6. Profits after taxes							

Specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the subject contract or contracts as indicated in the BDS for ITB Clause 6.1 (a).

Source of financing	Amount (US$ equivalent)

1.	
2.	
3.	
4.	

Attach audited financial statements—including, as a minimum, profit and loss account, balance sheet, and explanatory notes—for the period stated in the BDS for ITB Clause 6.1 (a) (for the individual Bidder or each partner of a Joint Venture).

If audits are not required by the laws of Bidders' countries of origin, partnerships and firms owned by individuals may submit their balance sheets certified by a registered accountant, and supported by copies of tax returns,

3.5.6 Personnel Capabilities

Name of Bidder

For specific positions essential to contract management and implementation (and/or those specified in the Bidding Documents, if any), Bidders should provide the names of at least two candidates qualified to meet the specified requirements stated for each position. The data on their experience should be supplied on separate sheets using one Form 3.5.6a for each candidate.

Bidders may propose alternative management and implementation arrangements requiring different key personnel, whose experience records should be provided.

1.	Title of position
	Name of prime candidate
	Name of alternate candidate
2.	Title of position
	Name of prime candidate
	Name of alternate candidate
3.	Title of position
	Name of prime candidate
	Name of alternate candidate
4.	Title of position
	Name of prime candidate
	Name of alternate candidate

3.5.6a Candidate Summary

Name of Bidder

Position		Candidate ☐ Prime ☐ Alternate
Candidate information	Name of candidate	Date of birth
	Professional qualifications	
Present employment	Name of Employer	
	Address of Employer	
	Telephone	Contact (manager / personnel officer)
	Fax	Telex
	Job title of candidate	Years with present Employer

Summarize professional experience over the last twenty years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company/Project/ Position/Relevant technical and management experience

3.5.7 Technical Capabilities

Name of Bidder

The Bidder shall provide adequate information to demonstrate clearly that it has the technical capability to meet the requirements for the Information System. With this form, the Bidder should summarize important certifications, proprietary methodologies, and/or specialized technologies which the Bidder proposes to utilize in the execution of the Contract or Contracts.

3.5.8 Litigation History

Name of Bidder or partner of a Joint Venture

Bidders, including each of the partners of a Joint Venture, shall provide information on any history of litigation or arbitration resulting from contracts executed in the last five years or currently under execution. A separate sheet should be used for each partner of a Joint Venture.

Year	Award FOR or AGAINST Bidder	Name of client, cause of litigation, and matter in dispute	Disputed amount (current value, US$ equivalent)

3.5.9 Power of Attorney

Note: Applicable only in case where the signatory to the Bid is not authorized directly by the Bidder firm through Board Resolution or Partners' resolution and is signing on behalf of the Authorized Signatory. The Power of Attorney is not required for a firm being Proprietary Concern

{On Requisite Stamp Paper}

KNOW ALL MEN by these presents that we, …[name of the Company/partnership firm], a company incorporated under the Companies Act 1956,/ Firm having partnership deed as per partnership act and having its Registered Office/ office at ….[Address of the Company/partnership firm] (hereinafter referred to as "Company/firm"):

WHEREAS in response to the RFP for {Title of the RFP}, ("Project"), the Company/ firm is submitting Bid Comprising Technical and Price Bids for the project in _____ to {Name of the Purchase}, and is desirous of appointing an attorney for the purpose thereof.

WHEREAS the Company deems it expedient to appoint Mr. / Ms. _____ son/daughter of _____ resident of _____, holding the post of _____ as the Attorney of the Company/firm.

NOW KNOW WE ALL BY THESE PRESENTS, THAT _____ [name of the company/firm] do hereby nominate, constitute and appoint……. [name & designation of the person]……as its true and lawful

Attorney of the Company/ firm to do and execute all or any of the following acts, deeds and things for the

Company/ firm in its name and on its behalf, that is to say :

To act as the Company's/firm's official representative for submitting the Bid comprising Technical Bid and Price Bid for the said project and other relevant documents in connection therewith;

To sign all the necessary documents, papers, testimonials, applications, representations and correspondence necessary and proper for the purpose aforesaid;

To tender/bid documents, receive and make inquiries, make the necessary corrections and clarifications to the Bid and other documents, as may be necessary;

To do all such acts, deeds and things in the name and on behalf of the Company as necessary for the purpose aforesaid.

The common seal of [name of the company/firm] was here unto affixed pursuant to a resolution passed at the meeting of Committee of Directors/ Partners held on --- Day of ----------, 20__ in the	Signature : (Name & designation of the person)

presence of [name & designation of the person] and countersigned by [name & designation of the person] of the Company/firm of [name of the company]	Signature : (Name & designation of the person)

3.5.10 Client Project Letter

The attached format is an optional format for bidders to use for project qualifications. Any client letter should provide the details asked in the qualification criteria for the projects. Bidder can add additional fields to form if required.

AFCS Qualification Letter

To Whomever It May Concern

Date: _____

On behalf of _____, I am pleased to provide the reference letter to _____ agency who delivered the Automatic Fare Collection System to our satisfaction. The details of the contract and the system are as follows:

1	Number of contract:
	Name of contract:
	Country:
2	Name of Purchaser:
3	Purchaser address:
4	Description of services relevant to the current project:
5	Contract role (check one)
	☐ Prime Bidder ☐ Management Contractor ☐ Subcontractor ☐ Partner in a joint venture
6	Amount of the total contract/subcontract/partner share in US$:
7	Date of award:
	Date of commissioning:
	Number of years in operation:

	Components of project delivered by the Bidder	
8 (AFCS)	Number of Transit Stations:	
	Number of Active Smartcards:	
	Payment Media (specify Smartcards, Tokens, Paper Tickets, etc.):	
	Years of Maintenance Provided:	

Signature of Authorized Signatory _____
Name of Authorized Signatory _____
Designation of Authorized Signatory _____
Seal of the Client Agency

AVLS Qualification Letter

To Whomever It May Concern

Date: _____

On behalf of _____, I am pleased to provide the reference letter to _____ agency who delivered the Automatic Vehicle Location system (AVLS) integrated with Passenger Information System (PIS) to our satisfaction. The details of the contract and the system are as follows:

1	Number of contract:	
	Name of contract:	
	Country:	
2	Name of Purchaser:	
3	Purchaser address:	
4	Description of services relevant to the current project:	
5	Contract role (check one)	
	☐ Prime Bidder ☐ Management Contractor ☐ Subcontractor ☐ Partner in a joint venture	
6	Amount of the total contract/subcontract/partner share in US$:	
7	Date of award:	
	Date of commissioning:	
	Number of years in operation:	
	Components of project delivered by the Bidder	
	Number of transit buses on which On-vehicle GPS unit is	

8	Installed	
(AVL)	Was the AVL system integrated with PIS and ETA information was provided?	Yes/No

Signature of Authorized Signatory _____
Name of Authorized Signatory _____
Designation of Authorized _____
Signatory Seal of the Client Agency _____

Scheduling & Roster Qualification Letter

To Whomever It May Concern

Date: _____

On behalf of _____, I am pleased to provide the reference letter to _____ agency who delivered the Scheduling & Roster Solution to our satisfaction. The details of the contract and the system are as follows:

1	Number of contract:	
	Name of contract:	
	Country:	
2	Name of Purchaser:	
3	Purchaser address:	
4	Description of services relevant to the current project:	
5	Contract role (check one)	
	☐ Prime Bidder ☐ Management Contractor ☐ Subcontractor ☐ Partner in a joint venture	
6	Amount of the total contract/subcontract/partner share in US$:	
7	Date of award:	
	Date of commissioning:	
	Number of years in operation:	
	Components of project delivered by the Bidder	
8 (Scheduli	Crew & Fleet size for which Scheduling was provided	
	Optimized fleet scheduling	Yes/No
	Time table creation	Yes/No

ng & Roster)		
	Daily roster of crew & fleet	Yes/No

Signature of Authorized Signatory _____

Name of Authorized Signatory _____

Designation of Authorized Signatory _____

Seal of the Client Agency _____

TMS Qualification Letter

To Whomever It May Concern

Date: _____

On behalf of _____, I am pleased to provide the reference letter to _____ agency who delivered the TMS Solution to our satisfaction. The details of the contract and the system are as follows:

1	Number of contract:	
	Name of contract:	
	Country:	
2	Name of Purchaser:	
3	Purchaser address:	
4	Description of services relevant to the current project:	
5	Contract role (check one)	
	☐ Prime Bidder ☐ Management Contractor ☐ Subcontractor ☐ Partner in a joint venture	
6	Amount of the total contract/subcontract/partner share in US$:	
7	Date of award:	
	Number of years in operation:	
	Components of project delivered by the Bidder	
8	Fleet size for which TMS was provided	
	TMS comprising of Depot Management System (including Workshop/ Store and Inventory management system) integrated with Scheduling and Roster system	Yes/No

Signature of Authorized Signatory _____

Name of Authorized Signatory _____

Designation of Authorized _____

Signatory Seal of the Client Agency _____

3.5.11 (a) Technical Responsiveness Checklist (Compliance Matrix)

S.No	Clause/Requirement No	Heading/Title/Requirement	Compliance		Bidder's technical reasons supporting compliance	Bidder's cross references to supporting information in Technical Bid
			FC	NC		

NOTE:

1. We hereby confirm that all implicit and explicit deviations, comments and remarks mentioned elsewhere in our proposal shall be treated as NULL and VOID and stand withdraw with no financial and time implications.
2. We hereby confirm that any comment by us in the Compliance Matrix above, other than either of

   "FC" or "NC" shall be treated as "Not Complied". And we further confirm that unless we include such clauses in the "Statement of Deviation" [as stated in 3.5.11 (b)] attached herewith and prices against such clauses in the Price Schedule 2, the comment shall be considered as unconditionally withdrawn with no financial and time implications.

3. We hereby confirm that **except for** deviation**s** noted in the form of the Statement of Deviation attached herewith, our proposal is fully and truly compliant.

Date: _____

_____

(Signature of Bidder)

3.5.11 (b) Statement of Deviation

Item No.	Clause Number	Details of Deviations (Original/Proposal)	Remarks explaining reasons for deviations and why it may be considered by the Purchaser	Check whether priced in the Price Schedule

NOTE:

1. We hereby confirm that the pricing of unconditional withdrawal of the above deviations has been given in the Price Schedule 2.
2. We hereby confirm that any comment by us in the Compliance Matrix but are not mentioned in the Statement of Deviation above shall be treated as NULL and VOID and stand withdraw with no financial and time implications.
3. We hereby confirm that the deviation noted in the form of the Statement of Deviation above but are not priced in the Price Schedule 2; such deviations shall be considered as unconditionally withdrawn with no financial and time implications.

Date :_____ _____

(Signature of Bidder)

3.5.12 Format for Bid Queries

S.No	Page	Clause as in RFP	Query/Suggestion
1			
2			
3			
4			
5			
6			
7			
8			

4. BID-SECURING DECLARATION

IFB: *[insert: **title and number of IFB**]*

To: *[insert: **name and address of Purchaser**]*

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we, and in the case of a Joint Venture all partners to it, will automatically be suspended from being eligible for participating in bidding for any contract with you for the period of time of *[Purchaser insert: **number of months or years**]*, in case of, and starting from the date of, breaching our obligation(s) under the bidding conditions due to:

(a) withdrawing our bid, or any part of our bid, during the period of bid validity specified in the Bid Submission Form or any extension of the period of bid validity which we subsequently agreed to; or

(b) having been notified of the acceptance of our bid by you during the period of bid validity, (i) failing or refusing to execute the Contract Agreement, or (ii) failing or refusing to furnish the performance security, if required, in accordance with the Instructions to Bidders.

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of the period of bid validity.

If the submission of alternative bids was permitted, and in case we did submit one or more alternative bids, this Bid-Securing Declaration applies to these parts of our bid as well.

Signed: *[insert: **signature of person whose name and capacity are shown below**]*

Name: *[insert: **name of person signing the Bid-Securing Declaration**]*, in the capacity of *[insert: **legal capacity of person signing the Bid-Securing Declaration**]*

Duly authorized to sign the bid for and on behalf of: *[insert: **name of Bidder**]*

Dated on _____ day of _____, 20__

[add Corporate Seal (where appropriate)]

[Note to Bidders: Joint Ventures need to ensure that, their Bid-Securing Declaration meets the requirements for Joint Ventures as stated in the ITB Clause on "Securing the Bid".]

4A. BID SECURITY (BANK GUARANTEE)

_____

*[insert: **Bank's Name, and Address of Issuing Branch or Office**]*

Beneficiary: *[insert: **Name and Address of Purchaser**]*

Date: *[insert: **date**]*

BID GUARANTEE No.: *[insert: **Bid Guarantee Number**]*

We have been informed that *[insert: **name of the Bidder**]* (hereinafter called "the Bidder") has submitted to you its bid dated *[insert: **bid date**]* (hereinafter called "the Bid") for the execution of *[insert: **name of contract**]* under Invitation for Bids No. *[insert: **IFB number**]*.

Furthermore, we understand that, according to your conditions, bids must be supported by a bid guarantee, and that the bid guarantee automatically covers any alternative bids included in the Bid, if the Bidder is permitted to offer alternatives and does so.

At the request of the Bidder, we *[insert: **name of Bank**]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert: **amount in figures**]* (*[insert: **amount in words**]*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

(a) has withdrawn the Bid (or any parts of it) during the period of bid validity specified by the Bidder in the Bid Submission Form or any extension of the period of bid validity which the Bidder subsequently agreed to; or

(b) having been notified of the acceptance of the Bid by you during the period of bid validity, (i) failed or refused to execute the Contract Agreement, or (ii) failed or refused to furnish the performance security, if required, in accordance with the Instructions to Bidders.

This guarantee will expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the contract signed by the Bidder and the performance security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful bidder; or (ii) twenty-eight days after the expiration of the Bid's validity.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

_____

[Signature(s)]

[Note to Bidders: Instructions on amount and currency can be found in the ITB Clause and BDS for "Securing the Bid." Joint Ventures need to also ensure that their Bank Guarantee meets the requirements for Joint Ventures as provided in the same Clause.]

4B. BID SECURITY (BID BOND)

BOND NO.: _____

BY THIS BOND, *[insert: **name of Bidder**]* as Principal (hereinafter called "the Principal"), and *[insert: **name, legal title, and address of surety**]*, authorized to transact business in *[insert: **name of Purchaser's country**]*, as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[insert **name of Purchaser**]* as Obligee (hereinafter called "the Purchaser") in the sum of *[insert **amount of Bond in currency, figures and words**]*, for the payment of which sum, well and truly to be made, we, the said Principal and Surety, bind ourselves, our successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has submitted a written bid to the Purchaser dated the ___ day of _____, 20__, for the execution of *[insert: **name of contract**]* (hereinafter called "the Bid"). If the Principal was permitted by the bidding conditions to submit alternative bid(s) and did so, then these are deemed part of the Bid and thus covered by this Bond.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal:

(a) withdraws the Bid (or any parts of it) during the period of the Bid's validity specified in the Bid Submission Form, or any extension of the period of the Bid's validity the Principal subsequently agreed to, notice of which to the Surety is hereby waived; or

(b) having been notified of the acceptance of the Bid by the Purchaser during the period of the Bid's validity, (i) fails or refuses to execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, if required, in accordance with the Instructions to Bidders;

then the Surety undertakes to immediately pay to the Purchaser up to the above amount upon receipt of the Purchaser's first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser shall state that the demand arises from the occurrence of any of the above events, specifying which event(s) has/have occurred.

The Surety hereby agrees that its obligation will remain in full force and effect up to and including the date 28 days after the date of expiration of the Bid's validity.

IN TESTIMONY WHEREOF, the Principal and the Surety have caused these presents to be executed in their respective names this ____ day of _____ 20__.

Principal: _____ Surety: _____

[add Corporate Seal(s) (where appropriate)]

_____ _____

[Signature] *[Signature]*

_____ _____

*[state: **printed name and title**]* *[state: **printed name and title**]*

[Note to Bidders: Instructions on amount and currency can be found in the ITB Clause and BDS for "Securing the Bid." Joint Ventures need to also ensure that their Bid Bond meets the requirements for Joint Ventures as provided in the same Clause.]

5. CONTRACT AGREEMENT

THIS CONTRACT AGREEMENT is made

the *[insert: **ordinal**]* day of *[insert: **month**], [insert: **year**]*.

BETWEEN

(1) Chandigarh Transport Undertaking (CTU), INDIA., incorporated under the Act of India and having its principal place of business at Chandigarh Transport Undertaking, O/o Director Transport UT, Chandigarh, Plot No. 701, Industrial Area Phase-1, Chandigarh, India (hereinafter called "the Purchaser"), and

(2) *[insert: **name of Supplier**]*, a corporation incorporated under the laws of *[insert: **country of Supplier**]* and having its principal place of business at *[insert: **address of Supplier**]* (hereinafter called "the Supplier").

WHEREAS the Purchaser desires to engage the Supplier to supply, install, achieve Operational Acceptance of, and support the following Information System *[insert: **brief description of the Information System**]* ("the System"), and the Supplier has agreed to such engagement upon and subject to the terms and conditions appearing below in this Contract Agreement.

NOW IT IS HEREBY AGREED as follows:

Article 1. Contract Documents

1.1 Contract Documents (Reference GCC Clause 1.1 (a) (ii))

The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:

(a) This Contract Agreement and the Appendices attached to the Contract Agreement

(b) Special Conditions of Contract

(c) General Conditions of Contract

(d) Technical Requirements (including Implementation Schedule)

(e) The Supplier's bid and original Price Schedules

(f) *[Add here: **any other documents**]*

1.2 Order of Precedence (Reference GCC Clause 2)

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed in Article 1.1 (Contract Documents) above, provided that Appendix 7 shall prevail over all provisions of the Contract Agreement and the other Appendices attached to the Contract Agreement and all the other Contract Documents listed in Article 1.1 above.

1.3 Definitions (Reference GCC Clause 1)

Capitalized words and phrases used in this Contract Agreement shall have the same meanings as are ascribed to them in the General Conditions of Contract.

Article 2.

Contract Price and Terms of Payment

2.1 Contract Price (Reference GCC Clause 1.1(a)(viii) and GCC Clause 11)

The Purchaser hereby agrees to pay to the Supplier the Contract Price in consideration of the performance by the Supplier of its obligations under the Contract. The Contract Price shall be the aggregate of: *[insert:* ***amount of foreign currency A in words*** *], [insert:* ***amount in figures*** *],* plus *[insert:* ***amount of foreign currency B in words*** *], [insert:* ***amount in figures*** *],* plus *[insert:* ***amount of foreign currency C in words*** *], [insert****: amount in figures*** *], [insert:* ***amount of local currency in words*** *], [insert:* ***amount in figures*** *],* as specified in the Grand Summary Price Schedule.

The Contract Price shall be understood to reflect the terms and conditions used in the specification of prices in the detailed price schedules, including the terms and conditions of the associated Incoterms, and the taxes, duties and related levies if and as identified.

Article 3.

Effective Date for Determining Time for Operational Acceptance

3.1 Effective Date (Reference GCC Clause 1.1 (e) (ix))

The time allowed for supply, installation, and achieving Operational Acceptance of the System shall be determined from the date when all of the following conditions have been fulfilled:

(a) This Contract Agreement has been duly executed for and on behalf of the Purchaser and the Supplier;

(b) The Supplier has submitted to the Purchaser the performance security and the advance payment security, in accordance with GCC Clause 13.2 and GCC Clause 13.3;

(c) The Purchaser has paid the Supplier the advance payment, in accordance with GCC Clause 12;

(d) *[specify here:* ***any other conditions, for example, opening/confirmation of letter of credit*** *].*

Each party shall use its best efforts to fulfill the above conditions for which it is responsible as soon as practicable.

3.2 If the conditions listed under 3.1 are not fulfilled within two (2) months from the date of this Contract Agreement because of reasons not attributable to the Supplier, the parties shall discuss and agree on an equitable adjustment to the Contract Price and the Time for Achieving Operational Acceptance and/or other relevant conditions of the Contract.

Article 4.

Appendixes

4.1 The Appendixes listed below shall be deemed to form an integral part of this Contract Agreement.

4.2 Reference in the Contract to any Appendix shall mean the Appendixes listed below and attached to this Contract Agreement, and the Contract shall be read and construed accordingly.

APPENDIXES

Appendix 1. Supplier's Representative

Appendix 2. Adjudicator *[if there is no Adjudicator, state* ***"not applicable"****]*

Appendix 3. List of Approved Subcontractors

Appendix 4. Categories of Software

Appendix 5. Custom Materials

Appendix 6. Revised Price Schedules (if any)

Appendix 7. Minutes of Contract Finalization Discussions and Agreed-to Contract Amendments

IN WITNESS WHEREOF the Purchaser and the Supplier have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

For and on behalf of the Purchaser

Signed:

in the capacity of *[insert: **title or other appropriate designation**]*

in the presence of

For and on behalf of the Supplier

Signed:

in the capacity of *[insert: **title or other appropriate designation**]*

in the presence of

CONTRACT AGREEMENT

dated the *[insert: **number**]* day of *[insert: **month**]*, *[insert: **year**]*

BETWEEN

*[insert: **name of Purchaser**]*, "the Purchaser"

and

*[insert: **name of Supplier**]*, "the Supplier"

Appendix 1. Supplier's Representative

In accordance with GCC Clause 1.1 (b) (iv), the Supplier's Representative is:

Name: *[insert:* ***name*** *and provide title and address further below****,*** *or state* ***"to be nominated within fourteen (14) days of the Effective Date"*** *]*

Title: *[if appropriate, insert:* ***title*** *]*

In accordance with GCC Clause 4.3, the Supplier's addresses for notices under the Contract are:

Address of the Supplier's Representative: *[as appropriate, insert:* ***personal delivery, postal, cable, telegraph, telex, facsimile, electronic mail, and/or EDI addresses.*** *]*

Fallback address of the Supplier: *[as appropriate, insert:* ***personal delivery, postal, cable, telegraph, telex, facsimile, electronic mail, and/or EDI addresses.*** *]*

Appendix 2. Adjudicator

In accordance with GCC Clause 1.1 (b) (vi), the agreed-upon Adjudicator is:

Name: Shri. Arun Saxena, (IRSSE-1978)

Title: Ex. Advisor (Signal), Railway Board

Address (email): *arunksaksena@yahoo.co.in*

Telephone: +918800109000

In accordance with GCC Clause 6.1.3, the agreed-upon fees and reimbursable expenses are:

Hourly Fees: INR 3,000 (Three thousand only)

Reimbursable Expenses: As per entitlement of Class I officer (Above Super-time scale)

Pursuant to GCC Clause 6.1.4, if at the time of Contract signing, agreement has not been reached between the Purchaser and the Supplier, an Adjudicator will be appointed by the Appointing Authority named in the SCC.

Appendix 3. List of Approved Subcontractors

The Purchaser has approved use of the following Subcontractors nominated by the Supplier for carrying out the item or component of the System indicated. Where more than one Subcontractor is listed, the Supplier is free to choose between them, but it must notify the Purchaser of its choice sufficiently in advance of the time when the subcontracted work needs to commence to give the Purchaser reasonable time for review. In accordance with GCC Clause 20.1, the Supplier is free to submit proposals for Subcontractors for additional items from time to time. No subcontracts shall be placed with any such Subcontractors for additional items until the Subcontractors have been approved in writing by the Purchaser and their names have been added to this list of Approved Subcontractors, subject to GCC Clause 20.3.

*[specify: **item, approved Subcontractors, and their place of registration that the Supplier proposed in the corresponding attachment to its bid and that the Purchaser approves that the Supplier engage during the performance of the Contract.** Add additional pages as necessary.]*

Item	Approved Subcontractors	Place of Registration

Appendix 4. Categories of Software

The following table assigns each item of Software supplied and installed under the Contract to one of the three categories: (i) System Software, (ii) General-Purpose Software, or (iii) Application Software; and to one of the two categories: (i) Standard Software or (ii) Custom Software.

	(select one per item)			(select one per item)	
Software Item	System Software	General-Purpose Software	Application Software	Standard Software	Custom Software

Appendix 5. Custom Materials

The follow table specifies the Custom Materials the Supplier will provide under the Contract.

Custom Materials

Appendix 6. Revised Price Schedules

The attached Revised Price Schedules (if any) shall form part of this Contract Agreement and, where differences exist, shall supersede the Price Schedules contained in the Supplier's Bid. These Revised Price Schedules reflect any corrections or adjustments to the Supplier's bid price, pursuant to the ITB Clauses 18.3, 26.2, and 33.1 (ITB Clauses 30.3, 38.2, and 45.1 in the two-stage SBD).

Appendix 7. Minutes of Contract Finalization Discussions and Agreed-to Contract Amendments

The attached Contract amendments (if any) shall form part of this Contract Agreement and, where differences exist, shall supersede the relevant clauses in the GCC, SCC, Technical Requirements, or other parts of this Contract as defined in GCC Clause 1.1 (a) (ii).

6. PERFORMANCE AND ADVANCE PAYMENT SECURITY FORMS

6.1 Performance Security Form (Bank Guarantee)

_____

*[insert: **Bank's Name, and Address of Issuing Branch or Office**]*

Beneficiary: Chandigarh Transport Undertaking
O/o Director Transport UT, Chandigarh
Plot No. 701, Industrial Area

Phase-1, Chandigarh, India

Date: *[insert: **date**]*

PERFORMANCE GUARANTEE No.: *[insert: **Performance Guarantee Number**]*

We have been informed that on *[insert: **date of award**]* you awarded Contract No. *[insert: **Contract number**]* for *[insert: **title and/or brief description of the Contract**]* (hereinafter called "the Contract") to *[insert: **complete name of Supplier**]* (hereinafter called "the Supplier"). Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Supplier, we hereby irrevocably undertake to pay you any sum(s) not exceeding *[insert: **amount(s)**[1] **in figures and words**]* upon receipt by us of your first demand in writing declaring the Supplier to be in default under the Contract, without cavil or argument, or your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

On the date of your issuing, to the Supplier, the Operational Acceptance Certificate for the System, the value of this guarantee will be reduced to any sum(s) not exceeding *[insert: **amount(s)**[1] **in figures and words**]*. This remaining guarantee shall expire no later than *[insert: **number** and select: **of months/of years** (of the Warranty Period that needs to be covered by the remaining guarantee)]* from the date of the Operational Acceptance Certificate for the System,[2] and any demand for payment under it must be received by us at this office on or before that date.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458, except that subparagraph (ii) of Sub-article 20 (a) is hereby excluded.

---

[1] *The bank shall insert the amount(s) specified and denominated in the SCC for GCC Clauses 13.3.1 and 13.3.4 respectively, either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Purchaser.*

[2] *In this sample form, the formulation of this paragraph reflects the usual SCC provisions for GCC Clause 13.3. However, if the SCC for GCC Clauses 13.3.1 and 13.3.4 varies from the usual provisions, the paragraph, and possibly the previous paragraph, need to be adjusted to precisely reflect the provisions specified in the SCC.*

_____

[Signature(s)]

6.2 Advance Payment Security Form (Bank Guarantee)

_____

[insert: Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: *[insert: **Name and Address of Purchaser**]*

Date: *[insert: **date**]*

ADVANCE PAYMENT GUARANTEE No.: *[insert: **Advance Payment Guarantee Number**]*

We have been informed that on *[insert: **date of award**]* you awarded Contract No. *[insert: **Contract number**]* for *[insert: **title and/or brief description of the Contract**]* (hereinafter called "the Contract") to *[insert: **complete name of Supplier**]* (hereinafter called "the Supplier"). Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of *[insert: **amount in numbers and words, for each currency of the advance payment**]* is to be made to the Supplier against an advance payment guarantee.

At the request of the Supplier, we hereby irrevocably undertake to pay you any sum or sums not exceeding in total the amount of the advance payment referred to above, upon receipt by us of your first demand in writing declaring that the Supplier is in breach of its obligations under the Contract because the Supplier used the advance payment for purposes other than toward the proper execution of the Contract.

It is a condition for any claim and payment to be made under this guarantee that the advance payment referred to above must have been received by the Supplier on its account *[insert: **number and domicile of the account**]*.

For each payment after the advance payment, which you will make to the Supplier under this Contract, the maximum amount of this guarantee shall be reduced by the ninth part of such payment.[1] At the time at which the amount guaranteed becomes nil, this guarantee shall become null and void, whether the original is returned to us or not.

This guarantee is subject to the Uniform Rules for Demand Guarantees, ICC Publication No. 458.

_____

[Signature(s)]

---

[1] *This sample formulation assumes an Advance Payment of 10% of the Contract Price excluding Recurrent Costs, and implementation of the main option proposed by this SBD in the SCC for GCC Clause 13.2.2 for gradually reducing the value of the Advance Payment Security. If the Advance Payment is other than 10%, or if the reduction in amount of the security follows a different approach, this paragraph would need to be adjusted and edited accordingly.*

7. INSTALLATION AND ACCEPTANCE CERTIFICATES

7.1 Installation Certificate

Date: *[insert:* ***date*** *]*

Loan/Credit Number: *[insert:* ***loan or credit number from IFB*** *]*

IFB: *[insert:* ***title and number of IFB*** *]*

Contract: *[insert:* ***name and number of Contract*** *]*

To: *[insert:* ***name and address of Supplier*** *]*

Dear Sir or Madam:

Pursuant to GCC Clause 26 (Installation of the System) of the Contract entered into between yourselves and the *[insert:* ***name of Purchaser*** *]* (hereinafter the "Purchaser") dated *[insert:* ***date of Contract*** *]*, relating to the *[insert:* ***brief description of the Information System*** *]*, we hereby notify you that the System (or a Subsystem or major component thereof) was deemed to have been correctly installed on the date specified below.

1. Description of the System (or relevant Subsystem or major component: *[insert:* ***description*** *]*

2. Date of Installation: *[insert:* ***date*** *]*

Notwithstanding the above, you are required to complete the outstanding items listed in the attachment to this certificate as soon as practicable. This letter shall not relieve you of your obligation to achieve Operational Acceptance of the System in accordance with the Contract nor of your obligations during the Warranty Period.

For and on behalf of the Purchaser

Signed:

Date:

in the capacity of: *[state:* ***"Project Manager"*** *or state* ***the title of a higher level authority in the Purchaser's organization*** *]*

7.2 Operational Acceptance Certificate

Date: *[insert:* ***date*** *]*

Loan/Credit Number: *[insert:* ***loan or credit number from IFB*** *]*

IFB: *[insert:* ***title and number of IFB*** *]*

Contract: *[insert:* ***name of System or Subsystem and number of Contract*** *]*

To: *[insert:* ***name and address of Supplier*** *]*

Dear Sir or Madam:

Pursuant to GCC Clause 27 (Commissioning and Operational Acceptance) of the Contract entered into between yourselves and the *[insert:* ***name of Purchaser*** *]* (hereinafter the "Purchaser") dated *[insert:* ***date of Contract*** *]*, relating to the *[insert:* ***brief description of the Information System*** *]*, we hereby notify you the System (or the Subsystem or major component identified below) successfully completed the Operational Acceptance Tests specified in the Contract. In accordance with the terms of the Contract, the Purchaser hereby takes over the System (or the Subsystem or major component identified below), together with the responsibility for care and custody and the risk of loss thereof on the date mentioned below.

1. Description of the System (or Subsystem or major component): *[insert:* ***description*** *]*

2. Date of Operational Acceptance: *[insert:* ***date*** *]*

This letter shall not relieve you of your remaining performance obligations under the Contract nor of your obligations during the Warranty Period.

For and on behalf of the Purchaser

Signed:

Date:

in the capacity of: *[state:* ***"Project Manager" or higher level authority in the Purchaser's organization*** *]*

8. CHANGE ORDER PROCEDURES AND FORMS

Date: *[insert:* ***date*** *]*

Loan/Credit Number: *[insert:* ***loan or credit number from IFB*** *]*

IFB: *[insert:* ***title and number of IFB*** *]*

Contract: *[insert:* ***name or System or Subsystem and number of Contract*** *]*

General

This section provides samples of procedures and forms for carrying out changes to the System during the performance of the Contract in accordance with GCC Clause 39 (Changes to the System) of the Contract.

Change Order Log

The Supplier shall keep an up-to-date Change Order Log to show the current status of Requests for Change and Change Orders authorized or pending. Changes shall be entered regularly in the Change Order Log to ensure that the log is kept up-to-date. The Supplier shall attach a copy of the current Change Order Log in the monthly progress report to be submitted to the Purchaser.

References to Changes

(1) Request for Change Proposals (including Application for Change Proposals) shall be serially numbered CR-nnn.
(2) Change Estimate Proposals shall be numbered CN-nnn.
(3) Estimate Acceptances shall be numbered CA-nnn.
(4) Change Proposals shall be numbered CP-nnn.
(5) Change Orders shall be numbered CO-nnn.

On all forms, the numbering shall be determined by the original CR-nnn.

Annexes

8.1 Request for Change Proposal Form
8.2 Change Estimate Proposal Form
8.3 Estimate Acceptance Form
8.4 Change Proposal Form
8.5 Change Order Form
8.6 Application for Change Proposal Form

8.1 Request for Change Proposal Form

(Purchaser's Letterhead)

Date: *[insert: **date**]*

Loan/Credit Number: *[insert: **loan or credit number from IFB**]*

IFB: *[insert: **title and number of IFB**]*

Contract: *[insert: **name of System or Subsystem or number of Contract**]*

To: *[insert: **name of Supplier and address**]*

Attention: *[insert: **name and title**]*

Dear Sir or Madam:

With reference to the above-referenced Contract, you are requested to prepare and submit a Change Proposal for the Change noted below in accordance with the following instructions within *[insert: **number**]* days of the date of this letter.

1. Title of Change: *[insert: **title**]*

2. Request for Change No./Rev.: *[insert: **number**]*

3. Originator of Change: *[select **Purchaser / Supplier (by Application for Change Proposal)**, and add: **name of originator**]*

4. Brief Description of Change: *[insert: **description**]*

5. System (or Subsystem or major component affected by requested Change): *[insert: **description**]*

6. Technical documents and/or drawings for the request of Change:

Document or Drawing No. Description

7. Detailed conditions or special requirements of the requested Change: *[insert: **description**]*

8. Procedures to be followed:

   (a) Your Change Proposal will have to show what effect the requested Change will have on the Contract Price.

   (b) Your Change Proposal shall explain the time it will take to complete the requested Change and the impact, if any, it will have on the date when Operational Acceptance of the entire System agreed in the Contract.

   (c) If you believe implementation of the requested Change will have a negative impact on the quality, operability, or integrity of the System, please provide a detailed explanation, including other approaches that might achieve the same impact as the requested Change.

   (d) You should also indicate what impact the Change will have on the number and mix of staff needed by the Supplier to perform the Contract.

   (e) You shall not proceed with the execution of work related to the requested Change until we have accepted and confirmed the impact it will have on the Contract Price and the Implementation Schedule in writing.

9. As next step, please respond using the Change Estimate Proposal form, indicating how much it will cost you to prepare a concrete Change Proposal that will describe the proposed approach for implementing the Change, all its elements, and will also address the points in paragraph 8 above pursuant to GCC Clause 39.2.1. Your Change Estimate Proposal should contain a first approximation of the proposed approach, and implications for schedule and cost, of the Change.

For and on behalf of the Purchaser

Signed:

Date:

in the capacity of: *[state: **"Project Manager"** or **higher level authority in the Purchaser's organization**]*

8.2 Change Estimate Proposal Form

(Supplier's Letterhead)

Date: *[insert: **date**]*

Loan/Credit Number: *[insert: **loan or credit number from IFB**]*

IFB: *[insert: **title and number of IFB**]*

Contract: *[insert: **name of System or Subsystem and number of Contract**]*

To: *[insert: **name of Purchaser and address**]*

Attention: *[insert: **name and title**]*

Dear Sir or Madam:

With reference to your Request for Change Proposal, we are pleased to notify you of the approximate cost of preparing the below-referenced Change in accordance with GCC Clause 39.2.1 of the Contract. We acknowledge that your agreement to the cost of preparing the Change Proposal, in accordance with GCC Clause 39.2.2, is required before we proceed to prepare the actual Change Proposal including a detailed estimate of the cost of implementing the Change itself.

1. Title of Change: *[insert: **title**]*

2. Request for Change No./Rev.: *[insert: **number**]*

3. Brief Description of Change (including proposed implementation approach): *[insert: **description**]*

4. Schedule Impact of Change (initial estimate): *[insert: **description**]*

5. Initial Cost Estimate for Implementing the Change: *[insert: **initial cost estimate**]*

6. Cost for Preparation of Change Proposal: *[insert:* ***cost in the currencies of the Contract*** *]*, as detailed below in the breakdown of prices, rates, and quantities.

For and on behalf of the Supplier

Signed:

Date:

in the capacity of: *[state:* ***"Supplier's Representative"*** *or* ***other higher level authority in the Supplier's organization*** *]*

8.3 Estimate Acceptance Form

(Purchaser's Letterhead)

Date: *[insert: **date**]*

Loan/Credit Number: *[insert: **loan or credit number from IFB**]*

IFB: *[insert: **title and number of IFB**]*

Contract: *[insert: **name of System or Subsystem and number of Contract**]*

To: *[insert: **name of Supplier and address**]*

Attention: *[insert: **name and title**]*

Dear Sir or Madam:

We hereby accept your Change Estimate and agree that you should proceed with the preparation of a formal Change Proposal.

1. Title of Change: *[insert: **title**]*

2. Request for Change No./Rev.: *[insert: **request number / revision**]*

3. Change Estimate Proposal No./Rev.: *[insert: **proposal number / revision**]*

4. Estimate Acceptance No./Rev.: *[insert: **estimate number / revision**]*

5. Brief Description of Change: *[insert: **description**]*

6. Other Terms and Conditions:

In the event that we decide not to order the Change referenced above, you shall be entitled to compensation for the cost of preparing the Change Proposal up to the

amount estimated for this purpose in the Change Estimate Proposal, in accordance with GCC Clause 39 of the General Conditions of Contract.

For and on behalf of the Purchaser

Signed:

Date:

in the capacity of: *[state:* ***"Project Manager"*** *or* ***higher level authority in the Purchaser's organization*** *]*

8.4 Change Proposal Form

(Supplier's Letterhead)

Date: *[insert: **date**]*

Loan/Credit Number: *[insert: **loan or credit number from IFB**]*

IFB: *[insert: **title and number of IFB**]*

Contract: *[insert: **name of System or Subsystem and number of Contract**]*

To: *[insert: **name of Purchaser and address**]*

Attention: *[insert: **name and title**]*

Dear Sir or Madam:

In response to your Request for Change Proposal No. *[insert: **number**]*, we hereby submit our proposal as follows:

1. Title of Change: *[insert: **name**]*

2. Change Proposal No./Rev.: *[insert: **proposal number/revision**]*

3. Originator of Change: *[select: **Purchaser / Supplier**; and add: **name**]*

4. Brief Description of Change: *[insert: **description**]*

5. Reasons for Change: *[insert: **reason**]*

6. The System Subsystem, major component, or equipment that will be affected by the requested Change: *[insert: **description**]*

7. Technical documents and/or drawings for the requested Change:

Document or Drawing No. Description

8. Estimate of the increase/decrease to the Contract Price resulting from the proposed Change: *[insert:* ***amount in currencies of Contract*** *]*, as detailed below in the breakdown of prices, rates, and quantities.

   Total lump sum cost of the Change:

   Cost to prepare this Change Proposal (i.e., the amount payable if the Change is not accepted, limited as provided by GCC Clause 39.2.6):

9. Additional Time for Achieving Operational Acceptance required due to the Change: *[insert:* ***amount in days / weeks*** *]*

10. Effect on the Functional Guarantees: *[insert:* ***description*** *]*

11. Effect on the other terms and conditions of the Contract: *[insert:* ***description*** *]*

12. Validity of this Proposal: for a period of *[insert:* ***number*** *]* days after receipt of this Proposal by the Purchaser

13. Procedures to be followed:

    (a) You are requested to notify us of your acceptance, comments, or rejection of this detailed Change Proposal within *[insert:* ***number*** *]* days from your receipt of this Proposal.

    (b) The amount of any increase and/or decrease shall be taken into account in the adjustment of the Contract Price.

For and on behalf of the Supplier

Signed:

Date:

in the capacity of: *[state:* ***"Supplier's Representative"*** *or* ***other higher level authority in the Supplier's organization*** *]*

8.5 Change Order Form

(Purchaser's Letterhead)

Date: *[insert:* ***date*** *]*

Loan/Credit Number: *[insert:* ***loan or credit number from IFB*** *]*

IFB: *[insert:* ***title and number of IFB*** *]*

Contract: *[insert:* ***name of System or Subsystem and number of Contract*** *]*

To: *[insert:* ***name of Supplier and address*** *]*

Attention: *[insert:* ***name and title*** *]*

Dear Sir or Madam:

We hereby approve the Change Order for the work specified in Change Proposal No. *[insert:* ***number*** *]*, and agree to adjust the Contract Price, Time for Completion, and/or other conditions of the Contract in accordance with GCC Clause 39 of the Contract.

1. Title of Change: *[insert:* ***name*** *]*

2. Request for Change No./Rev.: *[insert:* ***request number / revision*** *]*

3. Change Order No./Rev.: *[insert:* ***order number / revision*** *]*

4. Originator of Change: *[select:* ***Purchaser / Supplier****; and add:* ***name*** *]*

5. Authorized Price for the Change:

   Ref. No.: *[insert:* ***number*** *]* Date: *[insert:* ***date*** *]*

[insert: ***amount in foreign currency A*** *]* plus *[insert:* ***amount in foreign currency B*** *]* plus *[insert:* ***amount in foreign currency C*** *]* plus *[insert:* ***amount in local currency*** *]*

6. Adjustment of Time for Achieving Operational Acceptance: *[insert:* ***amount and description of adjustment*** *]*

7. Other effects, if any: *[state:* ***"none"*** *or insert* ***description*** *]*

For and on behalf of the Purchaser

Signed:

Date:

in the capacity of: *[state:* ***"Project Manager"*** *or* ***higher level authority in the Purchaser's organization*** *]*

For and on behalf of the Supplier

Signed:

Date:

in the capacity of: *[state* ***"Supplier's Representative"*** *or* ***higher level authority in the Supplier's organization*** *]*

8.6 Application for Change Proposal Form

(Supplier's Letterhead)

Date: *[insert: **date**]*

Loan/Credit Number: *[insert: **loan or credit number from IFB**]*

IFB: *[insert: **title and number of IFB**]*

Contract: *[insert: **name of System or Subsystem and number of Contract**]*

To: *[insert: **name of Purchaser and address**]*

Attention: *[insert: **name and title**]*

Dear Sir or Madam:

We hereby propose that the below-mentioned work be treated as a Change to the System.

1. Title of Change: *[insert: **name**]*

2. Application for Change Proposal No./Rev.: *[insert: **number / revision]*** dated: *[insert: **date**]*

3. Brief Description of Change: *[insert: **description**]*

4. Reasons for Change: *[insert: **description**]*

5. Order of Magnitude Estimation: *[insert: **amount in currencies of the Contract**]*

6. Schedule Impact of Change: *[insert: **description**]*

7. Effect on Functional Guarantees, if any: *[insert: **description**]*

8. Appendix: *[insert:* ***titles*** *(if any); otherwise state* ***"none"*** *]*

For and on behalf of the Supplier

Signed:

Date:

in the capacity of: *[state:* ***"Supplier's Representative"*** *or* ***higher level authority in the Supplier's organization*** *]*