The Hashemite Kingdom of Jordan

هيئة تنظيم النقل البري
LAND TRANSPORT REGULATORY COMMISSION

Request for Proposals (RFP)
for the

Design, Implementation, and Operation of an Intelligent Transportation System (ITS) for Public Transportation in Jordan

A Multitenant, Standards-Based, Account-Based, and Closed Payment System

November 2019

Tender No. 2/2019/special supplies

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1 Introduction

1.1 Overview

The Land Transport Regulatory Commission (LTRC) in the Hashemite Kingdom of Jordan is seeking proposals for the design, development, operation, and maintenance of a national intelligent transportation system (ITS) for public transportation in the country. The system being sought includes a multitenant, standards-based, account-based, and closed payment system.

This document includes 7 sections. The remainder of this section describes the national transportation context in Jordan. Section 2 outlines the assignment, presenting its context, objectives, and phasing and duration. Section 3 presents the scope of work for each phase, while Section 4 outlines the proposal submission process and evaluation criteria. Sections 5 and 6 include further technical details about the assignment, and Section 7 lists the tender's special conditions. This RFP also includes (4) annexes.

Transportation in Jordan has long been characterized by an over-reliance on the private car. Increasing population growth and rapid urbanization have exacerbated the problem in recent years. The number of private cars in the country is growing today at an estimated 6.5% per year[1].

The lack of adequate public transportation options is a key factor that has contributed to this trend. The existing system, comprising of large buses, minibuses (known locally as "Coasters"), and shared taxis, provides a service that is often unreliable. Users of the system are largely captive users, who have no other affordable options.

These challenges are especially difficult for women. Jordan has one of the lowest female participation rates in the workforce worldwide, and recent studies have shown that a significant number of women do not work because of the lack of safe and reliable transportation options[2].

Improving public transportation services is critical to economic growth in the Kingdom. The Government of Jordan (GoJ) has acknowledged this issue and has made revamping the sector among its top priorities3. To that end, a number of projects and initiatives are already underway. Two bus rapid transit (BRT) systems are under construction (one within Amman and another connecting Amman to Zarqa, BRT is not under the scope of the pilot required within this RFP. However, the system being implemented through this project is intended to be a national system that will cover all modes of public transport in Jordan, including—in the future—BRT), an ambitions bus reform initiative is underway for the cities of Jerash, Irbid, Madaba, Zarqa, and Salt, and new service-based operational models are

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[1] "Vehicle Ownership in Jordan: A Comparative Perspective", Jordan Strategy Forum, 2018
[2] Sahar Aloul, Randa Naffa, and May Mansour, "Gender in Public Transportation: A Perspective of Women Users of Public Transportation", Conducted by SADAQA and published by the Friedrich Ebert Foundation, 2018
[3] "Government Priorities for 2019-2020", Prime Ministry of Jordan, 2019

being introduced in Amman, where the municipality's investment arm recently purchased 135 new buses.

Among the challenges that have hindered improvements in public transport is the system's **fragmentation**, with approximately 85 percent of the Kingdom's public transport fleet being individually owned and operated.

To facilitate the consolidation process, the government and parliament introduced a paragraph in the Passenger Transport Law No. 19/2017. Paragraph A of Article 13 of the law states that licensed individual operators have to adjust their status within five years from the date at which the law came into effect (May 2017). This adjustment of status, the law states, can be achieved by either merging into a single company or being part of a management company in which the individual operators retain ownership of their vehicles.

It should be noted that the main public transport regulator in Jordan is LTRC, the entity issuing this RFP. LTRC is an independent government commission whose board is chaired by the Minister of Transport.

LTRC has full authority for planning and regulating public transport outside of Greater Amman and the Aqaba Special Economic Zone. In those areas, the local "competent authority" (as it is referred to in Law. No. 19/2017) plans and regulates public transport in coordination with LTRC. In Amman, this authority is the Greater Amman Municipality (GAM), and in Aqaba, it is the Aqaba Special Economic Zone Authority (ASEZA).

1.2 Context

1.2.1 Fare Management and Service Contracts

In the current mode of operation, individual transport operators have a license for a specific route and provide services on this particular route **without any imposed service standards**.

Fare levels and route alignments are set by the transport regulator. Operators provide the service and keep the fare revenue. Under this scheme, operators decide on their schedule and sometime adapt the routes to maximize their revenues and to balance their operation costs. As a result, many operators often choose to wait at bus terminals until their vehicles are full, rather than operate on a fixed schedule.

To address this challenge and to facilitate the consolidation process, LTRC aims to establish service contracts with public transport operators. Under such contracts, operators would be required to achieve certain key performance indicators (KPIs) and abide by service standards. The operations model would evolve into one with shared commercial risks where operating costs could be compensated. This would guarantee financial viability of the operation and give incentives to operators for satisfying the higher services standards of the contract.

In each city, LTRC is or will be consulting with operators to identify the ultimate arrangement for the most appropriate contract implementation and the risk sharing scheme.

In any case, LTRC must set up a mechanism for monitoring operations, to ensure the new service contracts are successful. Fare revenues and ridership must be monitored to estimate the amount of compensation (if needed) and to adjust operations as needed. Some contracts may involve the government collecting some or all fare revenues and paying the operators a fixed amount for providing the service. Others may require more complex arrangements in which operators have incentives to both abide by service standards and increase ridership.

1.2.2 Improvement of Service Reliability

Another important aspect of the new system is that it would potentially make real-time information available to riders and, by doing so, make the service more reliable. One of key challenges facing public transport users (and potential users) in Jordan is the lack of information about the system. Up until a few years ago, no route maps were available, nor was there any information on the locations of public transport vehicles and their expected time of arrival at a certain location.

The GoJ has been giving special attention to this issue, as explained below:
- In October 2018, LTRC formally adopted a public transport trip planning smartphone app developed by a local advocacy group[4].
- In December 2018, LTRC and the Ministry of Transport (MoT), in collaboration with the Ministry of Digital Economic and Entrepreneurship (MoDEE) and other entities, organized a public transport hackathon. Participants in the hackathon were given access to the application programing interface (API) of the app mentioned above, as well as live tracking data for two buses provided by a public transport operator. Participants then built their own app-based solutions, of which four were selected as winners.
- In the late summer of 2019, LTRC is expected to add tracking devices to approximately 200 buses and make the data available to the hackathon winners who can, in turn, develop their solutions further and make them available to the public.

This RFP is, in part, a continuation of the efforts listed above[5]. LTRC intends to provide some of the data that will be available through the new ITS solution **openly**, allowing local developers and entrepreneurs to participate in building solutions that would improve the rider's experience. This open data approach is an important element that bidders should take into account when developing their proposals. Special attention should be given to facilitating this approach by making use of data formats such as **General Transit Feed Specification (GTFS)** and others.

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[4] The public transport advocacy group *Maan Nasel* (Arabic for "Together We Will Arrive") published the first public transport map for Amman in 2016. A year later, the group launched a smartphone app that included a trip planning feature (providing static information with no schedules, given there were none). In October 2018, the government formally adopted the app, expanded its scope to include routes outside of Amman, and moved the app to its e-government platform.

[5] It should be noted that there have been other efforts to provide better information to public transport users. GAM's recently launched bus service (Amman Bus) has its own schematic map (see www.ammanbus.jo), and the largest public transport operator in Jordan (Comprehensive Multiple Transportation Company, CMTC, known in Arabic as "Al-Mutakamilah") launched its own smartphone app allowing user to track buses in real time.

2 Assignment Outline

2.1 Objectives and Benefits

The assignment contained in this RFP involves the design, implementation, operation, and maintenance of an ITS solution for public transportation in Jordan. Specifically, the assignment includes:

1. Design and implementation of a nationwide system
2. Procurement and installation of devices for pilot routes (in the city of Jerash and on some university routes)
3. Operations and maintenance of all components included in this RFP

The system is comprised of the following sub-systems:

- Required systems:
    - Automatic Fare Collection System (AFCS)
    - Clearing House System (CHS) integrated with AFCS
    - Automatic Vehicle Location System (AVLS)

- Optional items: items that may/may not be purchased in this stage based on the client decision (each of which should be priced separately by all bidders):
    - Passenger Information System (PIS)
    - Passenger Counting System
    - CCTV System

The system is a multitenant (multiagency), standards-based, account-based and closed-loop payment system extendable to an open-loop payment system[6]. The system aims to achieve the following objectives:

- The enforcement of new service contracts based on strict KPIs
- The introduction of different fare products (such as reduced tickets for certain groups, day passes, and so on)
- The improvement of operational efficiencies by reducing dwell time at stops and stations (Dealing with cash often requires more processing time.)

The expected functionalities of the system include:

- Compatibility among city-level AFCS allowing a rider to use the same fare media in different cities (interoperability)
- Compatibility of the clearing house with the existing AFCS in Amman. Greater Amman Municipality (GAM) currently using "KenKart System". We shall emphasize on the ability of this system to be open. It will be the responsibility of Amman's AFCS to integrate with this system and not vice versa. Therefore, it is important for this system to be open, standards based and have clear interfaces through APIs.
- A fare tracking and redistribution mechanism among operators

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[6] Future upgrade to open-loop payment should be consistent with Jordanian government regulations and platform, notably the Jordan Mobile Payments System (JoMoPay), developed by the Central Bank of Jordan.

- A user-friendly interface to extract and analyze the data at the national level as well as the city level

More specific benefits to different stakeholders are listed below:
- Rider:
    - Provide a seamless journey
    - Improve the experience in terms of payment options
    - Provide added-value services by enabling third party services
    - Make information about fares and fare policies available and easily accessible
    - Provide benefits from new discount schemes (e.g. resulting from integrated fares, fare capping, etc.)
    - Reduce boarding times
    - Provide better information on locations/arrival times of vehicles
- Bus operating company:
    - Reduce dwell times
    - Make available travel pattern data, which is useful to support service planning
    - Increase customer loyalty
    - Increase system usage and market penetration
    - Enhance security
    - Reduce total cost of ownership (due to the system's open architecture)
- Transport regulator:
    - Improve transparency and reliability of fund transfer in a gross cost contract
    - Make available travel pattern data, which is useful to support service planning
    - Provide flexibility in defining and implementing new fare policies and structures

Operations and maintenance (O&M) of the system are key elements of this RFP. Tasks within O&M include:
1. Technical support and Maintenance of all components
2. Clearing house operations
3. Central data system operations
4. Assisting LTRC in monitoring bus operators through providing regular reporting as required by LTRC
5. Card management and Riders' account management Call Center operations

2.2 Phasing & Duration

The winning bidder will be responsible for the design, implementation, operation, and maintenance of the system and the installation, operation, and maintenance of the pilot for the city of Jerash and university routes.

After the operations period ends, LTRC may choose to extend the contract with the winning bidder.

The assignment will be divided into four phases:
- Phase 1: Inception
- Phase 2: Systems Design
- Phase 3: Implementation & Piloting
- Phase 4: Operations & Maintenance

The duration of each phase is presented in Table 1. The total duration of the contract will be **66 months**.

Table 1: Duration of Each Component in the Assignment

Phase	Start Date	End Date	Duration
Phase 1: Inception	Project Commencement Date (C)	C + 1 month	1 month
Phase 2: Systems Design	C + 1 month	C + 5 months	4 months
Phase 3: Implementation & Piloting	C + 5 months (begin gradual installation on buses)	C + 8 months (complete installation on all buses)	3 months
Phase 4: Operations & Maintenance	C + 6 months (upon installation on first batch of buses)	C + 66 months	5 years (60 months)

2.3 Partners

The winning bidder will be working primarily with the client, LTRC. Other partners with whom they bidder may interface include the following:

- MoT (Ministry of Transport)
- GAM (Greater Amman Municipality) as well as the private company it recently established to operate the new bus service "Amman Bus" and its ITS implementing partner
- MoDEE (Ministry of Digital Economy and Entrepreneurship)
- Municipalities (through the Ministry of Local Administration)
- Bus operators (individuals and companies)

3   Scope of Work

This section presents the detailed scope of work for the assignment's four phases.

3.1   Phase 1: Inception

Three weeks after receiving the notice to proceed from LTRC, the winning bidder will submit an Inception Report that includes the following:

- Validation of the concept and architecture presented in this RFP
- Detailed staffing and work plan for Phases 2, 3, and 4
- Revised methodology and understanding of the assignment based on field observations and information provided by the client
- Communications plan to ensure seamless coordination with the client and partners throughout Phases 2, 3, and 4

It is LTRC's intention to review the submittal and provide comments such that the final Inception Report is adopted and approved one month after the issuance of the notice to proceed.

3.2   Phase 2: Systems Design

Phase 2 will commence after the approval of the Inception Report. The solution will be designed and implemented following an iterative and incremental approach. Design shall be reviewed and approved before the implementation.

3.2.1   Design Review and Approval

In order to ensure that the winning bidder is addressing all the requirements of the assignment adequately, the proposed design and solution shall be subject to two design review cycles. The design will be reviewed by LTRC after receiving the design documents as scheduled in the project plan. The design documents' main objective is to ensure that the provided solution **is not vendor locked and is built based on best practices, open architecture, and interoperability**.

The following documents shall be provided to LTRC for the design review
1   Detailed system architecture diagrams.
2   Detailed data architecture and data flow diagrams.
3   Complete database schema and data dictionary. This will act as the core for building the Public Transport Reference Data Model for the country in compliance with the requirements for the ITS Central Data Registry and Data Dictionary (e.g. ISO 14817). Bidders can suggest different reference data models that could be used for all other cities.
4   List of all interfaces and APIs supported in the Central Data system (CDS).
5   Full mockups of mounting hardware for all fleet types.
6   Manufacturing documentation showing compliance of hardware equipment with related ISO standards.
7   Detailed software specifications for all newly developed/provided software required by the system.
8   Detailed hardware specifications required to run and operate the proposed system.

9   Bidders shall address current standards that apply to offline transactions. Solution for offline support, when connectivity is down, and any of the system's components cannot communicate with the CDS. and .

10   Installation plans for each location and bus type.

3.2.2   Prototype and Showcase Based on the Agreed Design

The Bidder should provide a showcase for running the process end-to-end. The test showcase should show the following:

- Use of different smart cards issued by different issuers to ensure ticketing interoperability (Currently there are no issuers except in Amman, but in the future the system should support cards issued by universities, employers and banks in addition to LTRC cards)
- Show the performance of the system (end-to-end)
- Provide a prototype installation for on-board equipment
- Prototype for card inventory management and distribution
- Prototype for the running software showing how fare calculation and payment are done

3.2.3   Final Design

Based on the feedback on the design and prototype test cases, the winning bidder might need to provide updated design for final approval. The final design should also cover the following items:

- Fare capping implementation options
- A detailed requirement for handling and processing cards (EMV), integration with payment gateway and payment processing which comply with ISO/IEC 8583 and PCI DSS and local regulations. Supporting EMV is required. The system will start as closed loop but eventually will support both payments types in the future (closed and open). Forward compatibility is a must.
- Finalize all settlement and clearing procedures including retail provider handling cash payments[7]
- Final testing and cutover plan (We expect high available system, so we expect the winning bidder to provide a recovery plan, regular backup and ability of the system to recover from any type of failure without any loss of data or compromise its integrity.)
- Final design documentation
- Final working Prototype

3.3   Phase 3: Implementation & Piloting

The Implementation & Piloting phase will include:

- Supply, customize, install, commission, and maintain a secure and integrated AFC system to be operated for the LTRC
- Install onboard equipment on specific routes, as listed in Annex 1
- Enable the system for testing by the riders. Cash ticketing or paper ticketing may also be supported.

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[7] The ability to handle cash payments will be discussed during the Inception phase. LTRC may choose to not allow cash payments from the start of operations or to phase out cash payments gradually.

- Test loading passes into smart cards for specific organizations (e.g. universities)
- Test fare purchase and creating accounts by individual riders
- Examine the calculation and data in the CDS
- On board equipment installations for all fleet types
- Final as-built Documentation

As indicated in Table 1, this phase has a duration of 3 months, during which equipment will gradually be installed on all vehicles included within this RFP. The first batch of vehicles, however, should be ready for operation within one month. Once operations begin on the first batch, Phase 4 will start and will run in parallel to Phase 3.

More details about specific tasks included within this phase are included in the sub-sections below.

3.3.1   Network
The winning bidder will be responsible for designing, building, and testing the network. The WiFi network will be covered under the system hardware warranty and maintenance agreements. Currently buses have no installed devices. Bidders should provide all devices and setup, configure to operate with the backend systems with the Cellular connection.

3.3.2   Testing
- The winning bidder shall be responsible for a test plan which will be approved by LTRC.
- The winning bidder shall provide unit testing and integration testing for all equipment and devices. Integration testing between readers and CDS. Tests for applications running in the CDS. Tests for smart cards and management and distribution.
- Acceptance testing will be performed in the production environment with all components, subsystems, and third-party networks completely functional, operational, online, and in service.

3.3.3   Acceptance
Final user acceptance tests (UAT) will begin after full system launch and last for at least six months until final system acceptance is granted.

3.3.4   Training
The winning bidder shall provide installation instructions and training for installation of board equipment on all bus types:
- Operators training
- Maintenance staff training: require training on the installation and necessary first line maintenance of the equipment
- Administration training: for system management (e.g., website, back office, user security, etc.)
  - The fare collection system
  - Validators and operator consoles
  - Card readers
  - Agency (bus operator or beneficiary such as university) and riders portal

- Training and user guides to be used by customer service representatives and the customer service center
- Training on reporting system (and data warehouse)
- The expected number of attendees for training about (15-20) employees from LTRC and Ministry of Transport (MOT). The training for Bus Operators and drivers is also the responsibility of the Bidder as part of the operational cost.

3.4 Phase 4: Operations & Maintenance

The winning bidder will be responsible for operating and maintaining the systems, supporting infrastructure, and onboard equipment on the pilot routes listed in Annex 1 for five years following the implementation.

More details about specific tasks included within this phase are included in the sub-sections below.

3.4.1 Support

The winning bidder shall be responsible for:
- Hardware (onboard validators, operator console, CDS servers and network, offboard/garage network, POS, and vending machines) support during system acceptance
- Five-year warranty beyond system acceptance at a fixed price
- Hardware support after the expiration of the warranty at an annual price
- Additional smart cards at a preset unit price
- Additional onboard units at a preset unit price
- Specifications to procure smart cards elsewhere if they choose

3.4.2 Reporting

The winning bidder shall provide periodic reports as requested by LTRC.

3.4.3 Potential Rollout Phase

LTRC may choose to expand implementation to new routes after having enough time to analyze and learn from the pilot phase. This potential rollout phase should not be included in the bidder's price.

4 Proposal Submission and Selection Criteria

Bidders are requested to submit a technical and a financial proposal in separate, sealed envelopes. Details on the format and number of copies, as well as more instructions on the submission, can be found in the Special Conditions in Section 7.

4.1 Timeline

Following is the timeline for the tendering process:

- This tender was announced and the RFP made available for purchase on November27, 2019.
- The last date to purchase Tender Documents is on December4, 2019.at 2:00 PM, Jordan Local Time.
- Interested bidders will be invited to a bidder conference which will take place at the headquarter building of LTRC in Amman on December 5, 2019 at 12:00 PM, Jordan Local Time.
- Written questions on the RFP should be sent to LTRC by E-mail (Tender@ltrc.gov.jo), or handed to the secretary of tenders committee no later than December 8, 2019.
- LTRC will respond to all inquiries by December 12, 2019.
- Submissions of proposals must be received in sealed envelopes, at the address noted below not later than 12:00 PM (Jordan Local Time) December 23, 2019. Late proposals will not be considered.
- Technical proposals will be opened, in the presence of bidders who interested in attending, on the same date of submission at 1:00 PM(Jordan Local Time).

Contact information for LTRC is provided below. Questions can be sent by email, while proposals should be submitted as stipulated in the Special Conditions:

Land Transport Regulatory Commission
Amman – Jordan
Shafa Badran – Pr. Talal St.
Basement floor, Tenders Section
Phone: 00 962 6 5100500
Fax: 00 962 6 5164819
E-mail: Tender@ltrc.gov.jo
Website: www.ltrc.gov.jo

4.2 Technical Proposal Contents

The Technical Proposal should highlight the bidder's understanding of the assignment and his ability to fulfill its requirements. Past experience should be presented, highlighting aspects of that experience that are similar to this assignment.

The Bidder shall structure the Technical Proposal as follows using the corresponding templates/forms in Annex 2:

Section	How the Bidder should respond	Reference pages
Section-I: Understanding of the Project Topics to be included:		

Section	How the Bidder should respond	Reference pages
• Standards supported	Bidder should list all the standard supported. Supporting certificates should be provided in separate Annex and referenced here. The Bidder should clearly how this complies with all the standards provided in section 5.2	
• Multi-Modal	Bidder should describe how the proposed solution supports the followings 1. Rider purchase one ticket for a single route operated by single operator 2. Rider purchase one ticket for a single route with two segments. Each segment is operated by multiple operator. The Two operators operate within a boundary of a single city 3. Rider purchase one ticket () for a single route with multiple segments. Each segment is operated by a single operator but the route spans multiple cities • Bidder should clarify how this is linked to the clearing house and the financial settlements ** multi-modal here means a single mode (buses) since Jordan only now doesn't run metro/trams or other modes.	
• Account Based Ticketing	Bidder must explain clearly the architecture supporting the fare collection system that uses the Backoffice system to apply relevant business rules, determine the fare, and settle the transaction while clarifying the life cycle of the transaction	
• Closed loop payment architecture	Bidder must clearly describe how the solution works with closed loop payment architecture	
• Enabled for Open payment	Bidder must clearly describe how the system could be enabled in the future to accept open payment architecture. Bidder must show all the requirements for enabling the system to these payment methods.	
• Interoperability guarantee	Bidder should provide all the requirements so that any existing or any new system not implemented by the	

Section	How the Bidder should respond	Reference pages
	Bidder could be integrated with the system proposed by the Bidder (e.g. existing Greater Amman Municipality (GAM) system). This must include: • Detailed data architecture and data flow diagrams • Complete database schema and data dictionary. This will act as the core for building the Public Transport Reference Data Model for the country in compliance with the requirements for the ITS Central Data Registry and Data Dictionary (e.g. ISO 14817). Bidders can suggest different reference data models that could be used for all other cities. • List of all interfaces and APIs supported in the Central Data system (CDS). • Guarantee that LTRC can replace any device used in the solution by devices from another vendor given that the new devices are standard based ** Full details of the interoperability should be provided in a related Annex referenced by this point.	
Section II: Design and Implementation Approach		
	Bidder must provide the following in this section 1. Architecture of the proposed solution 2. Clear comments on all items listed under section 3.2 A clear reflection of items in section 3.2 in the work plan	
Section-III: Operations and Maintenance Plan		
	Bidder should provide a clear operation plan for LTRC based on the followings: 1. Five years operation and maintenance plan 2. Clearing house and financial settlements (section 6.1.2.7 && all items under 6.3.1) Bidder should also propose and SLA for	

Section	How the Bidder should respond	Reference pages
	all operations part with a clear set of KPIs	
Section IV: Past Experience		
	- Years in Business - Local Experience /Partner - Number of similar projects in complexity and scope - Operation and maintenance experience	
Section V: Work Plan & Staffing Schedule		
	1. Detailed Work plan 2. Installation plan 3. Risk Plan – covering all phases of implementation 4. Testing plan 5. Training plan 6. Staffing plan : Bidder should state clearly the role of the proposed staff and reflect that in the staffing schedule; Summary of qualification for each proposed staff focusing on the competencies relevant to the TOR	
Section V!: Compliance Sheets		
	Bidder must comment on all items under section 6.1. For **OOTB :** Bidder must provide evidence how this is supported (screen shot, explanation,…) **CUST:** Bidder must provide the level of customization needed. This should be reflected in the workplan clearly **3^{rd::}** Bidder must describe the interfaces and integration approach with third part system. **NOT:** Bidder may propose alternatives or roadmap plans to support these requirements ** Bidder should provide comments in the explanation and evidence column. Reference are provided only for extra detailed comments only	
Section VII: Annexes		

Section	How the Bidder should respond	Reference pages
	• Bill of material for all devices - with no prices in the technical offer • Bill of material for all hardware and software licenses offered- with no prices in the technical offer • Bill of material for all network and communication equipment - with no prices in the technical offer • Data sheets for all devices, servers, databases and network and communication equipment s • Detailed CV of proposed staff; Bidder should use unified template for all CVs • Brochures and relevant materials	

4.3 Financial Proposal Contents

The financial proposal should include a separate item for each of the following:

1. Design and development of systems (Phases 1 and 2) – lump sum in Jordanian Dinars (JOD)
2. Piloting and installation (Phase 3, including procurement and installation of equipment) – itemized prices in JOD
3. Operations and maintenance:
    A. Fixed annual payment for the first 13 million or below boarding per year on the routes and vehicles included within the pilot – JOD
    B. Percentage of the fare revenue collected for each boarding above 13 million boardings
4. Optional system components (see requirements section) – itemized costs in JOD

Prices should be inclusive of all taxes and customs and the offered prices for all (items including the optional items) should be valid for at least 1 year from the offer date, so that if the LTRC decides to purchase the optional items in the future these prices will be used.

The bidder will be evaluated based on items #1, #2, and #3 (A and B) above. Costs of optional components (item #4) will not be part of the evaluation, but should be priced by all bidders.

Financial evaluation metrics will be defined as follows. See section 4.4.2 for further details on the financial evaluation.

FIXED = Sum of items #1, #2, and 5 times item #3A
PCT = Percentage indicated in item #3B
Costs for optional components (#4) will not be part of the evaluation.

4.4   Evaluation Criteria

4.4.1   Technical Evaluation

The technical evaluation criteria are listed below.

Bidders that receive fewer than 70 out of 100 points will be disqualified and will have their Financial Proposals returned to them unopened.

During the evaluation process, the evaluation committee will assign each desirable/ preferred feature a whole number score (from 0 to 5) as follows:

Response	Score	Impact
OOTB	4,5	5- if the feature is meeting or exceeds the expectation 4- if the feature exists but showing deficiencies
CUST	3,4	4- if the feature is meeting or exceeds the expectation 3- if the feature exists but showing deficiencies
3rd	1,2,3	3- if the feature is meeting or exceeds the expectation 1-2- if the feature exists but showing deficiencies
NOT	0	if the feature / function does not comply or is not provided

Some items in the compliance sheet do not require the bidder to respond using the above categories. For such items, a score will be given out of 5 based on the degree of compliance

For all responsive Bidders the following evaluation sheet applies

Table 2: Technical Evaluation Criteria

Evaluation Criteria	Weight
Section I: Understanding of the project	10%
Section II: Design & Implementation Approach	15%
Section III: Operations & Maintenance Plan	15%
Section IV: Past Experience	20%
Section V: Work Plan & Staffing Schedule	10%
Section VI: Compliance Sheets	30%
Totals	100%

4.4.2   Financial Evaluation

Among bidders who received 70 or more points in their technical evaluation, a final score will be calculated giving the technical score a weight of 70% and the total price a weight of 30%.

The final score will be calculated as follows:
Final score = [Technical Score X 70%] + [Financial Score X 30%]

Where:
Financial Score = [60% X (Lowest FIXED among bidders / Bidder's FIXED)] + [40% X (Lowest PCT among bidders / Bidder's PCT)]

The bidder with the highest final score will be invited to contract negotiations with LTRC. The payment schedule will be agreed upon during contract negotiations. The operations and maintenance payment schedule will be partly based on the phasing plan for the pilot routes.

5   System Design & Architecture

LTRC aims to implement a modern AFCS to run on its bus network capitalizing on the new advances in technologies and standards. The AFCS will be account-based, supporting closed-loop payment system extendable to support open-loop payment system, built upon a CDS that manages accounts, process transactions based on different fare products, calculates fare payments, and distribute revenue between partners transparently. On-board validators work in two modes based on the status of the CDS which could be online or offline. On-board validators communicate with the CDS to perform fare validation and exchange transaction data. The smart ticketing features allows for either using one ticket for the journey or having one wallet with several tickets and in the future possibly one wallet for several services if applicable. There should be no limit to number of tickets. We here refer to mobile ticketing (e-Wallet) where the rider can purchase multiple tickets, store them on the mobile application and use them where applicable. Bidders should consider the account based ticketing where intelligence is moved from cards and validators to the back office.

The AFCS will be implemented using an open architecture approach, designed for expansion and integration by allowing for integration with 3rd party applications to integrate easily based on well-defined interfaces implemented using Open API. The system should allow for future expansion and should be scalable and flexible.

The architecture and design should support the following requirements:
- Moving intelligence from cards and readers to a more responsive CDS through an account-based solution
- Developing AFCS standards for back-office functions and not for smartcard standards
- Emphasizing the importance of using interoperable smartcards and smartphone apps to allow interoperability across city boundaries and across different services and modes in addition to the interoperability with the existing CDS such as the GAM system)
- Communicating with the CDS is conducted through APIs
- Creating a common data definition through portable meta-data for all data repositories inside the CDS
- Supporting data exchange for any intermodal journey, starting with planning and booking, right up to actual travel and payment even if the journey spans multiple operators or legs (it must support journey planner. The vendor should consider a single journey with multiple bus operators. Currently, there is no existing ITS systems but the architecture of the system should allow a rider to book for a journey)
- Providing flexibility in terms of fare and payment architecture allowing for:
  - Fare architecture
    - Account-based fare system
  - Payment architecture
    - Closed payment architecture
    - Open payment architecture
      Please note that the Clearing House (CH) based on closed loop does not required licensing from Central Bank of Jordan. The licensing and certification procedures from the Central Bank of Jordan is required when the CH will be open loop.

- In future phases, LTRC intends to accept open loop payments utilizing a variety of fare media and additional payment options such as Contact/contactless credit/debit/prepaid cards/e-wallet, etc. Bidders should clarify in their proposals how the proposed solution will be extended to meet the open-payment requirements. And Bidders should clarify in their proposals how the proposed solution will impact existing equipment and integration services
- Providing scalability, such that the performance of the system shouldn't degrade with continuous increase of the number of riders [horizontal/vertical scalability]
- Providing modularity, in which the scalability could be implemented at the level of each module (functional scalability)
- Supporting multiagency (multitenant) architecture, where each agency can only access its data with a possibility to integrate the agency CDS data with its internal systems through well-defined and secure APIs (Note: An "agency" in this context can refer to a bus operating company or a regulatory agency.)
- Allowing for, under perpetual license, the use of all open architecture interfaces, libraries, documents, and Intellectual Property (IP) for internal use and distribution to third-parties at no additional cost to the contracting agency or operators
- Using forward-capable technology [8]. For example, if the card validator currently doesn't support a smart card type and the vendor is working on supporting it in the future, this should be done without the need to replace existing validators. Current validators should be extendable and accept new modules to be installed.
- Providing flexibility in hardware replacement from the same vendor (the winning bidder) or another one

5.1   System Architecture

The AFCS is composed of the following modules and components:
- Field components:
  - Customer fare media
  - Validators [support all smart card types for account-based fare architecture]
  - Handheld Fare Inspection Device
  - Operator Console (Mobile data computer, On Board Unit (OBU)
- CDS components:
  - Account management
  - Fare management
  - Integration with bus tracking
  - Clearing house [open-loop payment enabled]
  - Customer portal
  - Agency portal

Vendors shall consider the reload network whether this is happening through a network of ATVMs or POS. ATVMS and POS equipment are required.

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[8] **Forward compatibility** or **upward compatibility** is a design characteristic that allows a system to accept input intended for a later version of itself.

5.1.1 Onboard Components

Support should be provided for different types of tokens, as well as possibly the need to support cash and paper tickets especially in the early stages of the piloting.

The main components are:

1 **Validators**: Validators are the customer-facing units used to validate fare media and accept fare payment. They should operate online when the connection with CDS is live or offline when the cellular network is not available. Validators should operate under different environmental/climate conditions and shouldn't be affected by surrounding signals. Requirements for validators are further detailed in the requirement section.

2 **Operator Console**: Will be used to show transactions done on the validator to the operator (Bus Driver) and also serve as an input device for the operator to accept cash payment and print tickets, if needed.

3 **Bus Network**: Bus network shows how onboard equipment will communicate with external interfaces specially the CDS. Buses should be able to use the network in garages to connect the CDS and Back office for synchronization purposes.

The vendor should provide all the onboard components needed as currently nothing installed in the Buses.

5.1.2 Inspector Devices

Components may include Handheld Fare Inspection Device.

5.1.3 CDS Components

The CDS should implement the following modules:

- Fare management
- Account management
- Clearing house
- Automatic Vehicle Location System (AVLS)
- Reporting and statistics

The CDS should implement all the components using:

- A modular approach
- A communication method between modules that follows a service-oriented architecture approach (An integration gateway is used to orchestrate the communication between modules.)
- A communication method between the CDS or portals and external interfaces that is done through APIs (preferable REST APIs) (A sample of required APIs is provided in the integration services section of the requirements.)
- A Map of Bus terminals and sub terminals locations attached and it is the Bidder's responsibility to provide the connectivity between terminals and data center

5.1.4 3rd Party Integration

The system should be open for integration with new or existing systems. These systems could be owned by the operators or third party added services integration (The bidder must provide an open architecture solution which allows third parties in the future to innovate and build additional services). If the operator console is not integrated with any AVL/CAD

system, the validator should provide GIS/route data with the transactions to the CDS tracking data component.

5.1.5   Integration with Banking System

The integration between the AFC and the Acquiring bank should be through a standard banking interface.

5.2   Standards Based Architecture

The winning bidder shall design the system to be compliant with relevant standards, laws, and regulations which include, but are not limited to:

- Financial transaction standards: cardholder information, transaction amount and transaction type in full compliance with the Central Bank of Jordan rules and regulations regarding e-payment systems and payment service providers communication protocols, transmission frequency for contactless fare cards (ISO 14443) and NFC (ISO 18092:2013).
- Physical characteristics of devices: length, width and thickness of contactless bankcard (ISO 7810)
- Security of information: how data is stored or transmitted to prevent tampering or theft
- Data requirements: such as the sequence and format of a data exchange between a contactless fare card and the card reader
- Interface with bank transactions should be PCI-DSS compliant
- IEEE 802.11 a/b/g/n standard for wireless data communications
- IEEE 802.11i standard for wireless data network security
- ISO/IEC 7810, Identification Cards – Physical Characteristics
- Payment Card Industry Data Security Standards (PCI-DSS)
- Payment Card Industry Payment Application Data Security Standards (PA-DSS)
- ISO 9001
- ISO/IEC‑8583 – Financial transaction card originated messages
- ISO/IEC 14443 Parts 1 through 4 – Contactless Smart Card Standard
- ISO/IEC 18092 / ECMA-340, Near Field Communication Interface and Protocol-1
- ISO/IEC 21481 / ECMA-352, Near Field Communication Interface and Protocol-2
- IEC 60068-2-27/ IEC 60068-2-64, for environmental testing of electronic equipment and products to assess their ability to perform under environmental conditions including extreme cold and dry heat, Vibration (sinusoidal), Shock
- ISO/IEC 18004 for QR code
- World Wide Web Consortium, Mobile Web Application Best Practices
- Web Content Accessibility Guidelines WCAG 2.0
- OWASP web application security
- Accessibility and usability standards
- we expect to have full details of any solution and preferably to be supported by similar projects implementations

6   Detailed Requirements

For each requirement listed in below sections, the bidder should provide his compliance level using one the following options:

OOTB = Functionality provided out of the box
CUST = Functionality requires customization/configuration
3rd = Functionality required 3rd party integration
NOT = Functionality does not exist

For each option, the bidder shall provide a detailed description of how the system meets or will meet the requirements. If the system doesn't meet the requirements, the bidder shall provide a clear roadmap if this will be supported or provide an alternative to the requirement.

6.1   Functional Requirements

6.1.1   Bus Infrastructure

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
6.1.1.1 Fare Media						
1.	Fare media will serve as a credential for a back-office account where the fare processing is handled by the CDS. This should reduce the need for complex field validation devices.					
2.	Following fare media should be supported • Contactless smart card • Limited use smart cards • Paper ticket • Smartphone via barcode or NFC-presentation as available. • Cash (Cash Management is optional. LTRC policy is to minimize or avoid cash transactions, therefore cash should only be considered as fallback plan. Bidders should enable their solutions for cash but it is not required to be implemented at the early stages) • Others such as virtual cards (please mention)					
3.	The AFCS shall accept closed-loop smart card issued by different agencies: • Smart cards for individuals or and institutions issued by the LTRC • Third-party compliant cards such as universities or businesses (employers)					
4.	Fare media shall be compliant with related national/ international standers and bidder should provide needed evidences					
6.1.1.2 Validators						
1.	Fare media validators shall perform but not limited to the following functions:					

| NO | Requirements | Response | | | | Proposal Explanation Reference |
		OOTB	CUST	3rd	NOT	(Page No/Section)
	• Support ISO7816 SAM-Size Card Slots • GPS integrated • Dust and water resistant • Over Voltage & Over Current Protection • Ensures that all transactions between card and reader are secure by supporting various forms of cryptography to protect the system from unauthorized access to the system and unauthorized transactions. The SAM provides a higher level of security by managing the security keys for all data exchange and transactions.					
2.	The validators should accept all fare media provided by the bidder mentioned in fare media section.					
3.	Bidder should clearly show all the measures that are proposed to handle offline validation of the Rider. Some standards like Calypso standard has some processing capabilities to provide a solution for offline validation based on risk management of the Rider. The System should be capable to upload transactions completed while offline to the CDS when the communication is restored. Account balances and whitelists can be maintained on the validators and transactions approved without back office approval. This would require the system to regularly publish account updates to the back office to keep accounts up to date					
4.	The validator should check on whether the presented card • Is valid • issued by a recognized entity • initialized, authorized for use • contains any valid fare product or travel authorization					
5.	The validator should do Blacklist check which must be downloaded on agreed frequency that will be determined in the design phase.					
6.	For travel passes, the System should verify that the travel pass is current, checks any applicable restrictions, approves or rejects its use, and stores or transmits transaction data for downstream processing and reimbursement					
7.	For time-based passes, the system should identify applicable fare products, checks period of validity and any other restrictions, approves / rejects the transaction, and stores / transmits the transaction record					
8.	For "tap-on, tap-off", the validator at entry may deduct the applicable fare and the validator. This option should be validated during the design phase. The Bidder should consider that the majority of the buses have only one door. Bidder should clarify the ability to implement all-door bus boarding to reduce dwell time specially for busy bus lines. For the pilot stage, single door and multiple doors should be implemented					
9.	Ability to handle journey-based tickets					

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
10.	Ability to handle free transfers or rebates for stored-value or journey-based tickets. the validator determines whether the transfer conditions have been met, and then decides whether to apply free / rebate transfer or treat it as a new trip and deduct the relevant value.					
11.	For fare-capping, the validator determines whether it is applicable, and applies the appropriate rules to determine what tariff to deduct (if any).					
12.	Payment validation and the deduction of fair value will occur when fare media are tapped on a payment validator. Upon presentation, the validator will determine the appropriate fare based on the defined tariff, ride history (including fare accumulation for fare capping), the presence of any institution-specific fare products, and other attributes contained in the account such as discount eligibility					
13.	The validator will have visual and audible indicators that provide distinctive messages for approval or denial of all fare media validations and validator status. Visual and audible indicators must be disability-people friendly. The validator display will convey transaction price, account balance, and other pertinent information					
14.	An operator console will be used to interface with the onboard validator and display fare validation results to the bus operator					
15.	The validators and/or operator consoles should have GPS capabilities. Location data collected from the validator shall be transmitted to the CDS, enabling the ability to track the current location of the bus and enabling third party services to geofence or project the location data into a map.					

6.1.1.3 Network

NO	Requirements	Response				Proposal Explanation Reference
1.	Communication in the field will occur using the existing onboard routers' cellular connection. Field transactions will be processed within hundreds of milliseconds so that data is available virtually immediately. (Currently buses have no installed devices. Bidders should provide all devices and setup, configure to operate with the backend systems.)					
2.	Currently Operators are individual operators and they do not own a garage. Operators may use the LTRC garage. The Bidder should provide a solution to connect buses with the CDS with using a garage. The WiFi available in garages which is routable to the internet can be used to download system updates to vehicles. It is the bidder responsibility to offer Wi-Fi or/and dedicated link for depots/garages—for the purpose of processing operations data, not necessarily for use by riders. The winning bidder shall supply, install, and configure Garage Communications Servers (GCSs) and wireless data networks at each of the garage facilities where the Client buss are parked and serviced. Via Wi-Fi communications, the Garage					

| NO | Requirements | Response | | | | Proposal Explanation Reference |
		OOTB	CUST	3rd	NOT	(Page No/Section)
	Communications Servers shall manage the secure and expedient transfer of all data transfers between the Central Data System (CDS) and the OBU see "On Board Unit (OBU).					
3.	The OBU shall not be connected to the Internet, it shall connect the bus business systems to the central system through a secure virtual private network through Business Mobile Gateway Router (BMGR)					
4.	The validators and/or operator consoles will have WiFi capabilities for communications with the back office while in the garage					
5.	The onboard modules will be able to communicate over Ethernet and TCP/IP, at a minimum. The communication interface to be used will be determined during design review and must provide adequate support for all system capabilities and integrations. Additional communication standards may be used such as SAE Vehicle communications standards (such as J1708/1939), Bluetooth, USB, etc. 3					
6.	The connection between the front-end devices and back office will be over a routable IP network. Where required, the connections will be secured using Transport Layer Security (TLS) and strong encryption, such as TDEA or AES. All data sent via the internet will be TLS-encrypted using the HTTPS protocol. Any IP communications must not preclude components of the system utilizing IPv6. 3					

6.1.1.4 Operator Console

NO	Requirements	OOTB	CUST	3rd	NOT	Proposal Explanation Reference
1.	For both authorized and denied transactions, the operator console will provide visual feedback similar to the payment validator, which may include information on the fare charged and the rider category associated with the account being used for payment					
2.	Operator consoles will be a ruggedized form factor to allow operation within the harsh onboard transit environment. They will also operate over a wide ambient temperature range and will be readable in nighttime and direct sunlight conditions. Operator consoles will be easily removed and swapped by authorized maintenance personnel with limited or no programming necessary to assign swapped devices to their new location.					

6.1.1.5 Portable Handheld Fare Inspection Device

NO	Requirements	OOTB	CUST	3rd	NOT	Proposal Explanation Reference
1.	The portable Handheld Fare Inspection Device is a light weight and user-friendly device that act as all in one. The device should have: (Please quote price for 10 devices) • RFID • ability to read all fare media • Wi-Fi • GPRS, GPS • High-brightness resistive touchscreen and numeric or QWERTY keypad • Rugged					

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
	• Has two integrated Secure Access Modules (SAM) for secure transactions • Wireless LAN connectivity					

6.1.2 Central Data System (CDS)

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
6.1.2.1	*General*					

1.	The CDS will maintain all accounts and perform fare calculation and validation for all fare payments. The CDS will enable the following system functions:
	• Account Management
	   o Creation of new accounts
	   o Association of accounts with third-party issued media
	   o Maintenance of account balances
	   o Loading of value to accounts
	   o Account transactions
	   o Account history
	• Fare Management
	   o Fare calculation
	   o Fare payments and transactions
	   o Capping
	   o Transaction history
	   o Account Balances
	• Settlements and Reconciliation
	• Data warehouse and reports
	• Tracking data					

2.	Each of the participating transit agencies will have access to the system's back office through a web management interface. Username and password access will allow them to see and manage only their portion of the system. They will be allowed to: • Set their fares by service • Include their fares in fare capping calculations (or not) • Honor capped accounts, or accounts that are riding free because of capping (or not) • Report on usage from their vehicles • Receive error reports from their vehicles					
3.	Based on password/user ID security, any authorized user will be able to download to any single device, any group of devices, and all devices: • Fare tables (one active, two pending) • New and updated application (executable) software files • Security access codes • Configuration files • Operational parameters • New and updated customer display screen text • New and updated Driver display text and selections • Any other information necessary for the operation and maintenance of the AFCS					

	devices • Authorized users will be able to select the date and time when any data download is to occur and to review and cancel any previously scheduled download.					
6.1.2.2 *Account Management*						
1.	The System should ensure having a unique account for all services					
2.	The System should support different types of accounts: **Prepaid / Postpaid accounts**: linked with fare media **Personalized / Anonymous accounts**: link to fare media **Third party payment**: Bill split approach **Account Group:** An account can be linked to a group of people. A given person may be linked to one account, several accounts					
3.	**Account Life-time:** The life-time of accounts can vary considerably. It can range from decades (in the case of bank accounts) down to days or even shorter (in the case of event-related and "disposable" prepaid accounts)					
4.	The system shall enable maintaining the accounts from: • The account management console • Through the portal/mobile app self-services • through APIs					
5.	Each Fare Media Account will be either Anonymous or Assigned to a Customer Account. Fare Media Accounts will include, at minimum: • Card Sequential Serial Number (which will be the Fare Media Account Number) • Account Creation Date & Time • Assigned Customer Account Number (if not Anonymous) • Account Type (e.g., Regular, Half-Fare, Student, etc.) • Account Value and Status (as required for the Master Status List					
6.	The CDS shall support the linking of several cards to a single account.					
7.	The CDS shall track the status of all cards in an inventory					
8.	The bidder shall provide a process by which an account is automatically created in the CDS for each card in the inventory upon receipt of cards from the card manufacturer					
9.	Card holders shall be able to add value to their accounts through several methods, including, but not limited to, one-time Internet transactions, "subscription" transactions (which occur automatically based on customer preferences), at the sales outlets of the Client, and at third party outlets, if any. The checkout page shall offer the following payment methods at minimum: - bank account / e-wallet - Payment Cards					

10.	Accounts linked to the fare media shall include information indicating, <u>at least</u>, the following items. • Unissued: the card has not been properly issued to a customer. • Issued: the card has been issued and activated, or the card has been reactivated after a previous suspension. This card can be used for all permissible transactions. • Suspended: the card or account has been suspended and cannot be used until reactivated. • Deactivated: the card or account has been permanently deactivated and can never be used again.					
11.	system should enable the setup and modification of customer accounts from a point-of-sale endpoint.					
12.	Each POS shall be fully integrated with the CDS allowing for conducting all the transactions applicable through the portal to be done from the POS including: • supporting offline transaction if the connectivity with CDS is down. • ability to print barcode tickets from the POS • issuance of smart cards • accept cash and credit card payments • support ACL authorization • easy to use with Arabic support • provides access through touch screens					

6.1.2.3 Fare Management

1.	The system will use stored value loaded to the customer's transit account to pay the base fare					
2.	The System should support the ability to set multiple fare capping time periods (daily, weekly, or monthly), each with its own price thresholds. All capping time periods will be calendar-based. Other capping techniques offered by the Bidder should be suggested in the proposal. Final decision about capping structure should be finalized during the design phase.					

3.	During the design phase, the following should be clarified:
	• If the System will support fare capping across participating agencies provided the agencies have the same capping price threshold
	• If the System will support fare capping across participating agencies provided the agencies have different price thresholds
	  o The system will support separate fare cap price thresholds based on the
	  o Service, Rider category
	  o Agency configuration					

4.	The System should provide a facility to communicate with customer about the fare cap status either through the customer portal or the					

	mobile application					
5.	The system should be capable to handle transfers by issuing time-based passes as the base fare. These passes will be configurable by LTRC to be valid for anywhere between 60, 90 and 180 minutes. All transfer transactions will be covered by the time-based passes. If the passenger subsequently boards another bus of the same or lesser service within the Potential bus Operator's transfer period (presently 90 minutes), the CDS will record the second boarding as a transfer and leave the passenger's stored value balance unchanged.					
6.	The Bidder should clarify if the System can support both having a fare capping and rolling pass (floating) functionalities (Rolling pass is a fare structure which is activated from the first tap/use. Vendors are requested to support all capping time periods which are calendar-based. Supporting both rolling pass and calendar based is optional.)					

6.1.2.4 Portal and Mobile Application General Requirements

1.	The design of the portal/mobile app should meet the following standards and best practices: • Accessibility and usability standards • Web Content Accessibility Guidelines WCAG 2.0 • OWASP web application security • Accessibility and usability standards					
2.	The Portal should be supported by a content management system (CMS) to enable LTRC end users to maintain and update portal content					
3.	User interface should support at least Arabic and English languages.					

6.1.2.5 Customer Portal

1.	The portal will be the primary means of account management and loading value for customers.					
2.	Customers will use one account to manage their account across both the mobile ticketing application and smart cards, including on the portal.					
3.	Using the customer portal, customers will have the ability to: • Register an account • View account balance • View transaction history • View fare capping status • Add value to their account • Provide a facility to enable customer to replenish the stored value • Set-up auto load to automatically replenish account value either by calendar date or by value threshold • Use their card number to manage their account (for anonymous customers) • Register a new or existing card for loss replacement • Report a lost or stolen card and request a replacement					
4.	The portal should support e-commerce functions: • Ability to browse fare products based on the category of the customer and					

	operator configurations • Support shopping cart behavior • Support check-out behavior • All purchase transactions shall be secured, and shall utilize no less than 128-bit Secure Socket Layer (SSL) encryption. • Ability to pay for the service using different payment methods • Ability to save and print the order and the invoice • Show historical orders and payments in the order page • Bank funding including credit cards and debit cards will be processed through a single payment gateway managed by a merchant bank or third-party payment processor. The gateway will support the processing of bank cards through the portal and mobile app • The payment Gateway identification shall be finalized during the design phase. • The payment gateway will be compliant with all appropriate security standards and the current version of PCI-DSS.					
5.	The General Public Web Portal shall display product selections tailored to the fare category profile of the user					
6.1.2.6	Agency Portal					
1.	The portal should serve two types of agencies • Operators (transit agencies) • Sponsors agencies					
2.	The transit agencies (operators) will have access to the system through the agency portal. Each Agency can only have access to their own data and be able to conduct different functions such as • Set their fare • Handle capping configurations • Account categories • View their fleet transactions and usage					
3.	Agencies granted permission by LTRC will be able to administer and manage their members' transit accounts using the Agency portal. [Sponsors and beneficiaries]					
4.	The system should provide a facility to upload a batch of valid identifiers representing the agency members to the system.					
5.	The System should support adding new agencies to the system					
6.	The bulk of partner agency members (beneficiaries) will be managed using a whitelist of valid cards from the partner Agency. Partner Agency will provide identification cards regularly to be imported into the system					
7.	Ability to handle agency passes through the portal					
6.1.2.7	Clearing House					
1.	Payment Collection and Revenue Reconciliation includes supporting the following functions:					

	• Data clearing • Data transfer • Data reconciliation • Financial clearing • Settlement management • Invoice handling All transaction data for the mobile ticketing application shall be loaded into the CDS database for inclusion in all applicable AFCS reports. This data shall also enable full reconciliation of mobile ticket purchases with the funds deposited into the potential bus Operator's bank accounts by the potential bus Operator's payment entity.					
2.	The System shall be responsible for settling all fare media transactions on the portal or the mobile app after deducting the transaction fees and depositing the remainder into <special account owned by LTRC> on a daily basis					
3.	The System shall provide a monthly invoice or reconciliation report detailing a breakdown of all fees withheld (e.g. bank card processing fees, chargeback fees, etc.).					
4.	The system should maintain payment records to support the auditing of all payments processed, and to support payment dispute and chargeback resolution					
5.	During the design phase the Bidder shall finalize all settlement procedure for retail provider handling cash payments. Reconciliation reports will be available from the system.					
6.	Settlement data from the bank card processor or merchant bank will be downloaded to the System. This will allow for full settlement traceability to the back-office applications. The system will automatically handle non-payment and chargeback transactions, generating the appropriate reports to correct account balances as necessary. (The winning bidder will not carry any responsibility in subsidizing transport operations. Settlement details and technicalities can be discussed during contract negotiations)					
6.1.2.8	Mobile Application					
1.	Mobile app should include GIS data and be sent to the CDS for reporting and analysis. (It is the bidder responsibility to provide the GIS and route/run data through APIs and make it available to any third-party authorized partner through a REST API. The API will read the data from the CDS tracking data.)					
2.	Customer should be able to access the customer portal from the mobile application and conduct all transactions available including payment transactions					
3.	Customers should be able to purchase base fare pass using their smartphone and then use the device to display valid fare payment on board using barcodes, NFC, or another form of electronic validation. The application will be available to both Android and iOS users and will be made available and maintained by the vendor from each platform's public app store.					

4.	The mobile application will also act as an account management application for account holders to perform: • Loading of value and fare products to accounts • Inquiry of account balance • View transaction history • View caps status					
5.	The mobile app will offer two factor authentication as an option to users					
6.	The mobile application will allow for dynamic generation of barcodes and real-time validation of accounts.					
7.	The mobile app will communicate with the validators and back end system to recognize, log, and report on the usage					
8.	Display a secure 2D barcode representing the purchased fare product					
9.	Account validation will be able to occur when the mobile device is not internet connected					
10.	The mobile app will be available in the app stores, offered and maintained by the vendor.					
11.	Mobile app QR codes will be national / international standards compliant					

6.1.2.9   Integration Services

1.	If the Operator console is not integrated with any AVL/CAD system the validator should provide the latitude/longitude data with the transactions to the CDS tracking data					
2.	The GIS and route/run data should be available to any third-party authorized partner through a REST API. The API will read the data from the CDS tracking data.					
3.	Integration with onboard components should be designed to allow for future expanding and using new onboard technologies. Bidders should show how the following functions will be supported through open-interfaces: • Transactions authorization • **Real-time access:** The onboard unit will reference the Master list in Realtime if the CDS is available. • **Offline access:** The Onboard unit (OBU) should be able to download a copy to be used when the CDS is offline. A copy of Master list could be uploaded to the OBU from a flash disk • **Synchronize**: Once the offline CDS is back, the System should allow for synchronization the offline transactions (e.g. download an updated master list to the OBU) • Operator consoles updates					
4.	Integration with external POS system; mobile application for functions such as: • Sales /Purchase • Suspension • Reactivation • Registration Or • Self-services such as:					

#	Description					
	• View transit account balance • View transaction history • View fare capping status • Search API • Reservations API • Post Booking: ticket cancellations • Schedules and trips • Multilingual Email Confirmation • New Account Setup					33
5.	Integration with Banking System: Bidders should explain how the System could be extended from closed-loop payment to open-loop payment considering the followings: • The integration between the AFC and the Acquiring bank should be through a standard banking interface. • The system should be enabled for open payment system where activities between an acquirer bank, AFC system and terminals require host-based risk management, authorization, clearing and settlement activities to be conducted in a secure way.					
6.	Ability of the System to integrate with CCTV and passenger counting sensors					
6.1.2.10 Data Warehousing and Reporting						
1.	The System must provide a facility to schedule reports/ Report run Task. Scheduling a report has the following attributes • Schedule name • Date • Time • Option to repeat if failed [retry option] • A recipient email for notification when completed or in case of failure to run Option to for repeat the run [specific date: repeat every month on Date/Time]					
2.	The System must provide a Report Builder tool to enable power users to customize reports' data and formatting. Bidder should provide full description of the proposed Report Builder in their proposal					
3.	A Report Builder should provide the following minimum capabilities: • Ability to add rows of columns selected from the DB and arranged in the report layout. • Ability to have multiple layouts and sections • Ability to edit the row labels • Ability to set row-level formatting • Ability to preview a sample result • Ability to add filters to selected columns • Ability to sort columns • Ability to save the report for future use • Ability to publish the report for use by other users • Ability to add ACL to the report					
4.	Provides data visualizations tool that include charts, maps, spark lines, and data bars that can					

	help produce new insights well beyond what can be achieved with standard tables and charts.					
5.	The system should have ready standards such as bot not limited to • Ability to generate reports showing all transactions categorized by media type, customer type and or operator • Ability to generate reports showing non-payment and chargeback transactions to handle balances • Ability to access reconciliation data and reports through the system. • Ability to conduct analysis based on GIS/route data provided with the transactions					34

6.1.3 Automatic Vehicle Location / Computer Aided Dispatch Systems (AVL/CAD)
Please note that AVL system is required but the CAD system is optional item

6.1.3.1 Automatic Vehicle Location System (AVL/CAD)						
1.	Currently buses have no installed devices. Bidders should provide all devices and setup, configure to operate with the backend systems. The automated vehicle location (AVL) system provide schedule information for the Operator, real time vehicle location and schedule adherence information for Controllers, and automatic data collection of the date, time, and location for many on-board events such as door openings, wheelchair ramp/lift use, and dwell times at service stops. Messages from the Operators and exception reports are automatically generated by the onboard system and sent via network back to the CDS					
2.	The AVL/CAD includes the following functions • Headway management • Accurate real-time transit information • Service planning and reporting • Scheduling and mapping Software • Integration with third party service providers					
3.	The System should support the ability to use positioning data to predict arrival times at transit stops. This information should be relayed to customers via next stop arrival reader boards at selected stops and over the web via the user portal or mobile application APIs Onboard, vehicle systems inform passengers when approaching the next stop location . (Please use best practice, based on the information provided in the RFP on routes and route lengths. Also note that this is related to an optional item)					
4.	The AVL system should receive the GPS signal every 5 second and updates the bus location to the CDS or CAD if applicable					
5.	Headway management: Ability to support switching between different dispatching methods based on the day and time of the day :, • High headway dispatching: a mode					

	forced by Forced by the operator • Automatic headway dispatching: dispatching shall be performed based on the mean time interval between vehicles • Time-Schedule dispatching: each vehicle shall be individually and independently regulated according to the departure and arrival times at terminus and main stations as defined in the timetable. • Take account of the t catch-up process and its impact on the computation of the mean time interval according to the new number of vehicles in operation.					
6.	Support the ability to add/remove new Vehicle and switching information					
7.	The AVLS shall provide the CDS operators with the appropriate information about the vehicle fleet, including for each bus: • Availability: affected to a vehicle-service, available, under repair, reserved for maintenance purpose, • Exit / Entry time from/in the depot, • Vehicle park ID, model, etc.					
8.	The AVLS shall provide the CDS operators with the appropriate information about the drivers such as but not limited to: • Full driver's name • Driver's ID, • Start of service time and end of service time for each partial part of the driver-service (where appropriate).					
9.	The AVLS shall provide the CDS operators with vehicles' location for all the vehicles in operation. This includes: For each vehicle in operation, the information shall be accurate enough in order to be used by: • CDS operators to manage the current operation, in case of any incident occurring in operation requiring dispatching measures (like a stopped vehicle), • The emergency services (police department, fire department, ambulance, towing vehicle drivers, etc.) in case of incident or accident.					
10.	The AVLS shall provide a synoptic line view of all vehicles in operation on the line. All tools allowing for creating the synoptic line view and the drawing of the line with stations position and depot surface shall be supplied					
11.	The AVLS shall provide a map view of the network, highlighting the location (last known location) of each vehicle and location of handheld communication devices (when equipped with a localization mean).					
12.	The AVLS shall provide the CDS operators with the theoretical timetable and the real-time timetable, for each vehicle-service and for each station. This information shall include: • Theoretical arrival time at the station, • Estimated arrival time at the station (if not yet reached by the current vehicle-					

	service), • Effective arrival time at the station (if station already passed for the current vehicle service).				

13.	The AVLS shall allow the CDS operators to access all information concerning current operation. This shall include:
	For each vehicle
	• The line number,
	• The vehicle-service,
	• The vehicle identification number,
	• The driver-service,
	• Full name of the driver,
	• Vehicle status: in operation, at the terminus station, at the depot,
	• Access to the list of alarms,
	For each journey:
	• Terminus destination,
	• Departure time from the previous terminus station,
	• Arrival time at the next terminus station (this time is based on the theoretical time, recomputed according to the vehicle's advance/delay).
	• For each vehicle's location:
	    o Last station left by the vehicle,
	    o Distance from the last station.
	For each station:
	• Have access to the list of all vehicles having a stop planned locally,
	• Have access to the list of all vehicles having stopped at that station,
	As a synthesis view for the lines or per line:
	• The theoretical number of planned vehicles,
	• The real number of vehicles in operation with a ratio real/theoretical,
	• An average of leads/delays,
	• Identification of the vehicle with the largest lead,
	• Identification of the vehicle with the largest delay,
	• Graphic view of the distribution of leads/delays on a given line.				

14.	The System shall provide a facility to time sync between all onboard, off board and servers based on GPS time.				
15.	AVL/Dispatch Application at the CDS shall have the following minimum specifications: • A Web based application which allows the controller in the CDS to use transit data to maintain or improve service quality in real-time during the operating day by: • use real-time performance monitoring to adjust operations to preserve or enhance service quality. • View schedule adherence • Headway management • Transfer protection The operator can view and access the data				

	through: • Interactive digital Map displays • Schematic route • Tabular displays					
16.	The Operator can monitor several types of events causing service disruption such as running late, bus bunching, impacts of a traffic accident and take an action such as reroute transit vehicles					
17.	Ability to detect the optimal path between source and destination, depending on multiple factors such as travel time, jam, topography and number of traffic lights					
18.	Ability to visualize the real position of buses on maps and to take decisions according to real-time information.					
19.	Alarm parameters represent the signal received from the Ability to track the status of the bus based on the sensors GPS/GPRS modem and alarm. The following alarm types should be supported • Speed alarm (Mandatory]: The speed signal of the tracked bus received from the GPS/GPRS modem allows the administrator to make a note of it, and therefore maintains control over the vehicle driver. • Temperature and fuel alarm [Optional]: The sensors of the GPS/GPRS modem are connected with the vehicle to read the status of temperature and fuel level to alarm the administrator of the vehicle's current status					
20.	Provide a facility to view the history of the bus trajectories with the ability to replay it					
21.	Provide a facility to show different types of information for riders such as: • Estimated arrival time of next bus. This type of information should be accessible from different locations such as bus stations if available, through the internet from the user portal, from kiosks, through mobile applications or SMS • Ability to notify riders with any changes on the schedules or timetables					
22.	The AVLS should support the ability to restore a service by enabling the CDS operator to: • Adjust trip schedules • Insert trips • Insert bus • Create detour • Create detour notifications • For any service restoration action that affects the schedule and route of the bus or service, the system will propagate the changes to the schedule and other affected system services (ie ETA, passenger information)					
23.	Provide advance warning to dispatchers whether the bus approaching the terminal will be able to fulfill the assigned rest period (layover) before resuming the next duty					

	Compute the impact of trip delay en-route on driver's layover while meeting performance indicators for buses coming into interchange and automate schedule adjustments					38
24.	The System should enable **Geo-fence zones by :** • Support different geo-fence types • Monitor bus entry/exit/inside movement • Trigger specific action (i.e. data upload when bus enters specific depot / geo-fence) or record specific event (i.e. trigger speed related event when defined threshold is exceeded (value or duration on entry or exit) • Provide editor to set up customer geometries - geographic polygons or poly-line					
25.	Bus Health Monitoring (Integration with health monitoring solution is optional) Data acquisition and accurate real time monitoring of various mechanical and electrical components on the bus (i.e. speed, RPM, odometer, fluids level values, DTC codes – fault codes, etc.)					
26.	Entered text shall have the possibility being either displayed full time or scheduled: • list of days with each day possibly being quoted as applicable for this text, • start time and end time during the day, • First day and last day of display.					
27.	The system should use differentiated colors for different types of messages, for example: • Red in case of critical situation, • Orange for a warning, • Green for simple information, · etc					

6.1.4	**On Board Video Surveillance and Recording System (Optional)**					
1.	The Vendor shall provide a proposal to install Onboard Surveillance System on existing buses. Current buses has no onboard surveillance system. The Bidder shall provide specifications for • CCTV Cameras • Mobile DVR/NVR (CCTV management, storage of recording) Installation fees on buses					
2.	The videos shall be recorded in the bus up to 7 days. The content shall be uploaded at the end of the day to the control center.					
3.	The control center shall have the required hardware, software for storage and management of videos for all CCTV cameras installed in the 650 buses. Videos shall be protected for intentional or unintentional modifications (e.g. use of watermarks,…). Bidder should clarify all the measures that will be applied to secure data at rest and data in motion.					
4.	The Bidder shall provide the specification and design of the control room					
6.1.5	**Passenger Information System-PIS (Optional)**					
1.	The system should provide reliable passenger information (departure/arrival times, 'next bus', and so on) at stations, on-board vehicles, and on other platforms, such as smartphone apps.					
2.	The PIDs shall display: • Traffic related messages such as: ○ bus traffic status, ○ bus direction for PIDs installed on platforms, ○ bus frequency/theoretical time between 2 buses for rush hours, o bus schedule for periods of low traffic, o delay information, ○ commercial information, ○ service disturbance, partial service when incidents/accidents/special events occur, ○ service interruption, including service not started or end of service. Current time (interfaced with Clock System) through a digital clock inserted in PIDs					
3.	The System should support CDS operator to send messages to PIDs (inside buses, at concourse/footbridge and on platforms ones). texts shall always have a line for Arabic and a line for English. It shall be possible to send text for : • A single vehicle or station: in the case of vehicles, all PIDs within the vehicle shall be concerned, for the selection of a single PID or any combination of PIDs • All PIDs of one direction of the line, Complete line PIDs.					
4.	The AVLS shall allow the CDS operators to access					

	all information concerning current operation. This shall include: 1. Have access to a simulation of what is displayed on the PID of each station, 2. Have access to any alarm concerning one of the PIDs.					
3.	Display Screen on Bus Stations/ Terminal Points and some important Bus Stops Technical Requirement - LED Technology: SMD - Matrix Format: Line Matrix - LED Color: Amber - Pixel Pitch: 6mm - Viewing Angle (H/V): 120o/120o - Brightness: >6000cd/m2 - Lines: 2 - Line Resolution: 128x7 pixels - Characters per Line: 21 - Brightness Control: 16 levels (automatic or manual) - Mechanical: Aluminum - Sides: Single Side, Angled Front Face - Service Access: Front access with swing door - Front Screen: Anti-reflective security glass - Protection: IP54 - Color options according to RAL standards - Communication Interfaces: Ethernet, GPRS - Operating Temperature: -20oC to +60oC - Humidity: up to 95% RH - LED Lifetime >100.000h - Power Supply: 230 VAC/50 Hz - Compliance: CE All such outdoor equipment shall be equipped with automatic system alarm for security reasons.					

6.1.6 Passenger Counting System (Optional)

1.	The system should be able to provide LTRC with the numbers of passengers boarding and, when possible, alighting on different vehicle types to an accuracy of 95%.					

6.2 Non-Functional Requirements

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
6.2.1 Security						
1.	Provide and implement plan for • Handling of fraud • Disaster recovery • High Availability • Backup and Restore • System security including PCI-DSS • Remote access to the web applications and web servers • Two authentication factors for rider portal • Physical security to mounted and installed devices including protection against damage and vandalism • Fault tolerance technique preventing loss of data • Network Security					
2.	Apply minimum 128-bit encryption keys to all data communicated between field equipment and CDS					
3.	The System should provide protection against the following attacks: There are different types of attacks that should be considered during the design and implementation. The most popular attacks are: • SQL Injection • Path Traversal • Cross-site scripting • Denial of service • Connecting local files • Implementing XML external entities • Downloading random files • Cross-site request forgery					
4.	System should implement Inter-tier authentication. Before initiating communication or data transfer with other tiers, application tiers should authenticate with each other. This ensures that an attacker cannot impersonate the identity of other communicating tiers/components.					
5.	Verify all account identity authentication functions (such as update profile, forgot password, disabled / lost token, help desk or IVR) that might regain access to the account are at least as resistant to attack as the primary authentication mechanism					
6.	Verify that all authentication decisions can be logged, without storing sensitive session identifiers or passwords. This should include requests with relevant metadata needed for security investigations.					
7.	Verify that credentials are transported using a suitable encrypted link and that all pages/functions that require a user to enter credentials are done so using an encrypted link					
8.	Verify that users can enroll and use TOTP verification, two-factor, biometric (Touch ID or similar), or equivalent multi-factor authentication mechanism that provides protection against single factor credential disclosure					

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
9.	An application must log security events (e.g., successful or failed authentication events, failed authorization events, session cookie modifications, data validation failures, etc.).					
10.	The logs Audit and monitor architecture has the following components Source: logs should be captured at least from the following three sources • Database logs • Application logs • Network activity logs A REST API : to capture the logs and send them to a log management system A Log Management System: it consists at least from the following components • A search component • A dashboard • Alert					
11.	Enforce HTTPS. If any user tries to access an application over an HTTP connection, the application should redirect the user to the HTTPS version of the application					
12.	Administrators shouldn't have one account for all activities, rather assign the administrator different accounts where each account has specific function					
13.	The system should utilize a role-based security system allowing an unlimited number of roles to be assigned to each user					
6.2.2	User Management					
1.	The User Management module allows system admins and managers to manage users, groups, and roles in the system					
2.	Ability to enable/disable users from the System using the admin tools					
3.	Ability to add groups					
4.	Ability to grant/revoke privileges on screen, record, transaction and field level					
5.	Ability to define permission which grants access to a specific record type.					
6.2.3	Multi-Tenant					
1.	The ITS should be architected to support multi-tenant (transit agencies or bus operators).					
2.	System should take into account logical segregation between tenants. Bidder should provide enough information how this is supported					
3.	System should account for encrypting the data and keeping it separate from other tenants , strong encryption complemented by tenant-owned key management is required					
4.	System should account for supporting tenant Isolation. The System should support the ability to move one tenant to separate physical infrastructure, databases, storage, networking, and so on.					
6.2.4	User Interface					
1.	For validators, driver consoles, hand held devices and vending machines a multi-language menu options and messages should be supported. At least					

NO	Requirements	OOTB	CUST	3rd	NOT	Proposal Explanation Reference
	Arabic and English should be supported.					
2.	The system must provide user-identified and configurable accessibility rules based on widely-acceptable Graphical User Interface standards					

6.2.5   Hardware Requirements

NO	Requirements	OOTB	CUST	3rd	NOT	Proposal Explanation Reference
1.	The Supplier should indicate the country of origin of all the equipment of the systems to be supplied					
2.	All the equipment of the systems should be Arabic enabled					
3.	All equipment shall be new and unused					
4.	The Winning Bidder shall be responsible for providing all devices, subassemblies, antennas, accessories, appurtenances, brackets, mounts, stanchion extensions, cabling, connectors, and any other elements of hardware or software to provide a complete system.					
5.	All devices and major subassemblies shall be identified by a part number and/or serial number, permanently and legibly affixed directly to the surface					
6.	All functionally identical devices and major subassemblies shall be fully interchangeable with like devices and subassemblies					
7.	All enclosures, chassis, assemblies, panels, switch boxes, terminal boxes, and similar enclosures or structures shall be grounded to a common ground point to avoid ground loops and voltage potential differences.					
8.	The installation method for all onboard equipment must permit simple replacement (i.e. remove, replace, and configure) in the event of a device failure					
9.	All onboard equipment shall be capable of being disassembled to fit through a vehicle door.					
10.	Onboard wiring and cabling shall meet the following requirements: • The Winning Bidder shall be responsible for the provision of all wiring, cabling, connectors, and terminations; • Wire dress shall include strain relief and allow sufficient slack on either end of a cable for re-termination if needed at a future date; • All terminations and cables shall be clearly indexed, labeled and schematically identifiable; • When components must be connected to each other through individual wires, the wiring shall be incorporated into a wiring harness; • For onboard equipment, all wiring and cables shall be protected against abrasion and moisture/dirt ingress. All openings to provide cable pass through shall be sealed after installation; and • Provisions shall be included to protect against incorrect cable connections in the event equipment is removed and replaced.					

NO	Requirements	Response				Proposal Explanation Reference (Page No/Section)
		OOTB	CUST	3rd	NOT	
11.	For onboard equipment, protection shall be provided against radio frequency interference (RFI) and electromagnetic interference (EMI) emission sources, as well as internal conductive or inductive emissions. The Winning Bidder shall be responsible for demonstrating RFI and EMI compliance to an accepted standard such as ISO/IEC, IEEE, and/or MIL specifications.					
12.	Central system equipment (workstations, servers, etc.) shall be designed for use in a normal office and transit dispatch environment.					
13.	Central system equipment shall be designed to operate on 220 VAC nominal unconditioned power; any power conditioning or UPS devices required shall be supplied by the Winning Bidder					

6.2.6   Performance

	Requirements					
1.	The bidders should explain the System capacity for expansion to accommodate more Buses, Validators, HFID, Stations, Point of Sales….etc.					

6.3   Operational Requirements

The minimum number of ATVM is (5) machines, (10) Personalized Points of Sale and (30) points of sales to be installed in the Universities, main Bus Terminals and any other locations that will be agreed upon during the design phase.

6.3.1.1   *Point of Sale*

1.	Fare media should be available via secure automatic ticket vending machines (ATVM) available at certain locations capable of issuing/reloading different fare media The ATVM shall support payment by coins and banknotes.					
2.	Minimum number of locations: Main terminals and sub-terminals at government universities. See the attached map for the main terminals and sub terminals. The Bidder may provide alternative distribution channels including automated self-service units at its own commercial risk					
3.	The Point of Sale shall be a modular, PC-based device supporting multiple configurations, depending on the modular components ,GUI Arabic enabled.					
4.	Each POS shall contain registers that track the following information: • A unique serial number of the POS. • The total number and value of all the completed transactions since data were last uploaded to the CDS. These registers shall be modified only by the POS and not manually modifiable. • The assigned IP address and /or the secure Website to initiate data transfer to the CDS. This register shall be modifiable only by use of a maintenance password. • Maximum number and value of transactions that can be conducted prior to					

NO	Requirements					
	uploading data to CDS. These registers shall be modifiable only by download from the CDS and by use of a maintenance password.					
5.	Reporting all transactions to the CDS. If it is not on-line, all records shall be stored locally and transferred once the connection is restored. In addition, all transactions shall be stored on an internally secured storage module					
6.	The POS shall receive from the CDS and store a list of smart cards serial numbers for which specific actions are required (i.e., the Action List).					
7.	Prices of all products presented for sale shall be customizable through CDS					
8.	The distributed fare media to sales' locations shall be registered by serial numbers and quantity for each location in CDS.					
9.	The POS shall satisfy the following additional requirements: • Cash register, credit card services and devices in a single integrated system. • POS shall control cash drawer for coins and banknotes, which opens under command of POS, and shall be monitored all times. • Payment methods may be enabled or disabled to suit the operational needs. The POS shall identify the initial funds bank (i.e., starting cash drawer balance) at the start of each shift (main and relief). Upon logging out or otherwise indicating an end-of-shift condition, the POS shall produce a report and receipt depicting the ending balance of the cash drawer					
10.	Ability to reverse previous transactions for refund (relevant to policy) or error correction and transmit these transactions to CDS					
11.	Enable the setup and modification of customer accounts					
12.	The CDS shall assign all new accounts a random password, which the POS shall print on a receipt and which the CDS shall require the customer to change upon first subsequent login.					
13.	CDS database shall record and track the version number of the software in each POS to ensure sustained compatibility.					
14.	The barcode ticket printer shall be a standard, commercial monochrome (black & white) laser printer rated for monthly duty cycle of no less than 10,000 pages. Toner cartridges sufficient to produce no less than X (to be mentioned by the bidder) pages as rated by the manufacturer shall accompany each printer. Thermal printer also acceptable					
15.	POSs shall include a Customer Display that shall be visible for all customers with minimum 2 lines of text.					

NO	Requirements	Compliance Notes
6.3.2	Hosting	
1.	For the AFCS hosting, the Bidder shall offer on Cloud local based hosting solution. The hosting solution should meet the performance and scalability requirements and cybersecurity policy (http://modee.gov.jo/content/national-cyber-security-policies-619) requirements.	

2.	The AFCS should be built on multi-tenant (multi-agency) architecture, where the system could be Software as a Service (SaaS) for each agency. The multi-tenant database could be implemented using a logical database where all data is stored in the same database, but each agency's data is accessible only to themselves, or hosted, in which every agency is treated separately with individual instances of software, databases, and servers.	
3.	The control room will setup and operation are the responsibility of the Bidder and will be hosted inside LTRC. The Control room in addition to running the software modules listed in this TOR with high performance and quality, it should have all the required hardware and software to manage the transactions data, capture and store video data from CCTV, ability to control and monitor and manage all AFCS equipment, manage the communication with field operators and drivers.	
4.	The control center will host all required hardware and software to support the ITS operation and backup, including data storage facilities and printing capabilities for each trip. Control center operators should be able to transfer maps, information, or any part of it, to any monitor connected to the system according to authorization levels. The contractor's proposal should detail control center design and setup including A monitor wall (large screen, side monitors) Monitoring stations Servers and data storage and printing facilities Other features the contractor recommends will add value Furniture (Tables, Chairs….etc.) Any Hardware and Software All Network and Electricity works needed Any other Civil work and cabling required The contractor must ensure that the control center is setup and operational prior to delivery of the first phase of ITS implementation.	
5.	The bidder shall also have a call center to support riders and field operators and drivers. The Call Centre system shall facilitate passengers to call into for information on bus routes and schedules as well and shall be able to log complaints through call center executive or IVR or online helpdesk system.	
6.	The Winning bidder shall supply all servers, including the relational database manager server and all other hardware, Local Area Network (LAN), security equipment, security software, and operating systems required for the CDS, at a facility made available by the Client with sufficient Wide Area Network communications infrastructure to support the performance requirements	
7.	The winning bidder shall provide all System Administrator tools including, but not limited to, backing up data and software, assigning and maintaining system access credentials, responding to user requests, applying software patches and other duties	
8.	The hardware will support and be compatible with all proposed software, and effectively process all	

	events and transactions from the devices that are being furnished and will provide sufficient capacity to accommodate a 50% increase in the number of devices and transactions	
9.	The Winning bidder shall optionally provide redundant CDS installations at separate locations and provide immediate, automatic fail-over between sites to ensure the CDS remains available whenever unplanned and planned outages of the production CDS occur. The redundant operations will enable continued operation of critical security and transaction functions without degradation that is obvious to the user	

6.3.3   Maintenance

1.	Software Maintenance will be the responsibility of the winning Bidder and the price will be included in the annual system fees. This includes - upgrades and bug fixes for the CDS - portals - mobile application - hardware, - OS and security upgrades on the hosted platform - Maintaining the firmware on the operator console	
2.	During the maintenance and warranty period the winning bidder will be responsible for field checking equipment, including ensuring that power and network connections are operational. If the equipment still fails, they will replace it with a spare and send it for repair or replacement.	
3.	Replaced devices will be programmed with their new location (e.g., vehicle number) and have their assigned location automatically updated in the appropriate back office application	
4.	The Bidder should provide during the bidding phase a sample of standard SLA to be agreed upon before contract award.	

6.3.4   Operations

1.	The winning bidder should fully operate the clearing house for 5 years, ensuring all its intended functions are carried out. (Cash Management is optional. LTRC policy is to minimize or avoid cash transactions, therefore cash should only be considered as fallback plan. Bidders should enable their solutions for cash but it is not required to be implemented at the early stages.)	
2.	The winning bidder should manage and operate the process of account management.	
3.	As the entity that operates all key functions of the system for 5 years, the winning bidder will be responsible (for this duration) for monitoring participating bus operators' performance (as per their respective contracts) and informing LTRC of any breaches.	

6.3.5   Rider Service

1.	Riders seeking to obtain discount-fare smart cards (e.g. youth cards, senior cards, or disabled cards) will need to visit a Personalized Points of Sale and bring with them the appropriate documentation	

2.	Winning Bidder should offer first level support to riders in case they need help with the system (First level support aims at providing riders with help near vending machines, and inside POS or how to use the fare media at early stages specially for senior people who are used to cash tokens).	

6.3.6   Card Distribution and Provision

1.	Card distribution and replacement cards will be handled by the winning bidder	
2.	Retail channels will also distribute cards given to them by the winning bidder	
3.	Tokens (smart cards) for sponsors will be distributed by the winning bidder Sponsors should be able to place card replacement new orders by email or through the portal	
4.	The Bidder shall supply the first (50000) fare media (excluding paper tickets) for free.	
5.	Future orders of smart cards could be made through a contract option with the selected Bidder or through competitive procurement	
6.	The Bidder shall manage a Distributor database for inspection by LTRC including details of: i. Number of smartcards distributed (by type), by period/month. ii. Total quantities of smartcards distributed by location to date iii. Number of re-load transactions by location iv. Commissions paid to date	
7.	The sale price of these smart cards will be determined by LTRC	
8.	The Clearing House (CH) will procure the smart cards as specified in this RFP, distribute them over sales channels (which have to be established by the bidder, and sell them directly to bus riders.	
9.	CH must manage the inventory of procured cards and track them over various channels	
10.	CH must maintain a sufficient level of inventory to support the system.	
11.	Cards that are reported lost or stolen are considered blacklisted.	
12.	Blacklisted cards are disabled and entered in a list.	
13.	Transactions using blacklisted cards will be rejected. Riders with blacklisted cards will not be able to use them for electronic fare payment	
14.	An updated blacklist table will be pushed to collection units on buses frequently via GSM/GRPS	
15.	It should be possible to print out the list if needed	

6.3.7   Sales Channels

1.	Sales channels should include bus stations, retail stores, university kiosks, and more. CH should ensure an optimum number of distributors to support the system, including automated machines as an option	
2.	Sales channels should include bus stations, retail stores, university kiosks, and more. CH should ensure an optimum number of distributors to support the system, including automated machines as an option	
3.	Sales channels should include bus stations, retail stores, university kiosks, and more. CH should ensure an optimum number of distributors to support the system, including automated machines	

	as an option.	
4.	Personalization centers are sales channels that offer personalization services (for subsidy purposes) besides card sales and card re-loading. These centers should be available near all public universities and bus terminals, as a minimum requirement	
5.	Sales channels distribution and accessibility should reflect demand.	
6.	CH will be responsible for recruiting and inspecting potential agents and will determine their commission payments	
7.	CH will provide and distribute smart card re-loaders and will manage the re-loading operations according to the contract	
8.	The bidder will propose a mechanism for re-loading smart cards online	

7   Special Conditions
7.1   Source Code

- The winning bidder shall take the necessary measures to conclude an agreement to store the software source codes (ESCROW Agreement) before final acceptance of the system, provided that LTRC shall bear the entire costs of the basic agreement, including the costs associated with conducting the necessary tests (Verification of Source Code) at the site where the source code is stored.
- The following terms shall apply on the stored software source codes:
  - The winning bidder shall update this version of the software source codes and documentation filed with LTRC within thirty (30) days as of the date of updating, testing and approving modifications.
  - LTRC is not entitled to use the source code without the consent of the winning bidder.
  - Ownership of the stored software source codes box shall be transferred to the LTRC in any of the following cases:
    - A decision is issued by the competent authority to liquidate the winning bidder voluntarily or compulsorily.
    - The winning bidder fails to provide technical support for the system.
    - The winning bidder announces its desire to waive any of its rights to the software source codes.

7.2   Other Special Conditions
7.2.1   Financial Terms

bidders should take into consideration the following general financial terms when preparing and submitting their proposals:

- All prices should be quoted in Jordanian Dinars inclusive of all expenses, governmental fees and taxes, including sales tax.

- The type of contract will be a fixed lump sum price contract including costs of software and hardware, professional fees, taxes, fees, profits and over-heads, and all other costs incurred , a clear breakdown (table format) of the price should be provided.

- The bidder shall bear all costs associated with the preparation and submission of its proposal. LTRC will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the proposal process.

- The bidders shall furnish detailed information listing all commissions and gratuities, if any, paid or to be paid to agents relating to this proposal and to contract execution if the bidder is awarded the contract. The information to be provided shall list the name and address of any agents, the amount and currency paid and the purpose of the commission or gratuity.

- The bidder shall submit a proposal security (tender bond) on a form similar to the attached format in Jordanian Dinars for a flat sum of JD 100,000.000 (one hundred thousand Jordanian Dinars) in a separate sealed envelope. The bond will be in the form of a certified check or bank guarantee from a reputable registered bank located in Jordan, selected by the bidder.

- The bidder shall ensure that the proposal security (tender bond) remains valid for a period of 90 days after the bid closing date or 30 days beyond any extension subsequently requested by the tendering committee, and agreed to by the bidder.

- Any proposal not accompanied by an acceptable proposal security (tender bond) shall be rejected by the tendering committee as being non-responsive pursuant to RFP.

- The proposal security of a joint venture may be in the name of all members participating in the joint venture submitting the proposal or in the name of one or more members in the joint venture.

- The proposal security of unsuccessful bidders will be returned no later than 30 days after the expiration of the proposal validity period.

- The winning bidder is required to submit a performance bond of 10% of the total value of the contract.

- The proposal security of the winning bidder will be returned when the bidder has signed the contract and has furnished the required performance security.

- The proposal security may, at the sole discretion of the tendering committee, be forfeited: (i) If the bidder withdraws its proposal during the period of proposal validity as set out in the RFP; or (ii) in the case of a winning bidder, if the bidder fails within the specified time limit to sign the contract, or sign the joint venture agreement in front of a notary public in Amman, Jordan; or furnish the required performance security as set out in the contract.

- The winning bidder will pay the fees of the RFP advertisement issued in the newspapers.

- LTRC is not bound to accept the lowest bid and will reserve the right to reject any bids without the obligation to give any explanation.

- bidders must take into consideration that payments will be made as specified in the tender documents and will be distributed upon submission and acceptance of the scope of work and of the deliverables and milestones of the scope of work defined for the project by the first party.

- LTRC takes no responsibility for the costs of preparing any bids and will not reimburse any bidder for the cost of preparing its bid whether winning or otherwise.

- LTRC shall make an advance payment to the winning bidder, equaling 10% of the contract price, as an interest-free loan to cover for mobilization, preparations, and provision of requested materials and services in accordance with bid conditions after the winning bidder submits the requested guarantee. Unless and until LTRC receives this guarantee, this item shall not apply. This guarantee shall be issued by a bank operating in Jordan,. The winning bidder shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid to LTRC in full. If the advance payment has not been repaid before the end of the contract duration or prior to termination, the whole of the balance then outstanding shall immediately become due and payable by the winning bidder to LTRC, and LTRC is entitled to

deduct this outstanding balance from the guarantee or any amount of money due to the winning bidder.

7.2.2 Legal Terms

bidders should take into consideration the following general legal terms when preparing and submitting their proposals:

- the joint venture members must furnish in their technical proposal letters of commitment on a form similar to the attached format signed by a duly authorized personnel (the authorization shall be indicated by duly-legalized power of attorney authorizing the execution of such commitment and attached within the technical proposal) stating that if the bid is awarded to the joint venture; each member in the joint venture commits itself to sign the sample joint venture agreement in front of a notary public in Amman, Jordan within (10) calendar days as of the date of award notification and before signing the Contract; otherwise LTRC is entitled to forfeit the bid bond whether it is in the name of all partners to the joint venture or in the name of any of the joint venture partners. Each partner in the joint venture shall be a business organization duly organized, existing and registered, and in good standing under the laws of its country of domicile. The Bidder must furnish evidence of its structure as a joint venture including, without limitation, information with respect to:

  - the legal relationship among the joint venture members that shall include joint and several liability to execute the contract; and

  - the role and responsibility of each joint venture member

- The Bidder must nominate a managing member (leader) for any joint venture which managing member will be authorized to act and receive instructions on behalf of all the joint venture members

- All bidders should duly sign the joint venture agreement attached to this RFP by authorized representatives of the joint venture partners without being certified by a notary public and to be enclosed in the technical proposal in addition to authorization for signature on behalf of each member. Only the winning bidder partners in a joint venture should duly sign the joint venture agreement attached to this RFP by authorized signatories and this agreement is to be certified by a Notary Public in Jordan

- The bidders shall not submit alternative proposals. Alternative proposals will be returned unopened or unread. If the bidder submits more than one proposal and it is not obvious on the sealed envelope(s), which is the alternative proposal, then in lieu of returning the alternative proposal, the entire submission will be returned to the bidder and the bidder will be disqualified.

- The proposal shall be signed by the bidder or a person or persons duly authorized to bind the bidder to the contract. The latter authorization shall be indicated by duly-legalized power of attorney. All of the pages of the proposal, except un-amended printed literature, shall be initialed by the person or persons signing the proposal.

- Any interlineations, erasures or overwriting shall only be valid if they are initialed by the signatory(ies) to the proposal.

- LTRC requires that all parties to the contracting process observe the highest standard of ethics during the procurement and execution process. The Special Tenders Committee

will reject a proposal for award if it determines that the bidder has engaged in corrupt or fraudulent practices in competing for the contract in question.

- Corrupt practice means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. Fraudulent practice also means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of LTRC, and includes collusive practice among bidders (prior to or after proposal submission) designed to establish proposal prices at artificial non-competitive levels and to deprive LTRC of the benefits of free and open competition.

- No bidder shall contact LTRC, its employees, the Special Tenders Committee, or the technical committee members on any matter relating to its proposal to the time the contract is awarded. Any effort by a bidder to influence LTRC, its employees, the Special Tenders Committee, or the technical committee members in the tendering committee's proposal evaluation, proposal comparison, or contract award decision, will result in rejection of the bidder's proposal and forfeiture of the proposal security.

- The remuneration of the winning bidder stated in the Decision of Award of the bid shall constitute the winning bidder sole remuneration in connection with this project and/or services, and the winning bidder shall not accept for their own benefit any trade commission, discount, or similar payment in connection with activities pursuant to this contract or to services or in the discharge of their obligations under the contract. The winning bidder shall use their best efforts to ensure that personnel, sub-bidders, and agents of either of them similarly shall not receive any such additional remuneration.

- A business registration certificate should be provided with the proposal for all joint venture members.

- the partners of the joint venture need to be identified with the rationale behind the partnership. Corporate capability statement should also be provided for all partners.

- The laws and regulations of The Hashemite Kingdom of Jordan shall apply to awarded contracts.

- LTRC takes no responsibility for the costs of preparing any bids and will not reimburse any bidder for the cost of preparing its bid whether winning or otherwise.

- If the winning bidder is an international company, it must provide a local representative or a local partner in Jordan.

- Proposals shall remain valid for a period of 90 days from the closing date for the receipt of proposals, as established by the Special Tenders Committee.

- The Special Tenders Committee may solicit the bidders' consent to an extension of the proposal validity period. The request and responses thereto shall be made in writing or by fax. If a bidder agrees to extend the period of validity, the proposal security shall also be suitably extended. A bidder may refuse the request without forfeiting its proposal security; however, in its discretion, the Special Tenders Committee may cease further review and consideration of such bidder's proposal. A bidder granting the request will not be required nor permitted to modify its proposal, except as provided in this RFP.

- LTRC reserves the right to accept, annul or cancel the bidding process and reject all proposals at any time without any liability to bidders or any other party, and withdraw

this tender without providing reasons for such action and with no legal or financial implications to LTRC.

- LTRC reserves the right to disregard any bid which is not submitted in writing by the closing date of the tender.

- LTRC reserves the right to disregard any bid which does not contain the required number of proposal copies as specified in this RFP. In case of discrepancies between the original hardcopy, the other copies, and/or the softcopy of the proposals, the original hardcopy will prevail and will be considered the official copy.

- LTRC reserves the right to enforce penalties to the winning bidder in case of any delay in delivery defined in accordance with the terms set in the tender instructions issued pursuant to its no.(1) for the year 2008 and their amendments(articles 69/68).

- bidders may not object to the technical or financial evaluation criteria set forth for this tender.

- The winning bidder will be expected to provide a single point of contact to whom all issues can be escalated. LTRC will provide a similar point of contact.

- LTRC is entitled to meet (in person or via telephone) each member of the consulting team prior to any work taking place. Where project staff is not felt to be suitable, either before starting or during the execution of the contract, LTRC reserves the right to request an alternative staff at no extra cost to LTRC.

- Each bidder will be responsible for providing its own equipment, office space, secretarial and other resources, insurance, medical provisions, visas, and travel arrangements. LTRC will take no responsibility for any non-Government of Jordan resources either within Jordan or during travel to/from Jordan.

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- bidders are responsible for the accuracy of information submitted in their proposals. LTRC reserves the right to request original copies of any documents submitted for review and authentication prior to awarding the tender.

- The bidder may modify or withdraw its proposal after submission, provided that written notice of the modification or withdrawal is received by the tendering committee prior to the deadline prescribed for proposal submission. Withdrawal of a proposal after the deadline prescribed for proposal submission or during proposal validity as set in the tender documents will result in the bidder's forfeiture of all of its proposal security (bid bond).

- A bidder wishing to withdraw its proposal shall notify the Special Tenders Committee in writing prior to the deadline prescribed for proposal submission. A withdrawal notice may also be sent by fax, but it must be followed by a signed confirmation copy, postmarked no later than the deadline for submission of proposals.

- Proposal withdrawal notices received after the proposal submission deadline will be ignored, and the submitted proposal will be deemed to be a validly submitted proposal.

- No proposal may be withdrawn in the interval between the proposal submission deadline and the expiration of the proposal validity period. Withdrawal of a proposal during this interval may result in forfeiture of the bidder's proposal security.

- The bidder accepts to comply with all provisions, whether explicitly stated in this RFP or otherwise, stipulated in the supplies regulation By-Law No. 32 of 1993, and the tender instructions issued pursuant to its no.(1) for the year 2008 and their amendments.

- The winning bidder shall perform the Services and carry out their obligations with all due diligence, efficiency, and economy, in accordance with the highest generally accepted professional techniques and practices, and shall observe sound management practices, and employ appropriate advanced technology and safe methods. The winning bidder shall always act, in respect of any matter relating to this Contract or to the Services, as faithful advisers to LTRC, and shall at all times support and safeguard LTRC's legitimate interests in any dealings with sub-bidders or third parties.

- LTRC reserves the right to furnish all materials presented by the winning bidder at any stage of the project, such as reports, analysis or any other materials, in whole or part, to any person. This shall include publishing such materials in the press, for the purposes of informing, promotion, advertisement and/or influencing any third party, including the investment community. LTRC shall have a perpetual, irrevocable, non-transferable, paid-up right license to use and copy such materials mentioned above and prepare derivative works based on them.

- bidders are not allowed to submit more than one proposal for this RFP. If a partner in a joint venture participate in more than one proposal; such proposals shall not be considered and will be rejected for being non- responsive to this RFP.

- Amendments or reservations on any of the tender documents: bidders are not allowed to amend or make any reservations on any of the tender documents. In case any bidder does not abide by this statement, its proposal will be rejected for being non-responsive to this RFP. If during the implementation of this project it is found that the winning bidder has included in its proposal any amendments or reservations on any of the tender documents or the Contract, then such amendments or reservations shall not be considered and the items in the tender documents and the Contact shall prevail and shall be executed without additional cost to LTRC, and the winning bidder shall not be entitled to claim for any additional expenses or take any other legal procedures.

- The winning bidder, shall not, during the term or after the expiration of the Contract, disclose any proprietary or confidential information relating to the Project, the Services, the Contract, or LTRC's business or operations without the prior written consent of LTRC. The winning bidder shall sign a Non-Disclosure Agreement with LTRC as per the standard form adopted by LTRC.

7.2.3 Response Submission

Proposals should be submitted as 3 separate parts, each in a separate well-sealed and wrapped envelope clearly marked, respectively, as follows:
• Part I: Technical proposal . This part (envelope) should contain 4 hard copies (1 original and 3 copies) and 1
softcopy (CD) . This part should not contain any reference to cost or price. Inclusion of any cost or price information in the technical proposal will result in the bidder's proposal being disqualified as irresponsive.
• Part II "Financial Proposal". This part (envelope) should contain 4 hard copies (1 original and 3 copies) and 1 softcopy (CD) .

• Part III "Bid Bond" This part (envelope) should contain 1 hard
Copy. This part should not contain any reference to cost or price. Inclusion of any cost or price information will result in the bidder's proposal being disqualified as irresponsive.
Note: Each CD should be enclosed in the relevant envelope. Late submissions will not be accepted nor considered and in case of discrepancy between the original hard copy and other hard copies, and/or the soft copy of the proposal, the hard copy marked as original will prevail and will be considered the official copy. Proposals may be withdrawn or modified and resubmitted in writing any time before the submission date.

LTRC will not be responsible for premature opening of proposals not clearly labeled.

Annexes