



CALCUTTA STATE TRANSPORT CORPORATION

45 Ganesh Chandra Avenue, Kolkata – 700 013

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Website: www.cstc.org.in

No: 002/260

Dated: 18-2-2015.

Request for Proposal (RfP) for implementation & Operation of Intelligent Transport Management System (ITS): 2nd Call.

2nd call inviting the Request for Proposal (RfP) for implementation and operation (for 5 years after commissioning) of Intelligent Transport Management System (ITS) for 632 UBS-2 buses of CSTC procured under JnNURM extended project, the document being modified as referred to above, is hereby notified with 3rd Corrigendum annexed hereto.

Relevant parts/ clause/ Sub-clause/Annexure will be deemed to have been further modified under the 3rd Corrigendum.

Submission of Bids (both Technical Bid and Commercial/Financial Bid) through e-tendering process and submission of hard copies of only Technical Bids will follow the time schedule as given in the table below.

Time Schedule

1.9	Last Date & Time of submission of Technical and Financial Bids through e-Tendering system	27.02.2015 , 12:00 Noon. Physical submission of Technical Bid at given address: 27-2-2015, 05:00 PM
1.10	Date of Presentation by the Bidders	28.02.2015, 11:00 AM
1.11	Opening of Technical bids for evaluation	28.02.2015, after 04:00 PM

1.12	Publishing of scores of Technical bids evaluation	03-03-2015, at 11:00 AM
1.13	Opening of Financial Bids	03.03.2015, at 02:00 PM.
	Other important information specified by the Tender Inviting Authority: <ol style="list-style-type: none"> 1. Sealed Bids received after due date and time will be summarily rejected. 2. In case of failure to submit bids on both the modes, e-Tendering mode as well as Physical mode, such bids will be summarily rejected 	

Documents under reference are available at: www.cstc.org.in. E-tendering will be executed through <https://wbtenders.gov.in>.

**Managing Director
CSTC.**

REQUEST FOR PROPOSAL

for

Selection of Implementation & Operating Agency (I&OA)

for

Implementation (Design, Development/ Procurement, Integration, Testing, Installation, Commissioning, Training etc.) and Operation of Intelligent Transport System (ITS) comprising Automated Fare Collection System (AFCS), Vehicle Tracking System (VTS) and Fleet Management System (FMS) for CSTC for five years

Issued by



Calcutta State Transport Corporation

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Table of Contents

Contents

1	Definitions	5
	Section-I: Tender Notice & Schedule of Events.....	9
	Section-II: Overview and Scope of Work	11
	2.1 Project Background	11
	2.2 Stakeholder benefits from the Project.....	12
	2.3 Project Management & Execution:.....	12
	2.4 Scope of Work of I &OA during Implementation:.....	13
	2.5 Scope of work of I&OA during Operations (after Commissioning):	14
	2.6 Indicative minimum quantities for CSTC operations to be covered under ITS:.....	14
	2.7 Expected Time schedule to complete the Project	17
	Section-III: Instructions to the Bidders	18
	3.1 General	18
	3.2 Earnest Money Deposit (EMD).....	18
	3.3 Right to Terminate the Process	19
	3.4 Submission of Bids.....	19
	3.5 Issuance of Corrigendum	20
	3.6 Legal Jurisdiction	21
	3.7 Conditions for Consortium.....	21
	Section-IV: Evaluation of Bids	23
	4.1 Project Management Committee (PMC).....	23
	4.2 Evaluation of Responsive Bids.....	23
	4.3 Criteria for Evaluation.....	24
	Section-V: Selection of I&OA and Payment of Project Cost	31
	5.1 Payment Schedule for Implementation	31
	5.2 Payment Schedule for Operations for 5 years (after Commissioning).....	33
	Section-VI: Forms	36
	Form - 1: Technical Bid Submission Letter.....	36
	Form - 2: Application for COMMERCIAL/FINANCIAL BID	37
	Form-3 : COMMERCIAL/FINANCIAL BID	39
	Section-VII: IT and Other Requirement (Indicative)	41

1 Definitions

1. **“Cashless or Automatic/ Centralized Fare Collection System”** means an Automatic Fare Collection (AFCS) system and it includes the collection of components like fare, media, devices to read/ write data, back office system for data analysis, etc. that automate the ticketing system of a public transportation network, basically an automated version of manual fare collection. The terms “Cashless Ticketing Solutions” or “Automatic Fare Collection System” and “Centralized Fare Collection System” are used interchangeably.
2. **“Agreement Period, Contract Period & Assignment Period”** shall have the same meaning wherever appearing in the RFP and it would mean different spans of period computed collectively.
3. **“Bid Process”** means the procedure explained in the RFP comprising the invitation to Bid, seeking and providing clarifications, Bid submission, Bid evaluation, short listing and award of contract. The process begins with the issue/download of the RfP document and shall conclude with the award of contract signified by the signature of the parties and furnishing of the Performance Guarantee.
4. **“Bid Security”** means the earnest money deposit (EMD) to be submitted by the Bidder along with the Bid in the amount prescribed in this RFP document.
5. **“Bid Submission Date”** shall mean the last date for submission of bids in hard as well as soft copies as specified in this RFP document.
6. **“Bid”** shall mean the proposal submitted by the bidder in terms of this RFP.
7. **“Bidder”** shall mean the sole bidder in case the Bid is submitted by an individual company. In case of Consortium, the term Bidder, unless and otherwise qualified shall mean Lead Member/ Prime Bidder only.
8. **“Consortium”** means all members that have come together and reached a legal agreement for the purpose of submitting the Bid against this RFP and complies with all the requirements of the Bid

Process.

9. **“Corporation or Purchaser” means CSTC.**
10. **“CPCP”** means Centralized Press for Concessional Passes Printing Section. Project implementing agency will arrange for the printing of personalized passes at CPCP. This will be located at some central location.
11. **“Go Live/ Date of Commercial Operation”** means the date on which the solution is fully implemented (as per the timelines mentioned in implementation plan) and ETMs are operational in all the buses identified and notified by CSTC in writing and a certificate of completion is obtained from all depot managers & CSTC HQ.
12. **“ICU”** means Integrated Control Unit, a device that establishes communication between the bus onboard AFC equipment and the backend equipment, using technologies like GPRS and Wireless LAN, etc. It also has a GPS module with which it determines its position and communicates it to backend.
13. **“IT Solution”** means deployment of information and communication technologies for delivery of information services efficiently as detailed in the functional and technical requirements of this RFP in **Section-VII.**
14. **“Lead Member”** means the consortium member company nominated by all members companies in case of a Consortium participating in and submitting the Bid who shall be responsible for execution of the project and to furnish the Bid Security and the Performance Security in case of award of the contract. .
15. **“PIS”** means Passenger Information System used in transport system.
16. **“Pre-Qualification”** means the process by which the bidders are first screened for their eligibility in terms of qualifying criteria stated in the Bid document. Financial Bids shall be taken into consideration only for those bidders who earn pre-qualification to implement the contract.
17. **“Project”** means the proposed initiative of CSTC to modernize and automate its fare collection system and information services comprising the design, development, financing, construction, operation

support and maintenance of the solutions based on functional specifications and technical requirements further elaborated in this RFP.

18. **"PTO/ STU"** means Public Transport Operator or State Transport Undertakings, an organization that operates public transport vehicles, for example, CSTC services in Kolkata city.

18. **"RFP"** refers to this Request for Proposals containing various sections, schedules and forms describing the Bid Process and the award of contract floated by CSTC for the purpose of soliciting valid offers from prospective and qualified companies to act as the Implementation and Operations Agency (I&OA) for CSTC, Kolkata.

19. **"Selected Bidder"** shall mean the Bidder who has emerged as preferred bidder in terms of this RFP and has been issued the Letter of Acceptance (LoA) by CSTC.

20. **"Similar Project"** means a Project for Automatic Fare Collection System, Vehicle Tracking network and display and other components of Intelligent Transport System implemented in any PTO/ STU for buses/ metros.

21. **"Transaction"** means a successful issuance of ticket to a commuter through ETM or Validation of Smartcard including passes at ETM. A complete transaction would require both Tap in and Tap out (Check in and Checkout/ Validate in and Validate out) at ETM in a single journey. The transaction does not include issuance of pre printed tickets (PPT).
22. **"VTS"** means Vehicle Tracking System in vehicles, etc.
23. **"ITS"** means Intelligent Transport System(s).
24. **"SRTU"** means a Government's Transport Department/Development authority operated State Road Transport Unit like CSTC.
25. **"OEM"** means Original Equipment Manufacturers.
26. **Recovery Point Objective (RPO):** The point beyond which data loss is not permissible. It will act as the basis for the development of appropriate backup/ Disaster Recovery (DR) strategies. This is maximum permissible timeframe for data loss.
27. **Recovery Time Objective (RTO):** The time within which the Systems/ Applications/ Functions must be recovered after an outage. It will act as a basis for the development of suitable Disaster recovery (DR) strategies. This is maximum permissible downtime for a system.

Section-I: Tender Notice & Schedule of Events

1.1	Name of the Work	Implementation (Design, Development/Procurement, Integration, Testing, Installation, Commissioning, Training etc.) and Operation of Intelligent Transport System (ITS) comprising Automated Fare Collection System (AFCS), Vehicle Tracking System (VTS) and Fleet Management System (FMS) for CSTC for five years
1.2	Tender Reference No.	002-260/ITS, dated 18-02-2015.
1.3	Language of Bid proposals	English Only
1.4	Contact Person and Office details	Director of Operation, Calcutta State Transport Corporation, Central Traffic Office, 45, Ganesh Chandra Avenue, Kolkata - 700 013, West Bengal Phone: 033 2237 1212-15. Fax: 033 2236 4477 E-mail: cstc.jnnurm@gmail.com Website: www.cstc.org.in
1.5	Cost of RFP document, Earnest Money Deposit (EMD) and Performance Bank Guarantee (PBG)	<ul style="list-style-type: none"> • RFP document downloaded from the website may be used by the Bidder. However, a Bank Draft of Rs. 5000/- (Rupees Five thousand only) is to be enclosed with the Bid towards the cost of the document. • The Bidder shall furnish, as part of its bid, EMD of Rs. 5,00,000/- (Rupees five lakh only) in the form of Bank Draft drawn on any Nationalized/Scheduled Bank in favour of Calcutta State Transport Corporation payable at Kolkata. • The Bidder selected as I&OA shall furnish a revolving Performance Bank Guarantee (PBG) of Rs. 50,00,000/- (Rupees fifty lakhs only) or 10% of the awarded Project value, whichever is higher, towards Performance Security, in addition to the EMD, within 15 days of issuing LOA and before signing of contract.
1.6	Validity of submitted Bid proposals	Bid proposals must remain valid for minimum 120 days after the bid submission date

1.7	Date of publication of RFP document	19.02.2015
1.8	Date of receiving Pre-bid queries, if any	23.02.2015
1.9	Last Date & Time of submission of Technical and Financial Bids through e-Tendering system as well as Physical submission of Technical bids only	27.02.2015 , 12:00 Noon Physical submission of Technical Bid at given address on 27-2-2015 before 5:00 PM.
1.10	Date of Presentation by the Bidders	28.2.2015, 11:00 AM
1.11	Opening of Technical bids for evaluation	28.2.2015, after 04:00 PM
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	Other important information specified by the Tender Inviting Authority:	
	3. Sealed Bids received after due date and time will be summarily rejected.	
	4. In case of failure to submit bids on both the modes, e-Tendering mode as well as Physical mode, such bids will be summarily rejected	

Section-II: Overview and Scope of Work

2.1 Project Background

Calcutta State Transport Corporation (CSTC) has been in the process of rolling out of 632 fleet of ultra premium low floor AC and Non-AC buses under JNNURM 1 (extended) Project to operate it in Kolkata Metropolitan Areas, for which CSTC has been declared by the Government as the Principal Public Operator (PPO) in the field of public transport. Most of the fleet strength has already been placed on road in different routes. Remaining buses are expected to be delivered by March 2015. CSTC intends to introduce an advanced integrated system for operation and management of these buses not only to match with the modern luxury fleet but also to cater to greater public convenience and serve larger public interest particularly for its customers and commuters. The proposed project is intended to be executed in two phases consisting of various components. However, final deliverable/outcome of the project shall be an Integrated Intelligent Transport System (ITS) through seamless integration of various components from both the phases. Thus, the Project includes the following sub-systems, intended to be commissioned in two phases:

- **Phase – I:** Main component of Phase-I of the project will be a **Cashless Ticketing Solution(CTS)/Automated Fare Collection System (AFCS)** to facilitate payment of bus fare by the passengers electronically using prepaid rechargeable cards on-board. Prepaid cards recharge facility is to be provided in various modes for greater convenience of the passengers such as Online (through Net banking/Credit/Debit/e-Wallet/e-Purse etc.) as well as Offline modes across the counters/POS etc.

- **Phase – II:** Phase-II will consist of two main components:
 - i) **Vehicle Tracking System (VTS)** – Automatic Vehicle Location Tracking for passengers and other stakeholders through modes such as Mobile apps, Computer Information Systems/Web Portals, Displays at selective locations (Central Control Station, Bus Terminals/Depots etc.). Will also include computer aided tools for route optimization etc.
 - ii) **Fleet Management System (FMS):** Automated fleet management system including Vehicle self diagnosis with sensors, Auto alerts for maintenance etc., Incident management for Breakdowns and Despatch of SOS teams, Peak hour management/Travel demand management etc.

2.2 Stakeholder benefits from the Project

- a. **Commuters:** Electronic ticketing through Smart cards will provide cashless convenience for passengers to commute by CSTC buses with variety of options for receiving and recharging pre-paid cards. Real-time tracking of buses through mobile phones or public displays will provide information for passengers' convenience as well as day-to-day time management and planning.
- b. **In-Vehicle Crew:** Convenience to crew through seamless communication and connectivity between driver and control room/ specific officials. Automated ticketing with stage based tickets and use of smart card with real-time update of data on centralized system to facilitate financial reconciliation for crew convenience.
- c. **Operation Managers:** Depot Manager/Dy. Traffic Manager /Asth. Traffic/ Traffic Inspectors will be able to monitor the entire fleet operations efficiently through a web based solution with help of alerts about service quality non-adherence, functioning of equipments and revenue reports, facilitating follow up action. Provide standard MIS reports, including exception reporting and BI analytical tools (with map, chart and text displays) to support all levels of management in decision-making.
- d. **CSTC Management:** Web-enabled, Dashboard-driven operations and revenue data for the top management to support effective management and decision-making through dynamic and text based reports, graphs and charts and other standard MIS reports to give a snapshot view to CSTC management on daily, weekly, monthly, quarterly, half-yearly and yearly performance.
- e. **Society:** Reduction in personal vehicles with enhanced utilization of Public transport infrastructure; positioning CSTC as a credible transport operator to improve general urban mobility.

2.3 Project Management & Execution:

- a. CSTC will implement different phases of the project through its Project Management Committee (PMC) with the assistance and under over-all guidance of Government of India and Government of West Bengal. The selected bidder will play a crucial and important role of Implementation & Operating Agency (I&OA) under PMC following prescribed IT and

other requirements during implementation as well as operating the integrated system after commissioning of the same in both stages for a period Five (5) years after actual commissioning.

- b. The selected I&OA will implement, own, maintain and operate the project under contract for a period of Five (5) years, and finally transfer it to CSTC after the prescribed period of its successful operation.

2.4 Scope of Work of I &OA during Implementation:

- a. I&OA shall be solely responsible for **Design, Development including Procurement and Systems Integration, Installation, Commissioning of all components of both phases of the project (CTS/AFCS, VTS, FMS etc.) as well as Training of various Stakeholders including concerned CSTC officials and personnel** on commissioned system.
- b. I&OA shall carry out smooth implementation and operations of the envisaged system by deploying adequate number of competent IT and other professionals with expertise and experience in implementation and operations of similar type of work under close supervision of CSTC management.
- c. I&OA shall ensure compliance of all minimum IT and other functional requirements of the Project as proposed in **Section-VII**. I&OA may always propose up-gradation of the system requirements, if necessary to meet various objectives of the project.
- d. I&OA shall ensure the quality and quantity of work implemented complying with latest national/international industry norms and standards.
- e. I&OA shall undertake trial-runs of phase-wise implementation in coordination with CSTC and arrange hand-holding and training of concerned officials of CSTC for its smooth operation.
- f. I&OA shall submit weekly/monthly/quarterly project review reports vis-à-vis project schedule and project finance (Reporting of Physical as well as financial progress of the project) to CSTC.
- g. I&OA shall prepare and submit a feasibility plan for the future scalability and sustainability of the system.
- h. I&OA shall also develop and prepare Miscellaneous periodic reports for reporting progress of project implementation and operations, as and when required by CSTC.
- i. The scope of work includes concurrently all items and components as provided under **clause 1.2 of Section VII** of this document. Any contradiction between the two may be reconciled with to attain the objectives of the Project under best possible architecture.

- j. On receipt of LOA, the I&OA shall submit a DPR based on the RFP Document and in conformity with the financial quotes made. The said DPR shall be part of the Agreement to be executed in terms of Section – V of this document.

2.5 Scope of work of I&OA during Operations (after Commissioning):

- a. I&OA shall **Operate, Maintain and Manage the implemented ITS for a minimum period of Five (5) years under the overall supervision of CSTC**
- b. I&OA shall ensure compliance with the Contract and Service level agreements pertaining to all components of the implemented ITS
- c. I&OA shall be solely responsible for maintenance/upgrade etc. of all Components and Equipments (both Developed by I&OA as well as Procured from OEMs) of the implemented project for the Operations period of 5 years. I&OA shall carry out OEM vendor management on behalf of CSTC in maintenance of the implemented ITS during this period.
- d. I&OA shall conduct regular as well as need-based Trainings and Hand-holding exercises for concerned CSTC officials and personnel involved in the Operations and Management of the ITS during this Operations period of 5 years
- e. I&OA will periodically conduct Gap analysis in terms of Performance, Reliability and Efficiency of the implemented ITS in coordination with CSTC and will implement corrective measures to fill up those gaps to achieve ultimate goals of the project
- f. I&OA shall prepare and submit periodic reports on Monitoring and Evaluation of the ITS Operations for close monitoring and decision-making by the CSTC management, as and when required during the period of 5 years’ Operations and Management
- g. On completion of Operating period of Five (5) years, I&OA shall ensure Smooth hand-over and Exit management of the Operations and Management along with all documentation (OEM to the CSTC or any agency/body authorized by CSTC to take over.

2.6 Indicative minimum quantities for CSTC operations to be covered under ITS:

S. No.	Item/Parameter	Qty	Remarks/Description
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1	Total no. of Buses to be covered under the ITS project	632	Volvo, Ashok Leyland and Tata buses with UBS-2 specifications (234 AC, 398 Non-AC buses)
2	Total No. of major Bus Stops	1000 (Approx.)	
3	Total No. of major Bus Stops/ Terminus requiring LED based PIS display	40 Bus stops/ Terminus	
4	Total no. of Bus Terminus/Depots to be covered under the project	Bus Terminus-40 Depots-10	
5	Total no. of Point of Sale (POS) required for across the counter prepaid cards delivery	40	Location of POS (Bus Depots/Terminus/Offices etc)
6	Minimum no. of ETMs required	900	To be used on 632 buses by conductors + inspectors for random inspections
7	Approx. estimated no. of Ticketing Transactions/ Ticket revenue per bus	Rs. 5000-6000 per day	Approx. no. of Transactions may be estimated per bus per day on average
8	Scalability required	15% of current estimate	In terms of all transactions (AFCS, VTS/PIS, FMS etc.)
9	Total no. of CSTC personnel/ officers to be trained on respective ITS operations	Drivers:1900 Conductors:1900 Depot managers & personnel:23 Traffic	Drivers and Conductors on ETM operations etc. Depot/Traffic managers and personnel on POS, Fleet management, Operations

managers:20

Control Centre etc.

Higher
officials:30

Higher officials/CSTC
management: Overall
Administration and
management, MIS,
Operations Control Centre
etc

10 No. of routes (appx) covered

AC routes-29

Non-AC routes-
70

2.7 Expected Time schedule to complete the Project

The expected time schedule for the completion of the key tasks after Signing of Contract for the project is given below:

S. No.	Project Task	Maximum permitted time	Remarks
1.	Project Kick-off meeting	T1	Where T1 = within 7 days from the Date of Signing of Agreement
2.	(Phase-I implementation) Design, Supply, Installation, Integration and Commissioning of all components of AFCS including necessary Hardware/software/ networks at Data Centre, POS, Fleet etc.	T2=T1 + 4 months	Partial implementation of Data Centre/Control Center may be carried out to cater to fulfil requirements of AFCS system operations.
3.	(Phase-I implementation) AFCS Trainings to all concerned stakeholders on respective systems	T3=T2 + 2 months	Trainings may be arranged in various batches for different group of officers/personnel. Repeat monthly trainings may be given initially
4.	(Phase-II implementation) Design, Supply, Installation, Integration and Commissioning of all components of VTS/Fleet Management System etc. including necessary Hardware/software/ networks at Data Centre, Depots, Bus stops, Terminus, CSTC offices, Fleet etc.	T4=T1 + 6 months	To be executed parallel to Phase-I implementation
5.	(Phase-II implementation)	T5=T4 + 2 months	

Trainings to all concerned stakeholders on respective systems

6. **Successful and error-free operations for at least 3 months uninterruptedly with regard to complete project of ITS including Handholding, Necessary support, Bug-fixing etc.** $T6 = T5 + 3 \text{ months}$

Overall Expected Timeline $T = T1 + 11 \text{ months}$

Section-III: Instructions to the Bidders

3.1 General

- a. While every effort has been made to provide comprehensive and accurate background information and requirements and specifications, Bidders must form their own conclusions about the solution needed to meet the requirements.
- b. All information supplied by Bidders may be treated as contractually binding on the Bidders, on successful award of the assignment by CSTC on the basis of this RFP
- c. No commitment of any kind, contractual or otherwise shall exist unless and until a formal written contract agreement has been executed by or on behalf of the CSTC. Any notification of preferred bidder status by the CSTC shall not give rise to any enforceable rights by the Bidder. Tendering authority (CSTC) may cancel this public procurement at any time prior to a formal written contract being executed by or on behalf of the CSTC.

3.2 Earnest Money Deposit (EMD)

- a) Unsuccessful Bidder's EMD will be discharged / returned after finalization of contract with the selected bidder. No interest will be paid by the CSTC on the EMD amount.
- b) 3.2.3 The EMD may be forfeited if:

- i) a Bidder withdraws its bid during the period of bid validity specified in the **Section-I (S.No 1.6)** of the RFP; or
- ii) a Bidder is found to have submitted false particulars / fake documents; or
- iii) a Bidder is found to have indulged in corrupt practices or manipulation of rates by cartelization; or
- iv) in the case of a successful Bidder, if the Bidder fails to sign the contract within 15 days of issuance of Letter of Acceptance (LOA) by CSTC or fails to furnish Performance Bank Guarantee (PBG), in accordance with clause. 1.5 of Section-I above.

3.3 Right to Terminate the Process

- a. CSTC may terminate the RFP process at any time and without assigning any reason. CSTC makes no commitments, express or implied, that this process will result in a business transaction with anyone.
- b. This RFP does not constitute an offer by CSTC. The bidder's participation in this process may result in CSTC selecting the bidder to engage towards execution of the contract.

3.4 Submission of Bids

- a. Both Technical and Commercial Bid along with formats and documents required are to be submitted concurrently, duly digitally signed in the e-Tendering website <https://www.wbtenders.gov.in>
- b. All electronic documents must have Digital signature of the bidder, wherever required in the proposal and supporting documents
- c. Technical Bids have to be submitted both Electronically through e-Tendering system as well as Physically in sealed covers within stipulated period at the Contact address provided in **Section-I**. Physically submitted Technical Bids shall be true copy of the documents submitted electronically and shall also contain the following:
 - i. RFP document including the annexed forms, shall be duly filled in and signed by the authorized signatory on behalf of the bidder at the bottom of every page of the document as a token of acceptance of the terms and conditions and other information provided in the RFP
 - ii. One Bank Draft of the value of RFP document and another of Earnest Money Deposit (EMD), both payable at Kolkata and drawn in favour of Calcutta State Transport Corporation

- iii. Notarized Power of Attorney executed by the Bidder in favour of the duly Authorized Representative, certifying him as an authorized signatory for the purpose of this RFP in prescribed format.
 - iv. Documents in support of the parameters as laid down in **Clause 6.3 of Section – I.**
 - v. Undertaking in prescribed format.
 - vi. Any other information/documents if asked for by CSTC before last date of submission of Bids.
- d. All the pages of the proposal must be sequentially numbered and must contain the list of contents with page numbers
 - e. The Financial Bid shall be submitted only electronically through e-Tendering system. It should clearly indicate the price to be charged without any qualifications whatsoever and should include all taxes, duties, custom, excise, service tax, fees, levies, works contract tax and other charges as may be applicable in relation to the activities proposed to be carried out. It is mandatory that such charges wherever applicable should to be indicated separately. In case the taxes are not mentioned separately, the amount so mentioned would be deemed as inclusive of taxes.
 - f. A Financial proposal submitted with an adjustable price quotation or conditional proposal shall be treated as non-responsive and the bid shall be rejected summarily.
 - g. Financial or Commercial Bids shall be in three parts: Part – I for the work under Phase – I of the Project, Part – II for the remaining phase of the Project (Phase II), and Part – III for the operation of ITS for 5 years.
 - h. Financial Bids shall be in the absolute value in INR against the actual project implementation. Format of Financial Bid is provided in **Section – V of this document.**

3.5 Issuance of Corrigendum

- a. At any time prior to the last date of submission of bids, the CSTC, may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify/add/delete any portion of the RFP Document by issuance of a Corrigendum, which would be published on the website <https://www.wbtenders.gov.in> and will be notified through website of CSTC and would be binding on all Bidders. It shall not be mandatory for the CSTC to disclose the reasons for this change. The amendments would also be notified through e-mail to the Bidders, who have purchased RFP document.
- b. In order to provide prospective Bidders reasonable time to take the Corrigendum into account in preparing their bids, the CSTC may, at its discretion, extend the last date for the submission of Bids.

- c. CSTC may at any time during the tendering process, request the Bidder to submit revised Technical / Financial Bids and/or Supplementary Financial bids without thereby incurring any liability on the CSTC to the affected Bidder or Bidders before opening of the Financial bids.
- d. CSTC will reject a proposal for the award of Contract if it determines that the bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract.
- e. The CSTC will declare a firm ineligible, either indefinitely or for a stated period of time, for awarding a contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, this contract.

3.6 Legal Jurisdiction

All disputes will have the jurisdiction of the courts in Kolkata and shall be governed by appropriate laws in India.

3.7 Conditions for Consortium

- **Maximum three members** are allowed in a Consortium including the Lead/Prime Bidder.
- All Consortium partners must be company/ firm incorporated and registered either in India or country of origin for at least 7 years as on last date of submission of bids (Supporting documents required - Certificate of incorporation/ registration)
- All Consortium partners should have been in respective ITS Operations (Software development, System integration, Network communications, Smart cards, Payment solutions, AFCS/VTS/FMS etc) for a period of at least 5 years as on last date of submission of bids (Supporting documents required - Copies of work orders/ agreements)
- Following other supporting documents will be required from all Consortium members,
 - a) Copy of the Sales Tax registration certificate
 - b) Copy of Service Tax registration certificate
 - c) Copy of the PAN Card issued by CBDT, Department of Income Tax, Govt. of India
 - d) Copy of Income Tax return for the last three years.
- The consortium agreement signed should legally bind all partners/members. The agreement is required on Stamp paper and should be notarized. Copy of the agreement entered into by the partners shall be submitted with the Bid.
- One of the members/partners shall be nominated by the consortium as the Lead Bidder, and this authorization shall be evidenced by submitting a Power of Attorney signed by legally authorized signatories of each member/partner
- The lead bidder shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the consortium, and the entire execution of the Contract.
- All the members/partners of the consortium 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 agreement.

- The consortium agreement shall indicate precisely the responsibility of all members in respect of planning, design, equipment, key personnel, work execution and financing of the project. All the members should have active participation during the tenure of the contract. This shall not be varied/ modified subsequently without prior approval of the CSTC with reason for change with supporting documentation
- During the bidding process or period of the contract, if any member of the successful bidder/consortium partner has submitted any false information/documentation even after the award the contract shall lead to termination with immediate effect and the security money will be forfeited

Section-IV: Evaluation of Bids

4.1 Project Management Committee (PMC)

- a. CSTC has constituted a PMC of competent officials to evaluate the responses of the bidders
- b. The PMC shall evaluate the responses to the RFP and examine all supporting documents / documentary evidence. Inability to submit requisite supporting documents / documentary evidence, may lead to rejection.
- c. The decision of the PMC in the evaluation of responses to the RFP shall be final. No correspondence will be entertained outside the process of negotiation/ discussion with the Committee.
- d. The PMC may ask for meetings with the Bidders to seek clarifications on their proposals
- e. The PMC reserves the right to reject any or all proposals on the basis of any deviations.
- f. Each of the responses shall be evaluated as per the Evaluation criteria specified in the **Clause 4.3 of this Section below.**

4.2 Evaluation of Responsive Bids

- a. Initial Bid scrutiny will be held and incomplete details as given below will be treated as non-responsive, if Proposals:
 - Are not submitted in as specified in the RFP document
 - Received without the Letter of Authorization (Power of Attorney)
 - Are found with suppression of details
 - With incomplete information, subjective, conditional offers and partial offers submitted
 - Submitted without the documents requested in the RFP
 - Have non-compliance of any of the clauses stipulated in the RFP
 - With lesser validity period than specified in this RFP
- b. Non-responsive bids will be rejected and no further evaluation will be carried out for such bids
- c. Only responsive Bids will be considered for further evaluation as below.
 - CSTC will prepare a list of responsive Bidders, who comply with all the Terms and Conditions of the Tender. All eligible bids will be considered for further evaluation by the PMC, according to the Evaluation Criteria defined in **Clause 4.3 of this Section below.**
 - The decision of the PMC will be final in this regard.

4.3 Criteria for Evaluation

- a. Evaluation of the Bids (Technical and Financial both) shall be undertaken and a panel of bidders shall be prepared by the PMC for selection of highest evaluated Bidder either for the first phase or for both the phases of the Project by CSTC.
- b. **Technical Evaluation:** Technical score will be evaluated using Technical bids out of total score of 100. **Minimum score required for Technical qualification is 60. Only Technically qualified bids (with score equal to or more than qualifying score) shall be considered for Financial bid evaluation.** Technical evaluation criteria is as follows:

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
1.	ORGANIZATIONAL STRENGTH		20	
	Average turnover from similar projects in India (i.e. revenue should be on account of Similar projects involving Design, Supply, Integration, Installation, Commissioning, Operations and Maintenance of Hardware/ IT infrastructure, System integration and associated Maintenance services for an Intelligent Transport Systems (ITS) etc. in last 3 years	<ul style="list-style-type: none"> Less than 2.0 Crore: 0 marks Between 2.0 Crore & 3.5 Crore (including both) : 3 marks Greater than 3.5 Crore & Less than 5 Crore: 6 marks Greater than 5 Crore & Less than 10 Crore: 8 marks Greater than and including 10 Crore: 10 marks 		<ul style="list-style-type: none"> Extracts from the audited Balance sheet and Profit & Loss; <p>OR</p> <ul style="list-style-type: none"> Certificate from the statutory auditor

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
	(Turnover in Rs Crores) In case of Consortium, Average Turnover of only Prime Bidder/ Lead member for last 3 years will be considered for evaluation of this criteria			
	Full-time professional (Technical/Engineering, Managerial, Other required professionals) staff engaged in Similar projects (Number of Staff)	<ul style="list-style-type: none"> • Less than 10: 0 marks • Between 10 & 25 (including both) : 3 marks • Greater than 25 & Less than or including 50: 6 marks • Greater than 50 & Less than 100: 8 marks • Greater than or Equal to 100: 10 marks 		A self-certification from authorized signatory/ authorized HR Department official of the bidder along with details such as No. of such professionals on company payroll, Their minimum and highest qualifications, Organizational structure etc.
2.	RELEVANT PAST EXPERIENCE		30	
	No. of similar ITS Projects with minimum Order value of Rs. 2.00 Crore involving implementation of IT enabled Cashless Ticketing Solutions/ Automated Fare Collection Systems/ Integrated Fleet Management System/ Vehicle Tracking systems etc. for SRTU clients in India as on 19 th Feb, 2015 in last 5 years	<ul style="list-style-type: none"> • Nil projects (Marks: 0) • 1 Project (Marks: 5) • 2 Projects (Marks: 10) • 3 Projects (Marks: 15) • >= 3 Projects (Marks: 20) 	20	<ul style="list-style-type: none"> • Completion Certificates from the client for work order completed OR • Work Order + Phase Completion Certificate (for ongoing projects) from the client OR • Work Order + Self

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
				Certificate of Completion (Certified by the Statutory Auditor)
	<p>No. of similar ITS Projects with minimum Order value of Rs. 3 Crore involving implementation of IT enabled Cashless Ticketing Solutions/ Automated Fare Collection Systems/ Integrated Fleet Management/ Vehicle Tracking systems etc. for Non-SRTU clients in India or for Foreign Transport authorities/ Private Transport operators etc. as on 19th Feb, 2014 in last 5 years</p>	<ul style="list-style-type: none"> • Nil projects (Marks: 0) • 1 project (Marks: 3) • 2 projects (Marks: 6) • 3 projects (Marks: 8) • > 3 Projects (Marks: 10) 	10	<ul style="list-style-type: none"> • Completion Certificates from the client for work order completed OR • Work Order + Phase Completion Certificate (for ongoing projects) from the client OR • Work Order + Self Certificate of Completion (Certified by the Statutory Auditor)
3	RESOURCE COMPETENCE		30	
3.1	No. of the relevant Resources on Company payroll proposed for the project implementation and management (minimum 6	<ul style="list-style-type: none"> • Less than 6 Resources: 0 marks • Any no. of resources without a Project 	10	List of resources with their proposed role/ position in the project such as

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
	Resources experienced in similar projects including a Project Manager required)	Manager: 0 marks <ul style="list-style-type: none"> • Between 6 and 10 Resources (including both): 5 marks • Greater than 10 and less than 15 resources: 8 marks • 15 or More resources: 10 marks 		Project Manager/ Hardware engineer/ Software engineer/ Vehicle Tracking expert / Fare Collection System expert/Payments & Fund management expert/ Fleet Management expert etc.
3. 2	<p>Experience of the resources proposed (Project Manager: minimum 10 years of experience with at least 2 projects of similar nature)</p> <p>(Experts in other areas (Hardware, Software, Vehicle tracking, Bus control systems, Fleet management, Automated Fare collection systems/ Smart Cards/ Payment solutions etc.)):</p> <p>Minimum 4 years of experience in their respective area of expertise with at least 2 projects of similar nature)</p>	<p>For, Project manager</p> <ul style="list-style-type: none"> • Less than 2 projects: 0 marks • Between 2 and 3 projects (including): 3 marks • More than 3 projects: 5 marks <p style="text-align: center;">+</p> <p>For Experts in other areas,</p> <ul style="list-style-type: none"> • Less than 2 projects: 0 marks • Between 2 and 3 projects (including): 3 marks • More than 3 projects: 5 marks 	10	CVs

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
3. 3	Qualification of the resources proposed	<p>Each proposed resource will be evaluated as follows for his/her qualification:</p> <ul style="list-style-type: none"> • Technical Graduate (BE/ B.Tech/ MCA etc.): 1 mark per resource • Technical/Management Postgraduate Degree/ Diploma holder (MTech/ME/MBA/PGDB M/PGDCA etc): 2 marks for each resource <p>(If total marks exceeds the maximum score, score will be limited to maximum marks)</p>	10	CVs
4	PRESENTATION		20	
	Demonstration of understanding and grasp of the System requirements of proposed project and past experience on similar assignment	<p>Full understanding of the Detailed Solution and Functional architecture of the components proposed : (Out of 5 Marks)</p> <p>+ Demonstration of past experience on similar assignment with Approach adopted, Solution architecture, Challenges faced and overcome and current Status of that project (Out of 5 marks)</p>	10	Self certified presentation and supporting documents
	Project Implementation Approach to perform this assignment along with Proposed Project Plan and Schedule	Project Implementation Plan including Project Schedule, Quality control plan and Risk	10	Self certified presentation and supporting documents

No	Criteria	Basis for valuation	Max Marks	Supporting Documents
	including Proposed IT Hardware/ Software systems, Proposed ITS System Architecture including all components of CTS/AFCS/VTS/FMS etc., System Integration, Installation and Commissioning plan including Trial runs, Training plan, Operations and Maintenance plan etc.	Mitigation – (out of 5 marks) + Proposed IT Hardware/ Software solutions including proposed ITS Architecture including all components of CTS/AFCS/VTS/FMS etc., System Integration, Installation and Commissioning plan including Trial runs, Training plan, Operations and Maintenance plan etc.– (out of 5 marks)		
Total Marks			100	

c. Minimum Technical qualifying score is 60. Financial bids of Bidders scoring less than 60 will not be considered for Bid Evaluation

d. Financial bids of only technically qualified bidders shall be opened and Bidder with Lowest Quotation (L1) will be adjudicated as the Best Value Bidder for award of the project.

e. Evaluation of Bids made finally by PMC shall be final and CSTC shall not be liable to make further clarification in relation to evaluation and scoring. Panel of the finally evaluated Bids shall be prepared by the PMC in a sequence of L1, L2, L3 and so on.

f. The provisionally selected L1 bidder will be bound to furnish estimates on his quotes to CSTC containing major heads such as:

- Cost of Material such as various Hardware, Software, Network systems for Data Center, Field and Fleet with item name, rate and qty etc.
- Cost of installation, integration and commissioning of all hardware and software systems etc.
- Cost of Training etc.
- Cost of Manpower deployment etc.

Section-V: Selection of I&OA and Payment of Project Cost

1. On completion of bidding process to the satisfaction of CSTC Letter of Acceptance (LOA) will be issued in favour of the selected Bidder who shall be responsible to execute Agreement within 15 days of issue of the LOA, unless the time period is extended.
2. The selected Bidder shall furnish Performance Security in the form of Bank Guarantee as provided herein above and also submit Detail Project Report based on relevant parts of this document prior to execution of the Agreement. The selected agency shall, after execution of the Agreement, be known as the Systems Integrator (SI) and the Implementation and Operating Agency (I&OA) for implementation of the Intelligent Transport Management System (ITS) Project and operation thereof for five years after commissioning of the complete Project.
3. Payments to Implementation & Operations Agency will be made on pro-rata basis and will be linked with the milestones of the project implementation.

5.1 Payment Schedule for Implementation

* **Total Value = (Value for Phase-I + Value for Phase-II)**, where Phase-I is implementation of CTS/AFCS and Phase-II is implementation of VTS and FMS etc.

S. No	Milestone	% of Total Value *	Basis of approval
1.	Signing of the Contract Agreement/ Master Service Agreement for the project	5%	Mobilization advance on signing of the Contract
2.	Design of all the components of the ITS to be implemented in both the phases (Submission of System Architecture diagrams, High Level Design and Low Level Design documents etc.)	5%	Minutes of meeting of PMC approving Design documents of the project
3.	Successful Supply, Installation, Integration and Commissioning of all necessary Hardware/Software, ETMs, Networking and Trainings etc. on all the Buses designated by CSTC for the project	5% [or 40% of the value of Phase – I]	Minutes of meeting of the PMC approving the same *Will be paid on pro-rata basis per Bus in case of partial/phase-wise implementation of this milestone
4.	Successful Readiness and Commissioning of all Sites (Central Control Room, CSTC	10%	Minutes of meeting of the PMC approving the

S. No	Milestone	% of Total Value *	Basis of approval
	Offices, Bus Terminals/Depots, POS etc.) with necessary Supply, Installation and Integration of IT Hardware/Software, Networking equipments, Prepaid cards etc. i.e. <ul style="list-style-type: none"> - Site Preparation - Hardware - Software - Networks - POS and Smart cards - Trainings 		same *Will be paid on pro-rata basis per Site in case of partial/phase-wise implementation of this milestone
5.	Successful supply, installation, integration and commissioning of the IT Server Hardware/Software, Networking etc. at Data Centre including: <ul style="list-style-type: none"> - Integration with Bus hardware (ETMs, GPS etc.) - Integration with Prepaid card/Cashless system and POS etc. - Integration with Fund Management and Payment Solution platforms - Integration with systems commissioned at various CSTC offices, Bus Terminals/Depots etc. 	15% [or 25% of the value of Phase – I]	Minutes of meeting of the Apex Committee approving the same
6.	Successful Trainings to concerned CSTC Officials and Personnel on system components of their Responsibility (CSTC Management/Higher officials, Bus Depot Managers, Finance personnel, Traffic Supervisors, Bus Drivers and Conductors etc.)	10% [or 10% of value of Phase – I]	Minutes of meeting of the PMC approving the same *Will be paid on pro-rata basis per Person trained in case of partial/phase-wise implementation of this milestone
7.	Successful commissioning and launch of all components of ITS with at least 25% of the Designated Buses	10%	Minutes of meeting of the PMC approving the same

S. No	Milestone	% of Total Value *	Basis of approval
8.	Successful launch of all components of ITS with at least 50% of the Designated Buses	10%	*Will be paid on pro-rata basis per Bus in case of partial/phase-wise implementation of the milestone
9.	Successful launch of all components of ITS with at least 75% of the Designated Buses	10%	
10.	Successful and error-free operation for at least 3 months uninterruptedly with regard to commissioning and complete project of ITS from the date of complete commissioning.	10%	
11.	Successful and error-free operation for 12 months uninterruptedly with regard to commissioning and complete project of ITS from the date of complete commissioning.	Remaining amount.	
	Total	100%	

5.2 Payment Schedule for Operations for 5 years (after Commissioning)

** Total Value = (Value for Operations and Management for 5 years)

S. No	Milestone	% of Total Value **	Basis of approval
1.	Quarterly payment for successful Operations and Management of the implemented ITS system for 5 years	4.5% per quarter (18% per year)	Approval from PMC based upon various Reports
2.	Successful Hand-over and Exit	10%	Approval from PMC

S. No	Milestone	% of Total Value **	Basis of approval
	management of the project to CSTC after 5 Years		
	Total	100%	

Section–VI: Forms

Form - 1: Technical Bid Submission Letter

To

**Managing Director
Calcutta State Transport Corporation
CTO, 45 Ganesh Chandra Avenue
Kolkata 700013**

Sir,

Sub: Response to the **Request for Proposal for selection as Implementation and Operation Agency for the project of Intelligent Transport System of CSTC.**

Ref: **RFP No.** _____ **dated** _____

We, the undersigned Bidders, having read and examined in detail all the RFP/ bidding documents in respect of Request for Proposal (RFP) for **Implementation and Operation Agency for the project of Intelligent Transport System of CSTC buses**, do hereby apply for our engagement by CSTC and propose to provide our bidding proposal submitted by us.

.1. NO DEVIATIONS

We declare that all the services shall be performed strictly in accordance with the RFP documents and we agree to all the terms and conditions in the RFP. We have not taken any deviations in the Scope of work, Terms and Conditions, Functional Requirement Specifications and Technical Specifications.

Further, we confirm that we have not mentioned any additional conditions, assumptions and if any, found in the Proposal documents shall not be given effect to.

2. QUALIFYING DATA

We confirm having submitted the information as required by you during the previous stage of Expression of Interest as Qualification Criteria. We also enclose a list of the key persons with their qualification and experience who will be available on the ground to supervise, monitor, co-ordinate the work with others and extend required consultancy to all concerned. In case you require any other further information / documentary proof in this regard before evaluation of our bid, we agree to furnish the same in time to your satisfaction.

3. PERFORMANCE GUARANTEE

We hereby declare that in case the contract is awarded to us, we shall submit the contract Performance guarantee in the prescribed form as prescribed in the RFP. We hereby declare that our bid is made in good faith, without collusion or fraud. All the information and statements made in this Proposal are true and accept that any misinterpretation contained in it may lead to our disqualification

- 4. We understand that our bid is binding on us and that you are not bound to accept any Bid you receive.

Thanking you,

Yours faithfully,

(Signature of the Bidder)

Printed Name

Designation

Seal

Date:

Place:

Business Address:

Form - 2: Application for COMMERCIAL/FINANCIAL BID

To

The Managing Director,
Calcutta State Transport Corporation
CTO, 45 Ganesh Ch Avenue, Kolkata – 700 013

Sir

Sub: Response to the **Request for Proposal for selection of Implementation and Operation Agency for the project of Intelligent Transport System of CSTC.**

Ref: RFP No. _____ dated _____

We, the undersigned Bidders, having read and examined in detail all the RFP/ bidding documents in respect of the captioned subject do hereby propose for our selection as specified in the RFP document.

1. PRICE AND VALIDITY

The price mentioned in our bid is in accordance with the terms as specified in the RFP documents. This bid is valid for a period of 120 calendar days from the date of opening of the technical bids.

2. We have studied the relevant clause(s) in Indian Tax Laws and hereby declare that any taxes, surcharge towards Professional and any other corporate Tax applicable under the laws, we shall pay the same.

3. BID PRICING

We further confirm that the price stated in our bid is in accordance with the RFP documents.

4. QUALIFYING DATA

We confirm having submitted the information as required by you as per the RFP documents. In case you require any other further information/documentary proof in this regard before evaluation of our bid, we agree to furnish the same in time to your satisfaction.

5. BID PRICE

We declare that our bid price is for the entire scope of the work and contract period as specified in the RFP. This price is attached with our bid as part of the bid. The price quoted will remain firm during the contract period.

6. CONTRACT PERFORMANCE BANK GUARANTEE

We hereby declare that in case the contract is awarded to us, we shall submit the contract Bank Guarantee in the form prescribed within 15 days of issue of LOA.

- 7. We hereby declare that our bid is made in good faith, without collusion or fraud and the information contained in the bid is true and correct to the best of our knowledge and belief.
- 8. We understand that our bid is binding on us DURING THE VALIDITY PERIOD OR THE EXTENSIONS THEREOF and that you are not bound to accept our Bid.
- 9. **We confirm that no Technical deviations are attached here with this financial offer.**

Thanking you,

Yours faithfully,

(Signature of the Bidder)

Printed Name

Designation

Seal:

Date:

Place:

Business Address:

Form-3 : COMMERCIAL/FINANCIAL BID

Part	Project Work/ Deliverables	Quoted price for the work (in Rs. Lakh)	Remarks
I	Phase-I: Design, Supply, Development, Installation, Integration, Commissioning, Trainings and Launch of Cashless Ticketing System (CTS) or Automatic Fare Collection		

System (AFCS) through Smart Prepaid Cards (including Cash payment option from the commuters) and integration of same with POS, Payment and Finance management platforms etc.

- II **Phase-II:** Design, Supply, Development, Installation, Integration, Commissioning, Trainings and Launch of Vehicle Tracking System (VTS) and Fleet Management Systems (FMS) including seamless integration with CTS/ AFCS-systems implemented in Phase-I above.
- III Operations, Maintenance and Management of the above Integrated ITS for min. of 5 years after commissioning and smooth Transfer/ Hand-over of same to the CSTC after 5 years (except consumables for ETMs, POS, DC/CCC such as Paper roll, Stationary, Fuel, Electricity etc, which will be borne by CSTC)
- IV **OPTIONAL (not to be considered for bid evaluation):** Per unit cost of supply, installation and backend integration of single On-board Validator per Bus for AFCS

Total Cost of the Project (I + II +III):

Condition- 1: L1 may be determined separately for each of the Parts of the project only in unavoidable circumstances

Condition – 2: L1 will be determined by combination of all parts excluding part - IV.

(Signature of the Bidder)

Printed Name,

Designation, Seal, Business Address, Date & Place:

Section-VII: IT and Other Requirement (Indicative)

1 General Requirement

1.1 Functional Requirements

The following clauses describe the functional requirements of different Applications to be deployed for CTS/AFCS implementation. Suitable software application must meet requirement as mentioned below in integrated and secured environment.

- a) Cashless Ticketing System (CTS)/Automatic Fare Collection System(AFCS) – By installing one validator in each bus and by providing one ETM with bus conductor to collect bus fare by both prepaid smart cards and in cash this system will operate at front end.
- b) Vehicle Tracking System (VTS) - Real-time tracking through Mobile apps, Web portals and electronic/digital displays at important Bus terminus/Depots and Bus stops.
- c) Fleet Management System including Stock Management System, fuel management, Incident Management for Bus Breakdowns, Peak Hour Demand Management, Route Optimization etc.

All these systems should work in an integrated manner and support Single Sign-on having common database for all these applications.

1.2 Scope of Work

In order to implement the ITS project as indicated under its three components the I&OA needs to take care of the following:

A. Fare Collection:

- a) Handheld Electronic Ticketing Machines for Bus conductors in the Bus (for cash and smart

- card transaction)
- b) Point of Sale Terminals (to issue passes, replacement etc.)
- c) Revenue Reconciliation System.

B. Passenger Information:

- a) Deployment of LED boards based information system at important terminus/locations (appx. 20-30) for digital display of real time tracking under the central system.
- b) Information dissemination through Mobile App and Web Portal.
- c) Integrated Central System.

C. Central Fleet Management:

- a) Fuel management.
- b) Daily maintenance and preventive maintenance of vehicles.
- c) Vehicle scheduling and dispatch.
- d) Real time automatic vehicle tracking.
- e) Integration with On Bus Intelligent Transport System (OBITS) in all buses procured under JnNURM extended scheme complying UBS-2 specification, to provide a harmonized solution for Fleet Management.

D. Network Infrastructure:

- a) Dual side communication between CCC and Bus, PIS, ETM, Validator, Bus Terminals etc.
- b) Dedicated Broadband connection for CCC.
- c) Essential Network Hardware.

E. Central Control:

Components of Central Control System will include the following:

- a. Automatic Fare Collection System with security modules.
- b. Automatic Vehicle Location System.
- c. Passenger Information System.
- d. MIS Reporting.
- e. Video Wall.
- f. Disaster Recovery Site (Cloud within India/ Physical within India as suitable)
- g. Necessary Hardware and Software.
- h. Other Modules for Seamless Operation.

F. Operation & Maintenance of ITS components in Central Control Centre:

After installation of all components of the Project and its successful trial run the Project will be

declared to have been commissioned. The I&OA is required to operate and maintain all the components of ITS for five years maintaining desired service level and efficiency of the Control Centre.

1.3 Centralized Fare Collection System

The AFCS shall include a Centralized Fare Collection System and Electronic Ticketing Machines (ETMs) carried by the conductor to facilitate the automatic fare collection system. Fare transactions from ETM to be transmitted to backend servers through GPRS. These transactions shall be processed by the Centralized Fare Collection System for generating various summarization reports and it should be available on web.

A. Solution Features

- i) Manage Route Data, Fare Matrix and Fare Rules, and downloading the same from the backend onto the ETM (in case of any update) based on the recommendation of CSTC from time to time.
 - ii) The Electronic Ticketing Machines shall be capable of reading/writing contactless Smart Cards.
- iii) ETM shall facilitate issue of paper tickets against cash payment.
- iv) The ETM shall have a display LCD screen with an alpha-numeric keypad. The ETM should also provide navigation keys, enter, cancel, configurable function keys, Power on/off toggle button, and other status indication LED.
- v) The ETM shall support at minimum the following functions:
 - a) Store route details with fare tables for all routes (of a depot) in its memory
 - b) Friendly, interactive and fast software to minimize the operation time for issue of tickets and smart cards
 - c) Quick printing and issuing of paper tickets with minimum clicks
 - d) Provision to issue journey tickets, half charge Tickets, and other concessional tickets in need.

- e) Facility to upload and download data from the backend server over GPRS, Over-The-Air (OTA) update of route details & fare data.
- f) Instant collection summary for conductors & Inspectors.
- g) Generation of daily collection report, smart-card/ticket issue report, inspection report, collection summary at any point of time.
- h) Web-based front-end for multiple type of users and providing access based on their roles.
- ix) Various reports shall be generated based on the fare collection transactional data. The required frequency of generation of these reports will be provided later to the Officer in charge of respective CSTC Depots. Below is the list of such reports:
 - a) Revenue Collection Report by ETM/ Validator
 - b) Revenue Collection at POS
 - c) Revenue Collection Summary (of Depot – through ETM/ validator or pre-printed tickets and of POS)
 - d) Passenger boarding/alighting report
 - e) Usage of Smart Cards
 - f) Cash loaded on Smart cards
 - g) Any other reports (as required)
 - x) Revenue Collection Summary report to be consolidated at the end of every day in encrypted form.
 - xi) The POS shall consist of a POS PC with an integrated Smart Card reader, display and receipt printer. The POS PC should be compact unit. There should be a webcam attached to this POS terminal.

xii) The POS terminal system shall enable POS Operators to perform all operations for issue/top-up/personalize and balance enquiry of the Smart Cards.

xiii) Provision for entering cash collection at POS.

- a) POS operators shall be able to accept requests and issue of personalized Smart Cards/passes (on showing the pre-approved form from the concerned authorities). The webcam to be used for taking a photograph of the person applying for the personalized Smart Card / pass. Data entered at POS for personalised passes would be instantly available online to Centralised Press for Centralized Press for Concessional Passes (CPCP) for printing. Bidder will arrange for the printing of personalized passes at CPCP.
- b) The system would allow pass holders to top up valid smart cards/ passes online from anywhere through net-banking or other modes of online payments.
- c) Bidder will be responsible for printing of Passes at CPCP. Bidder will arrange to delivery of Passes at respective depots within 7 days of receipt of online application and also send an SMS from the system to the commuters informing arrival of his/her Pass at their applied POS location.
- d) Providing refunds and receipt of cards in damaged/ good working condition shall be handled at POS, along with providing replacements wherever required.
- e) The POS shall be designed to facilitate the recording of payments in cash with future scalability to validate debit & credit card (using third party terminal).
- f) The POS shall permit all required functions to be easily accessible to the operator through an intuitive interface that will permit transactions to be completed with a minimum of operator actions.

xiv) The POS shall have an interface with the system for card related balance enquiries.

POS shall generate the end of shift reports to facilitate the end of shift reconciliation process. At the end of each shift, POS software shall provide feed to Central Server with details on

- a) Numbers of applications received for issue of Passes

- b) Number of Smart Cards issued for each type
- c) Value of deposit and travel value encoded on new Smart Cards issued under different schemes.
- d) Numbers of Smart Cards Refunds/ Returns
- e) Number and Value of Top-ups
- f) Number of Smart Cards personalized
- g) any other transaction done at POS.

xv) Implementation of New Business Rules: The system should have a feature of implementing new business rules like route data, fare matrix and fare rules and downloading the same from the backend onto the ETM from time to time. Business rules for fare stages, fare structures, various routes, etc shall be configurable. ETMs shall have facility to compute the fare as per the new business rules defined by CSTC.

1.4 Stock Management System

Stock Management System is an application to be used at Depot Level for various depot operations related to cash collection and managing stock of pre-printed tickets/passes. This application shall ease the operational activities performed by depot operators. It should be accessible on web and no extra software installation must be required at depot.

- a) It shall provide feature of generating and printing duty plan/ memo with mention of ETM details, crew details, pre-printed ticket/pass details etc. Issue of Secured Daily Passes to ensure sale and circulation of fake passes.
- b) Waybills can be printed individually or in bulk.
- c) Issue/Receipt of ETM units & consumables at depots and maintaining inventory of units as well as consumables.
- d) Depot audit operators shall be provided features to audit the conductor collection at end of the day. The components like conductor incentive shall be calculated automatically. The proposed solution shall take into account both the sale of pre-printed ticket/passes, as well as the ETM collection amount while auditing.
- e) Provision to feed into the system, the details of manual collection (through pre-printed tickets/passes) including in cases where a particular ETM/Validator is not working.
- f) Facilitate depot cash department operators to collect cash from conductors after audit in the form of a well structured fool-proof 'cash up' process.
- g) There should be an audit trail for all stock movement from Head office / to depot / to sale to Commuter etc.
- h) It should provide depot cash department summary reports like overall revenue generated by depot/division, Stock reports related to depot stock (summarised or detail), Stock consumption reports (denomination wise– break-up and consolidate
- i) Trip Sheet Report, Trip Cancellation Report, Boarding v/s Revenue Collection Report, Pass Details Report
- j) Various Collection Reports, Depot-wise, Operator-wise, Crew-wise, Vehicle-Wise, Route-Wise etc., Report for measuring Earning per KM for trip/schedule/route.
- k) Any additional reports that may be required from time to time.

2.1 Graphical User Interface (GUI) requirement

- The central system shall be delivered with a fully functioning Graphical User Interface (GUI) with interactive Dashboard as stated in solution features.
- The GUI shall be based on standard windows controls or an equivalent operating system.

- All screens with non-paging data shall open and populate with data within 3 seconds.
- All screens with paging data shall open and populate with the initial data within 3 seconds and thereafter page updates shall be retrieved within 1 second.
- Dragging the cursor bar for a scrollable list shall cause instantaneous redisplay of the list in time with the movement of the cursor bar.

2.2 System Security Requirement

- a) The system shall only be accessible by authorized persons, through controlled using login and password protection.
 - b) It shall be possible to create different user classes with different privileges and roles.
- The system shall maintain a transaction log that records all users that access reports, the reports accessed, edits and changes to the database and the system logon and logoff times.
 - The system security shall provide features to maintain data integrity, including error checking, error monitoring, error handling and encryption.
 - Verification features shall be provided to ensure that all system-created files are uniquely identified, and that no files are lost or missed during data transfer.
 - All systems, sub-systems and devices shall only allow access to authorized user classes.
 - All security breach detections shall be confidential and accessible only to users of the appropriate class and reported immediately.
 - Security provisions for owned and non-owned communications networks shall be described.

- For all data transactions, the system security shall include authentication features to verify that all claimed source, recipient or user identities are correct and valid.
- Device-to-Smart Card communication shall be secured using multiple security keys and layers of information protection or encryption to mitigate risk against the possibility of being “hacked” or read by an unauthorized device. **Vendor to provide information on proposed security methods in their Proposal submission.**

2.3 Key Requirement

- a) The data center shall be capable of handling at least a minimum of twenty lakhs (20,00,000) transactions every day. This includes all transactions per day such as Issuance of tickets/ Smartcard based fare collection, Issuance/Recharge of Smartcards, Pulling vehicle location/ETA etc. on Mobile app and PIS etc.
 - b) System should be capable of expanding and scaling upto additional 15% transactions with necessary deployment of required hardware and necessary amendments to software for smooth operation of the ITS.
- Server uptime more than 99.98%
 - Guarantee more than 99% availability of the Services
 - Sufficient data storage to maintain six (6) months transaction data and Eighteen months (18) summarized reports available on line for analysis, reporting, and investigation.
 - Three years complete data Backup to be available onsite.
 - System shall support at least 350-400 concurrent users, ETM Machines for total buses with at least 15% scalability.

2.4 System Monitoring Requirement

- Bidder shall implement all necessary tools to monitor all the SLA parameters (database

portal connectivity, concurrency, etc.) and generate reports (for example availability, performance, downtime, usage, etc.) accordingly.

- The system should be able to generate all types of reports which will be used to track status of Deployment, Technical and Operational SLA including Parameters like Correctness of deployment, Capacity of Application, Transfer of transactions, etc. for monitoring of SLA.

3 Speed of Generation of MIS reports

Maximum time after 'firing' a report to the time of report generation -30 sec to 90 sec (Depending on the size of the report)

3.1 System Reliability

All equipments like ETMs, POS etc. should be reliable.

3.2 Mean time between failures (MTBF) in operational hours

- Minimum MTBF for On-board equipment
- Electronic Ticketing Machine (ETM) - 7000 hours (including ticket printer)
- POS terminal sub-system - 7000 hours

3.3 Service Support for CTS/AFCS equipment

3.3.1 Maximum time for providing support at site - 2 hr

3.3.2 Mean time to repair (MTTR) for all equipment - max up to 2 hours after which the equipment has to be replaced from the buffer stock.

4 Proposed System Architecture

A schematic of the proposed CTS/AFCS System as per requirement given above with the sub-systems indicated herein below must be attached with the Technical Bid illustrating point-to point connectivity, data transfer, data back-up, synchronization etc.

4.1 Automatic Fare Collection (AFCS) system

The proposed AFCS system consists of the following sub-systems:

- Card Issuer Module
- The AFCS backend sub-system
- Depot Stock Management System
- Point of Sale Terminal sub-system
- The interconnectivity between the above sub-systems
- Any other module which can be specified at a later stage

4.2 Electronic Ticketing Machine (ETM)

The Electronic Ticketing Machine will be used by the conductor on-board

- To issue paper tickets
- To validate Smart Cards for trip and passes and deduct money from the e-purse of the AFCS card based on the concept of fare stages.

While performing the above job, the ETM captures all relevant transactions and stores them in its memory. Further, the ETM possesses a GPRS interface for communication to the AFCS backend via a suitable service provider's infrastructure. This facility is typically utilized:

- To periodically transfer all the captured transactions to the AFCS backend
- To download new fare structures and other necessary parameters and information from the AFCS backend

The suggested ticket length minimum 5 cm displaying CSTC logo, Date & Time, Route Code, Fare, Unique Ticket Code (comprising of machine ID & Ticket Sl. No.), Type of Ticket (Half, group etc.), No. of passengers, Bus ID AC/Non AC, Quote etc as per format approved from CSTC by vendor.

4.4 Security Access Modules (SAM)

In order to ensure the security of the transactions being captured, the ETM and Validator support the use of Security Access Modules (SAM) in slots for SIM Cards. For the AFCS project, the SAM shall hold the security keys downloaded from the CCHS. The framework within which this interface will take place is explained in detail in this chapter. The detailed interface specifications shall be provided to the successful bidder before implementation.

Suitably programmed ETMs would also be required to be carried by Inspectors to inspect typically the validity of the Smart card (for passes), determine the recent transaction performed on the card and the on-card balance.

The functional, non-functional and performance requirements of the ETMs and its essential technical specifications are given herein after. The bidder shall provide detailed features and specifications of the equipment proposed by them.

4.5 Backend Sub-System

The backend sub-system typically consists of the following:

- a) The Communication/transaction server that connects to the GPRS service provider's infrastructure for
 - b) Acquiring AFCS related transactions from the ETMs of all buses and sending it to the CSTC server.
 - c) Sending the necessary new fare structures and parameters available on the CSTC server to the ETMs.
-
- a) The Centralized Data Server, which holds the complete AFCS system's database.
 - b) The CCC workstations that are used to obtain information and generate reports relevant for the CSTC from the AFCS server
 - c) The backend sub-system provides a wide variety of MIS reports. The successful bidder, in his technical bid, shall provide a list as well as short description of each of these reports. However, the following reports are indicative and will be finalized by various departments of CSTC
 - Summary Card Report
 - Total Passenger Report Based on Fare Value
 - Bus Passenger and Revenue Statistics Report By Route
 - Summary Bus Revenue and Passenger Statistics
 - Bus Rider ship and Revenue Statistics Report
 - Card Exception Report
 - Any other reports as specified / required by CSTC.

- d) The AFCS backend includes a software module, which interfaces with the backend server for mapping the initialized smart card data.
- e) The AFCS backend interfaces seamlessly with the CCHS. The framework within which this interface will take place is explained in detail in Chapter - 17. The detailed interface specifications shall be provided to the successful bidder at the time of implementation.
- f) Entire Solution proposed in the Automatic Fare Collection System (AFCS) as follows:
- SI/OEM has to provide hardware sizing of all the hardware software and networking equipments required for implementation of complete AFCS such as the ETMs, Servers, desktops, network switches, routers, storage devices, licenses, etc.
 - Software systems planned for the Data center and control room such as Operating / network systems / databases, etc.
 - ETM software or other software application that are proposed to be used off-the-shelf.

NOTE: The above list of equipment is only indicative. The bidder shall design (select essential equipments and size them) the backend system to meet all requirements in the tender which reflect the price for this in the bid. The bidder shall provide detailed features and specifications of each of the equipment proposed by them with a suitable justification of the same.

4.6 Point Of Sale Terminal Sub-System

The point of sale terminals performs the following customer related functions:

- 4.6.1 Issue Smart Cards with an E-purse, over the counter (OTC), on accepting cash using Cash Vault.
- 4.6.2 Re-charge (i.e. re-load the E-purse) issued cards on accepting cash.
- 4.6.3 Provide and renew Smart Card-based personalized passes to passengers.
- 4.6.4 Handle customer complaints.
- 4.6.5 The POS system is connected to the AFCS backend online through broadband connection of a service provider.
- 4.6.6 Provide refunds and receipt of cards in damaged/ good working condition along with providing replacements wherever required.
- 4.6.7 The bidder shall provide a comprehensive system (including hardware, software etc.) which will perform all the above functions and to meet tender requirements. The bidder shall provide detailed features and specifications of the equipments proposed by them for POS location.

4.7 Interconnectivity between the Onboard and Backend Sub-Systems

The onboard ETM, the backend sub-system, the POS terminal sub-system are interconnected using a broadband link, as explained above. The bidder shall be responsible for setting up (with a service provider) and maintaining this interconnection in line with the performance requirements and the cost for the same shall be included in the bid.

5 System Descriptions – The CTS or Automatic Fare Collection (AFCS) System

The Automatic Fare Collection (AFCS) or CTS System shall consist of in-bus fare collection using Online Electronic Ticketing Machines (through paper tickets and smartcards), Stock Management at Depot(s), Smart Card Handling at Point of Sale (POS) Terminals, MIS Report generation at CSTC offices.

- POS should be equipped with Smart Card Reader/Writer, a small display unit for customer and webcam for taking customer's photograph. Commuters can obtain Passes (Personalized smart cards) at the POS, by submitting required supporting documents along with prescribed application form.

- Alternatively commuters with Smart Cards having an e-purse will show their card to the conductor for ticket. Conductor will validate the contactless card through ETM machine, which deducts fare amount for the route by entering source and destination point. Fare transactional data from the ETM shall be transmitted to back-end servers over GPRS at a regular pre-configured frequency.
- This ETM shall also be used for validating smart card passes, deducting fare from the e-purse and balance/transaction enquiries.
- In addition to supporting Smart card with e-purse, the system shall also support the use of Smart card Concessional passes. For this purpose, the system shall support a suitable issue and renewal mechanism at the POS terminals where the commuter shall be provided with a personalized smart card that can be used multiple times for load and use.
- Smart Card Pass (Concessional Pass) shall be issued to the commuter Over the Counter (OTC) at POS locations. This pass is non-transferable and shall be valid for a certain time. They shall be validated inside the bus using ETMs. Any payment received from the commuter for issuing the pass shall be acknowledged with a system-generated receipt.
- Conductor will validate the Concessional pass (Smart Card) and issue a travel ticket displaying origin and destination of journey and his/ her pass no. with 0 (zero) amount to the commuter.
- The e-purse shall be loaded with a pre-paid amount and shall be debited according to the travel. Any payment received from the commuter for issuing the above shall be acknowledged with a system-generated receipt.
- As the proposed AFCS system shall support the issue of paper tickets for manual cash, transaction, it shall therefore consist of cash up process by which the bus conductors at the end of their shift can remit the cash collected on ticket issue. Cash collected at the POS terminals shall be cashed up using a similar process. The Cash collected for issuing tickets shall be cashed up to the CSTC's cashier at the various depots and also the cash collected at the POS terminals shall be cashed to an authorized person/employee of CSTC.
- For Commuters who do not have Smartcard, and would like to purchase a ticket using cash payment, the Bus conductor will issue paper tickets using hand-held Electronic Ticketing Machine (ETM).

- The ETM must be able to transmit transactional data to Backend servers over GPRS at a pre-configured frequency. To ensure the smooth and un-interrupted running of the ETMs, Conductors should be supplied one power bank (minimum 3600 mAh) with charger for charging ETM.
- Stock Management Application will be used by the depot operations staff. This shall facilitate the management of stocks of pre-printed tickets, passes and Smart Cards, and will take care of reconciliation of collected revenue by conductors, calculation of conductor incentive and auditing.
- The entire information regarding cash collection at the POS and in-bus through ETM shall come to the central back-end application and collection summarization reports must be generated and given to CSTC in a specific encrypted format at the end of every day. This Backend system should act as a revenue management system for reconciling the collection and should generate all financial reports.
- Passengers who have any issues related to the Smart cards or the deduction of fares can contact the Point of Sale (POS) counters.
- At any point of time, it shall be possible for an inspector from CSTC to inspect the Smart card, whether a pass or an e-purse, using a suitable ETM. In case the pass is found invalid or the e-purse is found having inadequate balance, it shall be possible for the inspector to collect an appropriate fine in cash from the commuter and issue a system-generated receipt (from the Electronic Ticketing Machine) for the same.
- All transactions related to the following shall be captured in the various related sub-systems and transferred to the concerned backend subsystems.
 - ✓ Issue of paper tickets
 - ✓ Issue of Smartcards
 - ✓ Validation of Smartcard passes
 - ✓ Debit-credit of Smartcard e-purse
 - ✓ Collecting fines

The transactions captured in the various equipments like ETMs and the POS terminals shall be transferred to the backend server. It shall then be possible for the CSTC personnel to generate a wide variety of reports related to collections, travel information and other operational information.

- The CSTC backend shall seamlessly interface with the CCHS transferring transactions back and forth. The framework within which this interface will take place is explained in detail herein after.
- It will be the responsibility of vendor to check usage of fake ETM machines and/ or sale of fake tickets or passes by deploying high security features in the system.

6. Electronic Ticketing Machine (ETM)

Electronic Ticketing Machine will consist of in-bus fare collection using thermal paper tickets. The ETMs would be smart card ready and support contact less smart cards ticketing with e-purse and passes. A provision must be made in the ETMs for a smart card reader with inbuilt security protocols and modules. The ETM will support secure transfer of financial data from ETM through GPRS network to a central server at preconfigured intervals. ETM application will also empower CSTC Security & Vigilance Personnel to reconcile bus occupancy numbers with ticketed passengers and authenticate -ETM issued tickets or validated smart cards. In order to ensure the security of the transactions being captured, the ETM supports the use of Security Access Modules (SAM).

The system at the bare minimum should be able to perform the following:

- 1) ETMs should automate ticketing using thermal paper to commuters, support cash and ticket operations in case of failure of ETMs (with an inventory management of pre-printed tickets provided by CSTC).

- 2) Automate end of day cash audit and reconciliation of pre- printed tickets and support contact less smart cards ticketing with e-purse.
- 3) The ticket data should be communicated on-line from ETM devices to backend over GPRS using encrypted protocols and should automate revenue reconciliation data.
- 4) Revenue monitoring application should provide reports on financial performance, route wise etc with actual performance.
- 5) Empower security and vigilance department for inspection (reconciling bus occupancy numbers with tickets issued, inspecting status reports, etc.).
- 6) Handling wear and tear; high through put of transactions (during peak period) supporting prolonged battery power to last minimum for a shift with GPRS connectivity; and smartcard read/write facility.
- 7) Route, bus stop, fares, all types of pass data in the device application
- 8) Support secured Login using ID/PIN.
- 9) Provision to manually extract transaction data from ETMs using cable interface, in case the data is not communicated to central server due to problem in communication or ETM device.
- 10) Easy to use for conductors with issue of tickets requiring minimum key-strokes.
- 11) ETM should record the transaction before printing the ticket.
- 12) ETM should be able to print repeat tickets i.e. ticket for same source and destination.
- 13) Display the valid passenger count in the bus, as per the ticket issued, at any point of time.
- 14) Display the real-time status of the battery and ETM health.
- 15) The ETM should generate an alert and display the same in case of low battery alert with a message which will ask conductor to connect the ETM to power source in case of low battery.
- 16) Conductor will use power bank provided by bidder to charge the ETM enroute.
- 17) Conserve battery during idle time by invoking auto sleep mode.

- 18) Tamper proof software and hardware (alert upon tamper attempt).
- 19) ETM to print hard copy information of number of tickets issued in the bus and total revenue collected at that point of time for checking personnel to reconcile the number of passengers in the bus. (5% margin for no. of tickets to be printed for conductor)
- 20) Trip Direction/ Number Change should be automatic and reflect in the ticket.
- 21) Display must be readable in all ambient light conditions including bright, day light.
- 22) Curtailed trip, Partial trip, Bus Breakdown management, etc.
- 23) On line crew change support.
- 24) Checking/ Vigilance User log in support.
- 25) The device should support OTA updating of master data and application.
- 26) ETM data should be secured and be un-editable after each transaction.
- 27) System should be capable to block transactions from ETMs and lock such ETMs remotely which are reported theft, lost, etc. System should be capable of identifying such ETMs using AFCS application at back end.
- 28) ETM should support read / write of contactless smart cards of both Type A and Type B, conforming to ISO 14443 specifications. These contactless smart cards can be used by CSTC as e-purse tickets and passes (student, staff, all route passes, etc).
- 29) The ETM supplier shall modify the software to read / write / validate any existing or proposed smart cards conforming to Type A or B by the State Government / Central Government / MoUD / Metro, etc.
- 30) The list of minimum inputs attributes to be captured through these ETMs are:

- Category of Buses – Cat 1(AC)
- Category of Buses – Cat 2(Non-AC)
- Executive Service, Special Service, Flat fare, etc.
- Source
- Destination
- Numbers of people for Group ticket.
- Group Ticket
 - Repeat Ticket
 - Number of Day passes sold.

 - Date & Time stamp
 - Fare
 - Fare stages
 - Bus Route
 - Bus Number
 - Trip Code
 - Conductor Name / ID
 - Driver Name / ID
 - Ticket Inspector ID and Time stamp of checking

 - Toll taxes
 - Refund

7. Pre-Paid/ e-Purse Smartcard

ETM shall support a Smart Card interface, which can be used for validating smart card passes, deducting fare from interoperable Smart Card e-purse and balance/ transaction enquiries.

- a) System should be capable of checking and blocking blacklisted cards (such cards which may be reported theft etc.). System should be capable of identifying such cards using CSTC Concessional Pass Number. The system will send the lost/stolen details for card to CCHS according to which the Global Blacklist parameters will be generated at CCHS for all operators. At end of the day all Blacklisted cards will be transferred to all operators as Blacklist parameters. After that if the Card is shown at any device, the device shall block the card and generate the Blacklist Transaction to CCHS.
- b) ETM will print a thermal paper pass with a unique number and print name, gender & age for daily passes. Data entry of age and gender should be mandatory for issue of passes. The message – ‘This is not a journey ticket’ should be displayed on the daily passes besides other information. There will be a dedicated key in ETM to print daily passes. Whenever a commuter wants to travel again using daily pass on same day then conductor will enter that unique number generated for daily passes and with minimum inputs ETM should print a zero value ticket displaying source and destination of the particular journey, against that daily pass.
- c) At present there is no plan to use any different Smart Card, however, in any unforeseen circumstances if at any stage in future there is a need to introduce any other smart card then it will be responsibility of the bidder/ vendor to cooperate and support CSTC in designing & developing necessary infrastructure and integrate the new card with the existing AFCS. However any additional cost on that account would be borne by CSTC. To

ensure such future integration of any other smartcard, the vendor should make necessary provisions in the AFC system to ensure transaction security and future integration.

8. Command Control Center (CCC), Data Center (DC), Disaster Recovery Center (DR) and Near Disaster Recovery Site.

8.1 Command Control Center will act as a live hub to manage and monitor service related data which will be viewable through a centralized web application. Activities at the control center will comprise of monitoring services, incident management with defined escalation procedures, activities to include monitoring health of all components (hardware, software etc) of AFCS project through automatic check system. CSTC personnel will be trained to oversee the Command Control Center by the vendor.

DC & DR will receive transactional data from on board devices applications into servers and Decision Support/ Business Intelligence (BI) Applications respectively to generate alerts and reports on revenue and operational parameters. In case of emergency or critical situation in DC, data backup procedures from Disaster Recovery (DR) site should be clearly followed.

- a) The Command Control Center of CSTC, is to be located at 5, Nilgunge Road, Belgharia, Kolkata – 700056. The Data Center (DC) may be set up either at abovementioned CSTC location or may be hosted at any location within India. If hosted in a third party Data Center, the selected I&OA shall execute a tripartite agreement with CSTC and the host to continue DC services beyond 5 years. DC must be a minimum Tier-III level Data Center guaranteeing 99.982% availability and uptime equipped with dual-powered IT equipment, sufficient cooling accommodation for collocating servers, multiple Internet links, common servers, storage with high availability etc.
- b) Disaster Recovery (DR) Center may be located at any suitable, secured Physical/Cloud based Data Center located within India.
- c) Command Control Center (CCC) and Data Center (DC) set up including all connectivity, hardware & software will be the responsibility of vendor.

- d) The CCC shall have sufficient seating space for technical persons who can work 24X7X365. Vendor will train the CSTC staff for using the systems and appoint personnel for trouble-shooting activities and a supervisor for the General and Night Shifts.
- e) Electricity and space for Data Center (if hosted in CSTC location) and CCC shall be provided by CSTC. Everything else including furniture, air conditioners, backup, all connectivity, other civil works etc will be responsibility of the vendor.
- f) Command & Control Center (CCC) and Data Center should have secured card based access system and maintain a log of in/out.

The following equipments shall be provided by the vendor at the Command &

Control Center:

- Supply of Workstations/Computers: Latest processor machines with TFT monitors and friendly operating system, antivirus etc.
 - Supply of Printers All in One Printers: Laser Printer with Print, Scan, Copy and Fax facility.
 - Networking and network devices for the LAN connected with Data center for sharing Data center bandwidth.
 - All connectivity among the data center and control center should be provided by the bidder.
 - Two workstations will be provided dedicatedly for CSTC officials with all connectivity and functionality of the solution.
- e) All applications that are part of AFCS should be accessible from the CCC. The Work Stations will be web-enabled, provide for appropriate User Access (Role based, Read only/ Read-write) and other security controls. All monitoring stations shall be able to receive alerts from the ETM devices and display on screen on a **dashboard**.
 - f) Solution & Technical Architecture of Data Center & Command Center will be provided by the

vendor which includes IT hardware such as servers, storage, networking, UPS, etc. and all system software including Operating systems, RDBMS, firewall, antivirus, etc. The vendor should seek confirmation from CSTC before installation and commissioning of the Solutions, Technical Architecture and Equipments at DC and CCC.

- o Connectivity at Data Center and CCC.
- o Connectivity to Bus Depot
- o Connectivity to DIFFERENT Offices of CSTC other than depots
- o Connectivity between Bus (ETM/ Validator) and Data center (Data – GPRS)

g) To ensure continuity of business in an unforeseen circumstance when the DC has to stop operations, a **Disaster Recovery (DR)** center is required. The DR would have the similar specifications as the DC. The required storage may vary depending on the applications / services that are to be hosted at the DR. The DR would be configured in a manner that the critical applications and databases shall be of the same capacity as in the DC, however some of the non critical applications would be of a lower capacity of the DC. All ticketing related applications and databases at DR will be 100% replica of the DC. All other applications and databases shall be 50% replica of the DC. **DR site may be hosted on a Cloud or Physical Data Center environment by the selected I&OA on any suitable location within India. Permissible RPO and RTO values have been provided below with Indicative RPO and RTO values for DR of various systems**

S. No.	System/ Sub-system and related failure	RTO	RPO
1.	AFCS - Failure of transfer of transactions from ETM/Validators to Servers and vice-versa	1 hour	1 hour
2.	AFCS – Failure of transfer of data between Prepaid Card Recharge systems (Online/POS/ETM) and Servers etc.	1 hour	1 hour
3.	AFCS - Failure of transfer of transactions from POS to Servers and vice-versa	1 hour	1 hour
4.	VTS - Failure of Location and ETA data	2 hours	1 hour

**transmission from Servers to PIS displays
and Mobile apps in pre-configured time
interval**

5. FMS- Failure of data transmission between Fleet and Servers (Incident reporting etc.)	2 hours	2 hours
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- h) During system downtime, appropriate messages such as "System recovery under progress/ Sorry for inconvenience etc." must be displayed on respective field systems – PIS displays, Mobile apps, POS terminals, ETMs, Web portals etc.
- i) **Disaster Exclusions:** Not every Security breach is a Disaster, and not every Power outage a reason to declare a Disaster. Following are the Disaster exclusions, i.e., events that do not qualify to invoke a Disaster Recovery scenario:
- Known Data Center equipment malfunctioning, where procedures and guidelines are already known to the selected I&OA or Data Centre operator on the recovery of the same.
 - Network spikes caused owing to high traffic flows and not due to any equipment / Software issues.
 - Resignation / extended unplanned Leave of any Data Center employees, however critical he / she may be to the daily Data Center operations.
 - Virus / Spamming attacks on a single Server causing an isolated application outage without affecting critical systems such as AFCS, VTS, FMS etc.
 - Any non-critical application shutting down, irrespective of the down time duration
 - Planned individual critical DR application shut down for a period less than the defined RTO.
 - Natural Calamity in the neighboring areas not bound to affect Data Center premises / operations.
- j) The following equipment shall be provided by the I&OA at the each Depot:

- Supply of Workstations/Computers: Latest processor machines with TFT monitors and friendly operating system, antivirus etc.
 - Supply of All in One Printers: Laser Printer with Print, Scan, Copy and Fax facility.
 - Networking and network devices for the LAN connected with Data center.
 - All connectivity among the data center, bus depot, regional office and control center should be provided by the bidder.
 - Two workstations will be provided dedicatedly for CSTC per depot, one for cashier and one for depot manager with all connectivity and functionality of the application

Note: Bidder will specify the space required for DC & CCC and also for ETM/ Power Bank charging space required at each depot.

8.2 POS Terminal and Infrastructure

Currently CSTC has 14 office premises, out of which 12 offices will be converted into POS Terminals for selling Smart Card. Bidder will develop the infrastructure for 12 POS sections and one CPCP.

- a) POS should be equipped with Smart Card Reader, Writer, client PC & thermal printer for generating receipt of topping up amount, and Pre-paid/ e- Purse Travel Card etc.
- b) Bidder will provide minimum two workstations and at least one person at every POS/ Pass section.
- c) POS should be equipped with small display unit for customer for displaying validity and balance amount of their Smart Card.

- d) All POS set up including all connectivity, hardware & software will be the responsibility of vendor. Manpower will be provided by Vendor. Space & Electricity will be provided by CSTC.

8.3 Management Information System (MIS) and Decision Support System

This system should generate various automated reports for data analytics required for managing operations and improving performance. The decision support system should help the management by providing the following, but not limited to, reports at one place to help take decisions.

8.4 Dashboard driven daily, weekly, fortnightly, monthly, yearly or between any specified dates MIS reports for Top management, middle management and supervisors.

8.5 Overall, Depot wise, Duty wise, Route wise, Trip wise, Denomination wise, Bus wise, Driver wise, Conductor wise performance reports.

8.6 Reports must include revenue, kilometers, number of passengers, Earning per Bus, Earning per Kilometer, etc. as per formats finalized by CSTC.

9. Data Access and Authorization

Except for selling, buying back and topping up of Smart Cards, only read access right will be given at the depots, POS and control center to fetch the required data, information & reports from the server. If any changes or updation is required at the data center, a three level approval through digital signature will be executed to access the modification/ alteration in addition to the digital signature access by the authorized person of the vendor. Any changes or updation will be done by the digital authorization of CSTC officials and vendor jointly. It is responsibility of the implementing agency to obtain the approval from CSTC for any access.

10 ETMs (Qty: 900 Nos.) – Indicative Technical Specifications

Sl.	Parameter	Desired Minimum Requirement
Hardware Specification		
1	Processor	Minimum 400 MHz PowerPC/ ARM11 32-bit RISC processor or above
2	Operating System	Linux/Windows or equivalent (Vendor should provide free of cost up gradation of OS software/ application for proper functioning of devices throughout contract period)
3	RAM	64 MB or above
4	FLASH Memory	128 MB or above
5	Extendable Memory	SD/Micro SD card interface (minimum 2 GB or higher)
6	Display	Graphic LCD minimum 240 X 320 Pixels, 3.5", Backlight feature
7	Keypad	Min 27 Physical Keys (In case of touch screen, minimum 15 keys on keypad)
8	Thermal Printer	55 mm, 18 lines/sec, easy paper roll loading. Should support minimum 15 meter length thermal paper roll (55-60 GSM) Paper out sensor
9	SAM slots	2 SAM slots or higher
10	RTC	Inbuilt RTC with battery backup
11	GPRS	Wireless Wide Area GSM/GPRS on 850/900/1800/1900 MHz
12	Battery	Li-ion/Li-polymer, 1800 mAH on 7.2V/7.4V or 3600 mAH on 3.6 V Over-charge/ over-voltage/ over-current protection

		<p>Quick recharge</p> <p>Easily removable/swappable</p> <p>It should be possible to charge battery separately. Gang Charger support for charging multiple batteries at a time.</p>
13	Weight	Max. 500 g
14	Communication Ports	USB & RS232 – at least 1 each
15	Certifications	EMV Level 1 & 2 and PCI certification
16	Environment	<p>Operating Temp. 5 – 50 degree C</p> <p>Humidity: 5% to 95% (non-condensing)</p>
17	Contactless Smart Card Reader	Inbuilt Contactless Smart Card reader – ISO 14443, entire Mifare family
18	Indications on display	<p>Battery charge status</p> <p>GSM Signal strength</p>
19	Audio	Beeps on key-press and transactions
20	Accessories	<p>Shoulder carry bag</p> <p>AC charger (working from 160 V to 250 V)</p> <p>Memory Card – minimum 2 GB</p> <p>Extra battery</p>
21	LEDs	Green and Red (two separate LEDs or one dual colour LED)
22	Others	<p>Remote Administration</p> <p>Over the air upgrade of firmware, application, configuration parameters, master data, etc. should be possible.</p>

Development Platform/SDK Requirements		
23	OS	Linux / Window CE or equivalent compatible platforms
24	Database Support	Database Handling API
25	TCP/IP	Embedded TCP/IP Stack
26	Programming	Parallel Programming Support
27	Security –Encryption	Should support encryption standards including 3DES and AES for smart card reading/writing as well as communication with Central System
Support – Development and after sale		
28	Spare Parts	Readily available Spare Parts and batteries

11 Indicative list of Reports

The backend sub-system should provide a wide variety of MIS reports. The successful bidder, in his technical bid, shall provide a list of each of these reports. Various reports shall be generated based on the fare collection transactional data. Various departments of CSTC may at a later stage finalize data storage requirements for each of their reports. The required frequency of generation of these reports will be provided later to the successful bidder. Below is the indicative list of such reports:

- Dashboard driven daily, weekly, fortnightly, monthly, yearly or between any specified dates MIS reports for Top management, middle management and supervisors.
- Overall CSTC, , Depot wise, Duty wise, Route wise, Trip wise, Stop wise, Denomination wise , Bus wise, Driver wise, Conductor wise performance reports.
- Reports must include revenue, kilometers, number of passengers, Earning per Bus, Earning

per Kilometer, as per formats finalized by CSTC.

- The vendor shall be responsible for obtaining necessary approvals and clearance on various reports formats from CSTC.

11.1

Reports from ETM Device

Reports from ETM Device	
S.No	Reports
	Status Report at particular stage indicating trip title, service type, stage point,
1	date& time of inspection, no. of passengers, no. of tickets sold, revenue collected by conductor as per ETM, cash with conductor etc.
2	Ticket Details Report for all tickets (trip wise) or for selected trip
3	Trip wise/Ticket Type wise Revenue Collected through ETM.
4	Day wise Revenue Collected through ETM.
5	Stage wise Report of boarded / alighted passengers (Trip wise)
6	Toll Tax Payment Report (Trip wise)
7	Expenses from maintenance report

8	Trip-wise Traffic Receipt, Luggage charges receipts, toll tax receipts, Total no. of passengers (Adult & Child), Total no. of concession passengers, Total Earnings.
9	Refund of fare Amount Report indicating reason, no. of passengers, ticket no. amount of refund etc.
10	Concession Report – Trip-wise/ Concession-wise revenue collected through various concessions, fare collected, & no. of passengers traveled on concessional fare
11	Trip wise/ State wise breakup of revenue collection in case of interstate route.

11.2	Reports from Backend Software
S.No	Reports
ETM related reports	
1	Conductor Sign On/ Sign Off Details as on required date & time with summary containing conductors not reported back as per schedule duty, imprest amount tally report.

2	Machine Detail Report indicating No. of Online ETMs, No. of ETMs in depot & unmoved / idle ETMs in depot on a particular date & time.
3	Periodic reports on lost / damaged / late received / defective ETMs
11.3	Some Revenue related Sample Reports
1	Expenses Report
2	Conductor-wise & Rupee Denomination-wise revenue Report
3	Shift-wise Cash Collection Report
4	Daily Cash Collection Report for Central Traffic Office and respective depots
5	Toll Tax Payment Report
6	Conductor-wise Shortage / Excess Report
7	Concession-wise revenue & No. of passengers
8	Monthly Pass revenue & No. of passengers etc.

9	Crew change earning reports for crew duty performed for other depot (conductor-wise).
10	Trip-wise Passenger Revenue, Luggage Revenue, Toll Tax Revenue & No. of passengers for the selected trip or for all trips.
11	Head-wise and conductor-wise/controller-wise statement of Concessions
12	Service type-wise earning report for the selected trip or for all trips
13	Extra trip earning report
14	Date wise Revenue Collection Report
15	Trip wise Revenue Collection Report
16	Conductor-wise earning report (for selected conductor or for all conductors)

11.4	Analysis
1	Analysis statement for the selected trip or for all trips

2	Trip-wise direct passengers traveled report for the selected trip or for all trips
3	Analysis statement for the selected trip or for all trips
4	Cancellation trip report
5	No. of Passengers travelled
6	Date wise Inspector Report
7	Date wise Inspection Report
8	Date wise Toll Tax Report
9	Account head-wise /date-wise summary
10	Account Head-wise revenue split-up report
11	Concession wise revenue & No. of passengers
12	Monthly Pass revenue & No. of passengers etc.
13	Trip-wise, stage-wise passengers traveled report for the selected trip or for all trips

14	Trip wise direct passengers traveled report for the selected trip or for all trips
15	Detailed analysis statement for the selected trip or for all trips
16	Cancellation trip report
17	Account Head-wise Summary of Concessions
18	Low paying trip report for the given period
19	High paying trip report for the given period

Note: All the consumables such as Thermal Paper Rolls/ Printing stationary required for ETMs shall be arranged by CSTC, therefore out of scope of this RFP

12 Additional indicative Technical specifications and quantities

12.1 Smart Cards (Approx. Qty: 100,000 for five years)

Total No. of estimated prepaid Smart Cards required for AFCS/CTS to be implemented are Approx. 100,000/- for the period of five years. Cost of additional cards, if required will be met on pro-rata basis per card. Arrangement of card printing should be considered according to the volume of the cards for five years.

The AFCS system shall be capable of deploying **Contact less Smart Cards** for the following basic specifications:

- The Smart Card to be used for AFCS/CTS shall be **fully compliant with ISO/IEC 14443**
- Physical dimensions of the Smart Card will **comply with ISO/IEC 7810 standards**
- The resistance of SC to mechanical stress and chemicals shall **comply with ISO 10373**
- The operating frequency of Smart Card will be 13.56 MHz
- Min. storage capacity 4Kbytes
- **Card Lifetime** > 5 Years
- **Distance of Work:** Cards should work upto a distance of 10 cm from the antenna
- Each Smart Card shall have a unique external identification number linked to the card manufacturer supplied internal identification number, which shall not be erasable or changeable. External number shall be engraved or printed in a long-lasting ink. External number shall have a check digit to minimize the possibility of errors on data entry.

Note: Transaction Charges of payment gateway will be borne either by card holders or by CSTC, as decided by CSTC later. This cost component is out of scope of this RFP

12.2 PIS Display Boards at Bus Stops (20 No.)/ Bus Terminals (20 No.)

LED based display screens that provide sufficient visibility in broad daylight condition shall be installed at CSTC bus stops and terminals. Display unit at Bus Stops / Terminals shall receive dynamic data of the current locations, expected time of arrival, route no, destination, messages, of the buses plying on the route from Data Centre /Command Control Center/ Central database and Advertisements, notifications, announcements, fares for the different destinations and categories of commuters. The display units shall receive data on communication network for data movement Messages shall be displayed in bright colours such as RED or AMBER, on multiple lines to be able to view during bright day light and support multilingual format shall be mounted on a rugged enclosure to withstand harsh environmental conditions and secure from vandalism.

There shall be minimum one 2-line GPRS enabled LED display per Bus stop and minimum one 4-line GPRS enabled LED display for Bus Terminals. They shall display route and estimated arrival time (ETA) including digital advertisements and other digital content as may be approved by CSTC. They may also be used to display public service information. The display shall receive encoded information of route and ETA from the Data Centre/ Control centre through the common wired/wireless communication link set up at each bus stops/terminals. The displays must have the ability to decode the information received from Data Centre /CCC and display appropriate message on the screen.

a) PIS Display system Functional requirements:

- Display of PIS in a display unit at bus stop / terminal shall be configurable based on bus stop and terminal. Single unit should display services of more than one platform.
- Information Display units will be supplied and mounted appropriately, configured and commissioned by selected I&OA.
- PIS information shall be displayed in English & Bengali (single or multiple language shall be configurable).
- Display units will receive/display transmitted contents from the data centre server /central system through a gateway or mention other suitable means in the technical architecture.
- Display systems needs to support full colour display for streaming advertisements, Digital display of text, images and video on LED screens.
- Displayed messages must be readable in high bright, day light.
- Display system in addition to the display of information for PIS shall be capable of displaying advertisements and multimedia content at the bus stops and may need to alternate between Passenger information and Advertisements.
- The frequency and period of information display on PIS display shall be configurable from central location for advertisements and other transit information.
- All displays for PIS will have a configurable refresh rate with minimum of 5 seconds.

b) PIS Display system Technical and Hardware Requirements:

- 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.
- One Integrated tamper proof casing for complete PIS Unit addressing physical security considerations.
- Provide any hardware like GPRS Communication system, networking, etc. required to run the PIS and advertisements on LED Display Units.
- Aesthetic requirements such as fonts, colours, rows per page, display time to be remotely configurable and displayed based on business requirement of CSTC.

c) Minimum Technical Specifications of PIS LED Display System:

- **Minimum and Maximum viewing distance and angle of viewing (where the display screen looks DOTFREE) :** Viewing distance 3- 30 meters, Minimum 150°V – 60°H
- **Size of Display characters:** 2" (at Bus stop), 4" (in Bus terminal)

- **Resolution in terms of number of pixels (X by Y) and pitch between pixels for the display character:** Minimum of 32 X 32 pixels with a pitch of 30 mm per character
- **Length of the message for a particular route; information that needs to be displayed in English & Bengali:**
 - Route No.: The vehicle Route Identity
 - Vehicle No.: The Vehicle Identity of the bus
 - Time: Estimated Time of Arrival of the bus at the given bus Stop
 - Service Class: Type of service like Limited stop Service etc
 - Destination: End point of the Trip
 - Via – en-route information
- **Number of characters:** Minimum of 32 characters per route
- **Number of lines of display:** Minimum 2 lines display for Bus Stop LED Display and Minimum 6 lines display for Bus Terminal LED Display
- **Intensity of display:** Minimum of 2500 candelas (luminous intensity) or (informally called Nits) / sq. Meter assuming that no display board would be installing directly under the sunlight.
- **Maximum Width & Length available at the bus stop / bus terminals:**
 - Bus Stop: 200 mm X 900 mm
 - Bus Terminal : 600 mm X 900 mm
- **Capability for self check remote configuration:** Configuring Real time clock, assessing the status of LED in a display remotely, storage capacity to handle for instance
- **Storage capacity inside the display:** Minimum of 20 route information for 30 minutes (bus stop), automatic update of the firmware; minimum of 50 route information for 30 minutes at Bus terminals
- **Display colour:** Multi-colour
- **Update of display:** Real time
- **Communication Protocol between the display unit and the central server:** GPRS /TCP/IP, FTP, HTTP
- **Controller and Antenna:** Built-in
- **Banner Advertisement capability:** Should support at least 10 messages in English and Bengali to support Banner information. The size of each message should be minimum 40 characters. Language text should fit within the display size. The systems should support at least 10 Graphic messages.
- **Environmental specifications:**
 - (a) Temperature: 0 to +55 deg C
 - (c) Thermal cycling: 5 Deg C/mt
 - (d)Vibration: 2 g
 - (e)Sealing: IP 67
 - (f)Humidity: 90% RH
 - (g)Drop : 1 mt on all faces

- **Minimum life of the display system:** 100,000 hours
- **Power supply:** 90 V to 250 V AC; 50 VA
- **Data format:** Bit map or Unicode
- **Display format:** Fixed and scrolling

12.3 PIS through Mobile apps, SMS and Web portals

- Selected agency shall have to develop web portal/ web portals, which shall be linked to the existing CSTC Portal to download Route information, Route schedule etc. by commuters. This information must be accessible using WAP enabled mobile phones also. The web portal may have facilities for Pass application, Cards top-up using credit/debit/net banking facility as well as Google map Integration required for VTS/PIS etc.
- The selected agency shall develop **mobile apps for Android OS based Mobile phones to start with. Later iOS and Windows Mobile OS support will also be developed.** Apps shall include a mobile application to help passengers to get information about the buses, search and view bus schedules on various routes and deliver ETA based on their real time location. System shall show the time table of the buses, fare structure etc. System will also provide a Smart card recharge facility
- The selected agency shall also develop a Pull SMS based mobile information facility using a SMS gateway for citizens/commuters not having access to Internet in their mobile phones. Using this facility, commuters will be able to receive ETA/Current Location of a Bus etc. by sending SMS in a specific format to a shortcode/ mobile number. Format of the SMS may be decided by the agency in agreement with CSTC (For example: **ETA Tollygunge V1**, where V1 is Bus No and Tollygunge is the Bus stop. This SMS should pull ETA for Bus V1 at Tollygunge bus stop).

Note: The charges for each SMS transaction shall be either levied on Commuters or to be borne by CSTC, as may be decided by CSTC later. Therefore out of scope of this RFP.

12.4 POS Terminals: Min indicative technical specifications (Qty: min 40 Nos.)

- a) **Screen size and Resolution:** minimum 15" with 1024 x 768 Resolution
- b) **CPU clock speed and memory:** minimum 1.6 GHz with 4GB DDR3
- c) **Network support:** 1Gbps LAN port
- d) **Operating System:** Industry standard

- e) Electronic Cash Drawer and MSR (Magnetic Swipe reader)

Note: All the consumables such as Paper Rolls/ Printing stationary required at POS shall be arranged by CSTC, therefore out of scope of this RFP

12.5 LED Video wall and Workstations at Command Control Center (Qty: 1 LED Video wall, min 6 Nos. of Workstations)

Functional Requirements:

- Display live and complete ITS solution on multiple workstations simultaneously using a TCP/IP Ethernet network
- **Minimum indicative quantity of Workstations is 6 Nos. for CCC**, which may be dedicated/ shared for live monitoring and control of AFCS, PIS, VTS, Fleet management (Route, Incident management etc), BI and MIS etc.
- The system at CCC shall provide the capability for multiple web-based display consoles to configure, manage, display, and control various components of ITS solution for administrative and operations purpose.

Minimum indicative technical specifications:

- **Configuration:** Black light LED Video wall of 3 x 3 of Super narrow Bezel LCD panels of 55"
- **Resolution:** 1920 x 1080
- **Pixel Pitch:** 0.53 mm
- **Contrast Ratio:** 4000:1
- **Color Capability:** 1.07 Billion
- **Response Time:** 8 ms
- **Viewing Angle:** H : 178°, V : 178°
- **Scan Rate:** H: 30~75kHz, V: 50~85Hz
- **Video:** NTSC, PAL, SECAM, 480i, 480p, 720p, 1080i, 1080p
- **Standard Inputs:** 1x Digital DVI-I ; 1x Digital DVI-D ; 1x CVBS BNC ; 1xComponent Video BNC ; 1x 5BNC (RGBHV or YPbPr) VGA
- **Standard Outputs:** 1x Digital DVI-D ; 1x CVBS BNC
- **Control:** RS-232/RS-422/IR
- **Power Consumption:** < 160W
- **Standby Mode:** < 2W at 110V
- **Temperature:** 0°C - 35°C (32°F - 95°F)
- **Humidity:** 10% - 90%, non-condensing
- **Operating Life:** > 50,000 hours
- **Maintenance Feature:** Quick Swap Modules
- **Video Wall Tiling:** 20 X 15

- **Display controller:** Controller to control Display module in a matrix of 2 (C) x 2 (R) with 4 outputs, DUAL LAN input & 8 DVI inputs along with necessary software
- **Processor specs:** Quad core 64-bit, 2.0 GHz CPU or latest
- **RAM:** 8 GB minimum
- **HDD:** Min 500 GB Hard Disk (Hard disk Capacity should be upgradable)
- **Network support:** Dual-port Gigabit Ethernet Controller inbuilt, Support for Add on Network adapters, Support for Optical Fiber interface Adapters
- **Accessories:** DVD-R,DVD+RW,, Keyboard, mouse
- **OS Support:** 64-bit Operating Systems Windows / Linux or equivalent industry standard
- **Power Supply:** (1 + 1) Redundant AC-DC high-efficiency power supply w/ PFC, AC Voltage 100 - 240V, 50-60Hz
- **Chassis:** 19" industrial Rack mount movable, Front Panel should have lockable Door to Protect Drives
- **Wall configuraution:** 4 DVI-D Outputs
- **Resolution output support:** 1920x1200 per output minimum
- **Universal Inputs:** 2 DVI Inputs
- **Redundancy Support for:** Fans, Power Supply and LAN
- **Display & Controller:** should be from the same manufacturer

12.6 Data Center and Command Control Center (CCC) related items

a) Database Server specifications (Qty: 2 Nos)

<u>S. No.</u>	<u>Parameter</u>	<u>Minimum required specifications</u>
1	Processor	Minimum 2 Socket x 8 Core processor (with min 2.90 GHz clock speed or higher)
2	Memory	Minimum 96 GB 1333 MHz registered ECC DDR3 memory with min. expandability upto 256 GB
3	Cache	Minimum 16 MB L3 Cache per processor
4	HDD	4x 300 GB 10K RPM SAS Hot Plug drives
5	Network controller	4 Nos of Gigabit Ethernet Ports

6	Server connectivity to SAN	Support for Dual port 8 Gbps FC Host bus adapter
7	DVD Drive	1 x DVD-RW Drive (either external or internal)
8	Power Supply	Dual redundant hot-pluggable power supplies
9	Cables	Required cables should be supplied to connect the server HBA/HCAs to storage
10	KVM switch	Internal/external 8 Port KVM Console and switch with Color monitor, Keyboard and Mouse
11	Server management tools and system management processor	<ul style="list-style-type: none"> • Should be provided with GUI based server management console • Capable for generating pre-failure alerts for CPU, memory, hard disks and HS fan failures • Dedicated system management processor/controller to manage health of server, LEDs for Power on, System health, HDD activity, Diagnostics (with error code) etc. • Integrated Remote management controller
12	Resource management	Support for tools with capability of dynamic allocation of resources (CPU, Memory, I/O)
13	Certifications	FCC, UL/CSA, RoHS, CE compliance
14	Operating System	64 bit OS: Hardware compatible Operating system with High Availability (HA) feature
15	Clustering and High availability	Database servers to be configure in Active/Passive clustering for high Availability OS
16	Warranty	3 years 24x7 support with comprehensive onsite warranty for all components + additional 2 years AMC

b) Application Server specifications (Qty: 2 Nos)

<u>S. No.</u>	<u>Parameter</u>	<u>Minimum required specifications</u>
1	Processor	Minimum 2 Socket x 8 Core processor (with min 2.60 GHz clock speed or higher)
2	Memory	Minimum 32 GB 1333 MHz registered ECC DDR3 memory with min. expandability upto 256 GB
3	Cache	Minimum 16 MB L3 Cache per processor
4	HDD	3x 300 GB 10K RPM SAS Hot Plug drives
5	Network controller	4 Nos of Gigabit Ethernet Ports
6	Server connectivity to SAN	Support for Dual port 8 Gbps FC Host bus adapter
7	DVD Drive	1 x DVD-RW Drive (either external or internal)
8	Power Supply	Dual redundant hot-pluggable power supplies
9	Cables	Required cables should be supplied to connect the server HBA/HCAs to storage
10	KVM switch	Internal/external 8 Port KVM Console and switch with Color monitor, Keyboard and Mouse
11	Server management tools and system	<ul style="list-style-type: none"> • Should be provided with GUI based server management console • Capable for generating pre-failure alerts for CPU, memory, hard disks and HS fan failures • Dedicated system management processor/controller to manage health of

	management processor	server, LEDs for Power on, System health, HDD activity, Diagnostics (with error code) etc. <ul style="list-style-type: none"> Integrated Remote management controller
12	Resource management	Support for tools with capability of dynamic allocation of resources (CPU, Memory, I/O)
13	Certifications	FCC, UL/CSA, RoHS, CE compliance
14	Operating System	64 bit OS: Hardware compatible Operating system with High Availability (HA) feature
15	Clustering and High availability	Application servers to be configured in Active/Passive clustering for high Availability OS
16	Warranty	3 years 24x7 support with comprehensive onsite warranty for all components + additional 2 years AMC

c) Web Server specifications (Qty: 1 No.)

<u>S. No.</u>	<u>Parameter</u>	<u>Minimum required specifications</u>
1	Processor	Minimum 2 Socket x 8 Core processor (with min 2.60 GHz clock speed or higher)
2	Memory	Minimum 32 GB 1333 MHz registered ECC DDR3 memory with min. expandability upto 256 GB
3	Cache	Minimum 10 MB L3 Cache per processor
4	HDD	3x 300 GB SAS Hot Plug drives

5	Network controller	4 Nos of Gigabit Ethernet Ports
6	DVD Drive	1 x DVD-RW Drive (either external or internal)
7	Power Supply	Dual redundant hot-pluggable power supplies
8	KVM switch	Internal/external 8 Port KVM Console and switch with Color monitor, Keyboard and Mouse
9	Server management tools and system management processor	<ul style="list-style-type: none"> • Should be provided with GUI based server management console • Capable for generating pre-failure alerts for CPU, memory, hard disks and HS fan failures • Dedicated system management processor/controller to manage health of server, LEDs for Power on, System health, HDD activity, Diagnostics (with error code) etc. • Integrated Remote management controller
10	Resource management	Support for tools with capability of dynamic allocation of resources (CPU, Memory, I/O)
11	Certifications	FCC, UL/CSA, RoHS, CE compliance
12	Operating System	64 bit OS: Hardware compatible Operating system
13	Server to SAN connectivity	Support for Dual port 8 Gbps FC Host Bus Adapter
14	Warranty	3years 24x7 support with comprehensive onsite warranty for all components + additional 2 years AMC

d) Backup Server (Qty: 1 No.) – Optional, if DC is set up at CSTC location

S. No.	Parameter	Minimum required specifications
1	Processor	Minimum 2 Socket x Quad Core processor (with min 2.40 GHz clock speed or higher)
2	Memory	Minimum 32 GB DDR3 memory with min. expandability upto 256 GB
3	Cache	Minimum 10 MB L3 Cache per processor
4	HDD	3x 300 GB SAS Hot Plug drives
5	Network controller	4 Nos of Gigabit Ethernet Ports
6	DVD Drive	1 x DVD-RW Drive (either external or internal)
7	Power Supply	Dual redundant hot-pluggable power supplies
8	KVM switch	Internal/external 8 Port KVM Console and switch with Color monitor, Keyboard and Mouse
9	Server management tools and system management processor	<ul style="list-style-type: none"> • Should be provided with GUI based server management console • Capable for generating pre-failure alerts for CPU, memory, hard disks and HS fan failures • Dedicated system management processor/controller to manage health of server, LEDs for Power on, System health, HDD activity, Diagnostics (with error code) etc. • Integrated Remote management controller
10	Resource management	Support for tools with capability of dynamic allocation of resources (CPU, Memory, I/O)
11	Certifications	FCC, UL/CSA, RoHS, CE compliance
12	Operating System	64 bit OS: Hardware compatible Operating system
13	Server to SAN	Support for Dual port 8 Gbps FC Host Bus Adapter

	connectivity	
14	Warranty	3years 24x7 support with comprehensive onsite warranty for all components + additional 2 years AMC

e) SAN Storage (Qty: 1 No.) – Optional, only if DC is set up at CSTC location

<u>S. No.</u>	<u>Parameter</u>	<u>Minimum required specifications</u>
1	Operating System & Clustering Support	The storage array should support industry leading Operating System platforms including: <i>Windows2008</i> , <i>VMWARE</i> , and <i>Linux</i> .2. Offered Storage Shall support all above operating systems in Clustering.
2	Capacity & Scalability	The Storage Array shall be offered with minimum 2 TB Capacity, and shall be scalable to greater than 35TB using SAS drives
3	Processing Power	Offered controllers shall be based on latest processor technology to ensure that there is no bottleneck for IO communication.
4	Architecture	The storage array should support dual, redundant, hot pluggable, active array controllers for high performance and reliability Controllers shall be true active so that a single Logical unit can be shared by both controllers at the same time.
5	No single point of failure	Offered Storage Array shall be configurable in a No Single Point of configuration including Array Controller card, Cache memory, FAN, Power supply etc
6	Disk Drive Support	1. For SFF drives, Offered Storage Array shall support minimum 146/ 280 /450/ 600/ 900 GB hot pluggable Enterprise SFF SAS hard drives along with SAS MDL (500/1000GB) drives.

		2.For LFF drives, offered Storage Array shall support minimum 280/450/ 600 GB hot pluggable Enterprise LFF SAS hard drives along with SAS MDL (1000,2000&2800GB) drives.
7	Cache	<p>1. Offered Storage Array shall be given with Minimum of 2GB cache per controller in a single unit after removing the operating system over head</p> <p>2. Cache shall be backed up in case of power failure for indefinite time either using batteries or capacitors or any other equivalent technology</p>
8	Host Ports & Backend Ports	Offered Storages shall have minimum of 4 host ports for connectivity to servers running at 8 Gbps speed. Offered Storage subsystem back end engine shall be running on latest SAS (6Gbps) loop Speed.
9	Ports bandwidth	Offered storage shall be end to end 6Gbps where each drive and drive shelf shall be connected through dual active-active paths.
10	Performance	Shall have capability to use more than 60 drives per array group or raid group for better performance.
11	Load Balancing & Multipath	Multipath and load balancing software shall be provided, if vendor does not support MPIO functionality of Operating system.
12	Maintenance	Offered storage shall support online no disruptive firmware upgrade for both Controller and disk drives
13	Storage Array Configuration & Management software	Vendor shall provide Storage Array configuration and Management software.
14	Remote	Offered storage subsystem shall support storage based replication to DR location.

	Replication	
15	Warranty	3years 24x7 support with comprehensive onsite warranty for all components + additional 2 years AMC

f) OPTIONAL items, as may be required if DC facility is setup in CSTC location

- L2 switches – 5 Nos.
- L3 switches - 2 Nos.
- Suitable Firewall and Intrusion Prevention System (IPS) etc.
- Antivirus – 1 No.
- 42U standard Rack – 2 Nos.
- DG Set and Power backup equipment as required for DC
- Fire fighting, Cooling and Electrical, LAN, Internet connectivity work for DC

f) Other items, as may be required in CCC facility

- 10 KVA UPS with minimum 2 Hrs backup
- Civil work, Interior, Furniture, Fire fighting, Cooling, Electrical, LAN, Internet connectivity work for CCC
- Access control equipment for CCC

Note: Costs for all the consumables such as Diesel fuel, Electricity charges etc. required for DC (if located at CSTC) and CCC shall be borne by CSTC, therefore out of scope of this RFP

13 Future Needs

To ensure the future integration of any other Smart Card, the vendor should make necessary provisions in the AFC system to ensure transaction security and future integration. The likeliness of categories of the keys to be managed is as under:

- a. Kolkata Metro Smart Card Keys
- b. CSTC Smart Card Keys
- c. Any other Smart Card Keys
- d. Compatible to open Pay environments – Banks issued contactless Master, Visa Cards.
- e. Other (Active Fare, Personalized, non-Transit Usage) Keys

The system should have provision to implement business rules as required by CSTC or any other agency authorized by CSTC.