



EXPRESSION OF INTEREST

DEVELOPMENT, IMPLEMENTATION, OPERATIONS AND MAINTENANCE OF AUTOMATED FARE COLLECTION AND BUS SCHEDULING SYSTEM (AFC-BSS) FOR PUBLIC TRANSPORT SERVICE IN KHYBER PAKHTUNKHWA

In line with the vision of improving Urban Transportation System in Khyber Pakhtunkhwa (KPK), Transport & Mass Transit Department, Government of Khyber Pakhtunkhwa, invites Expression of Interest (EOI) from reputed, technically & financially sound I.T companies for shortlisting for “Development, Implementation, Operations and Maintenance of Automated Fare Collection and Bus Scheduling System (AFC-BSS) for Public Transport Service in Khyber Pakhtunkhwa”

I.T companies/firms/JVs having wide exposure, expertise and financial soundness are the one we are looking for, to respond this EOI.

1. The interested parties may download the detailed EOI document from the official web portal www.kp.gov.pk and apply accordingly.
2. Only tax registered companies/JVs will be eligible.
3. The application should reach at the following address by 1100 hours on or before 25th July 2016.
4. The applications will be opened on the same day at 1200 hours; the participating party may ensure its presence for opening of applications at own expense.
5. The shortlisted firms will be asked to submit technical & financial proposals later.
6. Applications which are incomplete, not sealed, not signed, unstamped and received after due date & time will not be considered.
7. Interested Parties must submit one original and three (03) copies of their applications along with relevant documents on or before the due date and time, at the following address

**Business Development Officer, BDU
Transport & Mass Transit Department, Government of Khyber Pakhtunkhwa,
Mian Rashid Hussain Block, Civil Secretariat, Peshawar. Pakistan.
TEL: +92 (92) 9211762/ 9212557; FAX: 091-9212556**



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1. Schedule of Activity (Tentative)

The following timelines shall apply to this invitation for prequalification application.

Publishing Date	2 nd July 2016 or as advertise in Newspapers
Closing Date & Time	25 th July 2016; at 1100 hours
Application Opening	25 th July 2016; at 1200 hours
Evaluation completed	30 th July 2016 (Tentative)
Enlistment/Notification of results	30 th July 2016 (Tentative)

2. Purpose

This document is prepared for the companies/JVs engaged in the business of providing IT services/solutions to the clients with special reference to IT services in Public Transport sector, who intends to furnish their 'Expression of Interest', to consider them for pre-qualification to bring Automated Fare Collection and Bus Scheduling System (AFC-BSS) and to improve and replace the existing manual fare collection system in Peshawar, Khyber Pakhtunkhwa starting from Peshawar as pilot project.

In first phase, shortlisted companies/firms/JV would be invited to implement AFC-BSS on the specified urban route(s) of Peshawar, Khyber Pakhtunkhwa. The AFC-BSS sought under this Expression of interest would be implemented for Public Transport Services in Peshawar KPK and may be in other public services point in the future. The sole objective of this document is to solicit Expression of Interest from eligible I.T companies/firms/JV's to be short-listed for consideration for a further tender process, wherein a Request for Proposal (RFP) would be issued to the shortlisted I.T companies/firms/JV's based on the evaluation of EOI's. The implemented model will be replicated for other inter and intra city operations in Khyber Pakhtunkhwa as and when required.

3. Important Note:

Registered companies and Joint Ventures complying with criteria given in this document are eligible to apply, here and after referred as 'Interested Party'.

- ✓ This document does not constitute a binding agreement or an offer or invitation by the Transport & Mass Transit Department (TMTD), Government of Khyber Pakhtunkhwa (GoKP) to any party other than the interested one(s) to participate and submit their

proposals for shortlisting. The purpose of this document is to provide the interested party with information that shall form the basis of their proposal. This EOI contains the minimum requirements and information desired by the TMTD. The contents hereof may be supplemented by the TMTD as it deems appropriate. Each Interested party may conduct its own investigations and analysis and check the accuracy, reliability and completeness of the information given in this document to its satisfaction. The TMTD makes no representation or warranty and shall incur no liability under any law, rules or regulations as to the accuracy, reliability or completeness of the document. The TMTD may, at its sole discretion but without being under any obligation to do so, update, improve or supplement the information in this document.

- ✓ Interested Parties must ensure that they submit all the required documents indicated in this document in order to comply with this EOI. EOI received without valid documentary evidence, supporting documents and various requirements mentioned in this document are liable to be rejected at the initial stage. The data sheets, valid documentary evidences for the critical components as detailed hereinafter should be submitted by the Interested Party for scrutiny. It is intimated that no objection/revision/supplement shall be entertained regarding the terms and conditions of this document submitted by the Interested Party.
- ✓ The Interested Party is requested to access the official web portal of Government of Khyber Pakhtunkhwa (www.kp.gov.pk) or Transport Department TMTD (www.transport.kp.gov.pk), for addendums (if any). For minutes of meeting the Interested Party is requested to frequently visit the TMTD website.
- ✓ This pre-qualification process will be governed under Khyber Pakhtunkhwa Public Procurement Rules 2014, as amended from time to time.
- ✓ The Interested Party is advised to obtain for itself, at its own cost and responsibility, all information that may be necessary for preparing the EOI.

4. Evaluation Criteria for Shortlisting

In case of Consortium/JV, marks shall be evaluated jointly for all members unless stated otherwise. References and supporting documentation required as evidence for each:

For Short Listing (Annex-A)

Sr#	Criteria	Marks	Comment/Description	Documents Required
1	Number of implementations of successful similar projects of automated fare collection systems, automated vehicle location systems and bus scheduling solutions (verifiable list to be provided) (Mandatory Feature)	20	1 to 2 = 8 Points 3 to 5 = 16 Points 6 or Greater =20 Points	User Acceptance Test (UAT) Sign Off Certificate or Any other valid evidence of project completion
2	Maximum passenger journeys per day that the AFC-BSS can handle in Millions	5	<2 = 0 Points >2 to 10 = 1 Points >10 to 20 = 3 Points Unlimited = 5 Points	Any valid document or proof
3	Total number of passengers served via the proposed system till the EOI date in Millions	5	<500 = 0 Points >500 to 1000 = 1 Points >1000 to 1500 = 2 Points >1500 to 2000 = 3 Points >2000 to 2500 = 4 Points >2500 = 5 Points	Any valid document or proof
4	Number of projects greater than Rs. 500 million in value	10	1 to 2 = 2 Points 3 to 4= 4 5 to 6= 6 7 to 8=8 9-10 and above=10	Any valid document or proof

5	Total number of human resource managed by the company/firm	10	Less than 50 = 2 Points 50 to 200 = 4 Points 200 to 300= 6 Points 300 to 400= 8 Points 401 or more =10 Points	List of Human Resources Employed stating Designation and numbers
6	Team members having more than 3 years' experience in the AFC-BSS software its Implementation & Maintenance.	5	4 to 5 years = 2 Points 6 to 10 years = 3 Points 11 to 15 years = 4 Points 16 or Greater = 5 Points	Please ensure to attach updated resumes with date of joining information for each team member.
7	Financial Strength of the bidder Average Annual Turnover of Business in last three years in Rs. Millions	20	Less than 50 = 2 Points 50-100 = 5 Points 101-200 =10 Points 201-300 = 15 Points 300+ = 20 Points (Changed) (BDO NOTE...reduce as per BUS document)	Financial Statements for the Fiscal years 2012-2013, 2013-2014, 2014-2015 OR Calendar Years 2013, 2014, 2015 whichever is applicable in the Country of origin of operations.
8	Number of successful projects with deployment of more than 200 resources onsite in multiple shifts	15	1 to 2 = 5 Points 3 to 6 = 10 Points 7 or Greater = 15 Points	Legal Proof and other document valid
9	Project Managers with at least 10 years of Project Management Experience. ()	10	1 to 4 = 4 Points 5 to 9 = 7 Points 10 or Greater = 10 Points	Detailed corporate profile of Project Managers Employed
	TOTAL	100	Minimum Passing/qualifying Marks = 60	

* Undertaking must be attached with Application. (Annex-C)

5. Financial Capacity (Annex-B)

Additionally, the following financial data form shall be filled out by the Interested Party; and by all partners in case of a Joint Venture and along with one summary form for all partners. The TMTD reserves the right to request additional information about the financial capacity of the Interested Party. An Interested Party that fails to demonstrate through its financial records that it has the financial capacity to perform the required Supply/Services may be disqualified.

Financial Information	Provide the required information for the previous three years. (Most recent to oldest). Also attach balance sheets for the relevant years		
	Year 1 (Year)	Year 2 (Year)	Year 3 (Year)
Information from Balance Sheet:			
(1) Total Assets (TA)			
(2) Current Assets			
(3) Total Liabilities (TL)			
(4) Current Liabilities (CL)			
Information from Income Statement:			
(5) Total Revenue (TR)			
(6) Profits before Taxes (PBT)			
Net Worth (1) - (3)			
Current Ratio (2) / (4)			

Also provide information on current or past litigation or arbitration over the last three (3) years as shown in the form below.

Litigation or arbitration in the last three (3) years: ___ No: _____ Yes: (See below)

Litigation and Arbitration during Last three (3) Years

Year	Matter in Dispute	Value of Award Against Operator in PAK Rupees
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6. Undertaking (Annex-C)

(Signature)

(Name, Title and Address of the Attorney)

Date:

UNDERTAKING

It is certified that the information furnished here in and as per the document submitted is true and correct and nothing has been concealed or tampered with. We have gone through all the conditions of the prequalification document and are liable to any punitive action for furnishing false information / documents.

Dated this ____ day of _____ 20 __

Signature

(Company Seal)

In the capacity of

Duly authorized to sign bids for and on behalf of:



7. Eligibility Requirements of Interested Party

An eligible Interested Party is the Party who:

- I. Is a Locally Registered Company or Foreign Company with an established place of business in Pakistan, registered with the Pakistan Software Export Board (PSEB), or Joint Venture (JV) complying with criteria given in the following JV criteria
- II. Supplies / sources / routes the services from “origin” in “eligible” member countries. “Eligible” is defined as any country or region that is allowed to do business in Pakistan by the law of Government of Pakistan. “Origin” shall be considered to be the place where the company / firm is incorporated
- III. Has a registered office in the respective country of origin (In case of JV, Applicable to all members)
- IV. Has been registered for at least 5 years in country of origin, and has proven experience of I.T Solutions/ Services. (In case of JV, Applicable to Any one member)
- V. Has a valid Registration Certificate for Income Tax, Sales Tax (on goods and services where applicable) or possesses corresponding equivalent documents from the country of origin. (In case of JV, Applicable to all members)
- VI. Has submitted Income Tax (on goods and services where applicable) Returns for the last three tax years or possesses corresponding equivalent documents from the country of origin (In case of JV, applicable to all member).
- VII. In the case of a local company forming part of the joint venture, this local company must be registered under Companies Ordinance 1984 with Security and Exchange Commission of Pakistan.

The Joint Venture (JV's):

Joint ventures are eligible for this EOI, as long as the joint venture complies with the following conditions:

- I. The Interested Party may form a joint venture of maximum four Parties/Companies. An Agreement Deed legally executed to that effect, or a Memorandum of Understanding (MOU), signed by all the partners shall be submitted with the EOI. All partners of the JV must be Registered Companies.
- II. One partner will be designated the lead partner and would enter into legal contract with Client and would be liable to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners. A power of attorney to that effect, legally executed, signed by all the partners shall be submitted with the Tender.

- III. There must be at least one locally registered company (Partner) of good repute, with relevant experience and proven track record, in the joint venture that must be the lead partner.
- IV. The Lead Partner in case of joint venture shall not be allowed to assign the contract or any part thereof to another party, without permission of the Client.
- V. All the partners shall be jointly and severally liable for the execution of the Contract in accordance with the terms and conditions of the Contract. The EOI, Tender, and in case of successful Tender, the Contract Deed, to that effect, shall be signed by the lead partner.
- VI. Partners other than the lead would also be bound by the terms and conditions of the contract.

8. EOI Submission Cost

The Interested Party shall bear all costs / expenses associated with the preparation and submission of the Tender(s) and the Client shall in no case be responsible / liable for those costs / expenses.

9. Preparation and Submission of Proposal in Response to EOI

The Technical Proposal shall contain the following documents, **without quoting the price:**

a. Documents Required For Substantial Responsiveness:-

- I. Firm Registration record in the country of Origin (In case of JV Applicable to all members)
- II. Firm Establishment record for at least 5 years in the form of Company Registration with PSEB/Certified Copy of Certificate of Incorporation OR equivalent document as applicable in the country of origin (In case of JV Applicable to any one member)
- III. Relevant experience record of 5 years (In case of JV Applicable to any one member)
- IV. Valid GST and NTN company registration certificates (In case of JV Applicable to all members)
- V. Active SEI CMMI Level/ ISO status (Enclose Certificate)

- VI. Income tax OR equivalent documents as applicable in the country of origin. The returns shall be for the Fiscal Years 2011-2012, 2012-2013 and 2013-2014 or Calendar Years 2012, 2013 and 2014 whichever is applicable in the country of Origin. (In case of JV Applicable to all member)
- VII. Agreement Deed / MOU in case of JV
- VIII. Document stating compliance to each bus specification mentioned in the Annex of the RFP document issued to short listed interested parties.
- IX. Audited statement for the last three years for all JV members (if applicable)
- X. Any other document (if needed) as and when requested by the client.

b. Documents Required for Prequalification, Evaluation and other requirements

- I. Covering letter duly signed and stamped by authorized representative.
- II. Executive Summary, highlighting brief description of the history and the structure and capabilities of the Interested Parties and its associated partners
- III. Organizational Structure, which shall include the information regarding the Interested Parties and its associated partner(s).
- IV. Management Capability stating Experience and capability of personnel for efficiently managing such projects.
- V. Proposal for Evaluation (along with supporting documents as mentioned above.)
- VI. Financial Capacity of the Bidder (along with supporting documents as mentioned above)
- VII. Power of Attorney
- VIII. Undertaking (as per Annex-C above; all terms & conditions and qualifications listed anywhere in the document have been satisfactorily vetted)
- IX. Conflict of Interest section shall include detailed information regarding any existing or proposed future conflict of interest that Interested Party (and associated partner) or any of its subsidiaries or affiliated or associated undertakings / companies may have with

the TMTD/TransPeshawar.

- X. Authorized Certificate / document from the principle / manufacturer (if applicable).
- XI. Technical Brochures / Literature or any other relevant material
- XII. List of National and International Clientele
- XIII. Active SEI CMMI Level/ ISO status
- XIV. Any other document (if needed) as and when requested by the client.

10. Overview & Objective

Peshawar, the provincial capital of Khyber Pakhtunkhwa, is the 8th largest city in Pakistan with a population of about 4.5 million. The city's population has been growing at a growth rate of about 3% per annum. The city's rapidly growing population coupled with increasing vehicle ownership has resulted insatiable travel demand. The development of the public transport network has not kept pace with this increase, and has caused transport related problems such as traffic congestion, accidents, poor environment etc.

Currently old vehicles plying on the roads of urban centers are neither comfortable nor meet the environment and safety standards. There are individual Transporters running buses in a haphazard manner and not maintaining vehicle standards, as long as the fare collection system is concerned it is totally manual; due to which sometimes, especially in the ceremonial days, regulations on fare control is questionable. Through introduction of Automated Fare Collection & Buss Scheduling System (AFC-BSS) the government intends to strengthen the regulatory mechanisms at one hand and provide efficient service delivery with improved systems at the other hand.

Moreover, the Provincial Transport Authority (PTA) has recently classified 25 new routes for Peshawar, including five Mass Transit Corridors, based on passengers and travel demand as per the Pre-Feasibility Study (PFS) conducted by Asian Development Bank (ADB) in 2014. However, only about 5 routes are operated due to lack of balance in supply and demand. Most public transport routes are served by vehicles which are non-permitted wagons, mini buses, buses, rickshaws and Qingqis.

GoKPK realizes the importance of providing safe, efficient, comfortable, and affordable Transport to the public. The ADB after completing Pre-Feasibility Study in 2014 for Mass Transit Corridor of Peshawar with Bus Rapid Transit (BRT) as preferred option, has now engaged the consultants for Feasibility Study (FS) under the PPTA (Project Preparatory

Technical Assistance) for Corridor-2 (GT-Jamrud Road). Since the introduction of BRT system on corridor-2 will require minimum two years to complete as the FS under process followed by the design and construction phases.

Therefore, the GoKPK intends initially, to further facilitate the passengers of Peshawar travelling on main artery(s) with induction of New AC Buses/fleet in advance **(The other component of BRT, out of the scope of this document;** for which on certain routes and Bus Stands AFC-BSS will be introduces **(scope of this document)** .

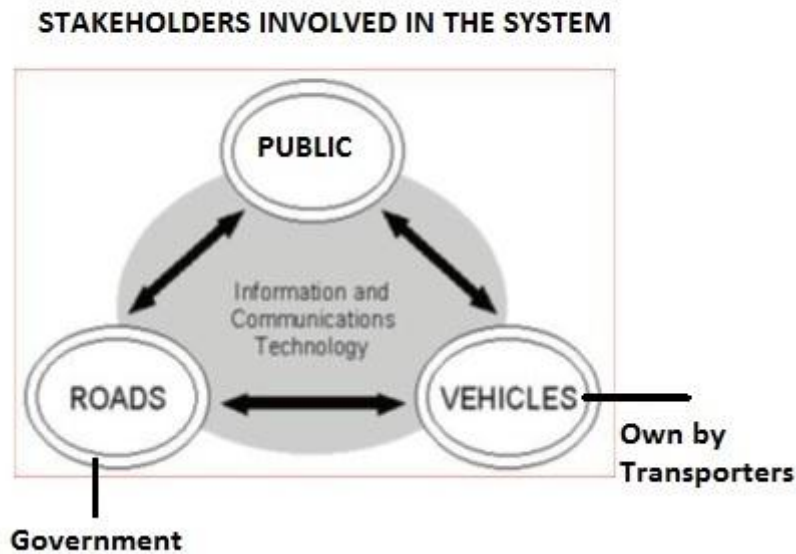
The physical operation and maintenance of the new bus fleet along with good quality services shall be provided under this project through transport companies who qualify.

It is worth to mention here that the main **“Objective of this document is to shortlist the reputed companies/firms/JVs to Develop, Implement, Operate & Maintain Automated Fare Collection and Bus Scheduling System (AFC-BSS) in Khyber Pakhtunkhwa”** to provide a good quality Automated Public Transport System across the Khyber Pakhtunkhwa and the Urban Centers of the Khyber Pakhtunkhwa for the facilitation of general public.

Initially the operations would be supervised by the TMTD and upon the establishment of ‘TransPeshawar-The Urban Mobility Company’; the contract would be transferred to it. Furthermore, once the operations of BRT system are intact, the system will be integrated with BRT system (on specified BRT route).

10.1 Model for Automated Fare Collection & Bus Scheduling System

Presently, there are various stakeholders involved in the existing transport system in Khyber Pakhtunkhwa that include, the Government, Transporters/Fleet Operators & the general public but under current system fare collection is done by the Transporters/fleet operators with poor bus scheduling mechanism; sometimes enjoying monopoly in the market especially during ceremonial days and ultimately it leads to public dissatisfaction and many other traffic related issues. The GoKPK is now determined to endeavor to handle this chaos with introduction of efficient systems through IT solutions one of which is to introduce AFC-BSS for Public Transport Services in Khyber Pakhtunkhwa with main objective **the transporters are to operate vehicles and not to collect fare and fare collection and Bus Scheduling shall be done by another service provider;** under this model. However, the fleet operator will be paid against their services on per KM basis as per the predetermined rates.



An automated fare collection (AFC) system is the collection of different components that will automate the manual, disintegrated & chaotic ticketing system of public transportation network in Khyber Pakhtunkhwa in a quality manner having long term impact. Automated version of manual fare collection AFC system is usually the basis for integrated fare collection/ ticketing.

Automated fare collection & Bus Scheduling System is a revolutionary, solution to streamline many potential issues associated with the manual collection of fares on buses, vans, taxis, or any other form of public transportation service in Khyber Pakhtunkhwa. Why is it revolutionary? Because, in one fell swoop, it addresses many difficulties associated with the efficient operation of the transportation system.

10.1.1 Methods for AFC

- ✓ Cash only through hand held devices
- ✓ Tickets and tokens
- ✓ Monthly Pass
- ✓ Magnetic stripe pass
- ✓ Smart card



Electronic Desired

10.1.2 Key AFC-BSS Parameters

- ✓ Encourage ridership
- ✓ Faster boarding
- ✓ Revenue Reconciliation
- ✓ Ridership data, seat turnover data, average fare collection etc.
- ✓ Passengers/Commuters Convenience & fare incentives
- ✓ Administrative & Operational Efficiencies
- ✓ Easier to track revenue and ridership (*The number of passengers using a particular form of public transport in Khyber Pakhtunkhwa*)

10.2 Issues with Traditional Fare Collection

If we still using tickets, tokens, passes or cash to collect fares, then we know how much of a hassle traditional fare collection can be. Without software or systems to manage the transportation system, you risk facing many serious problems, often caused by human error.

Outdated methods for fare collection are:

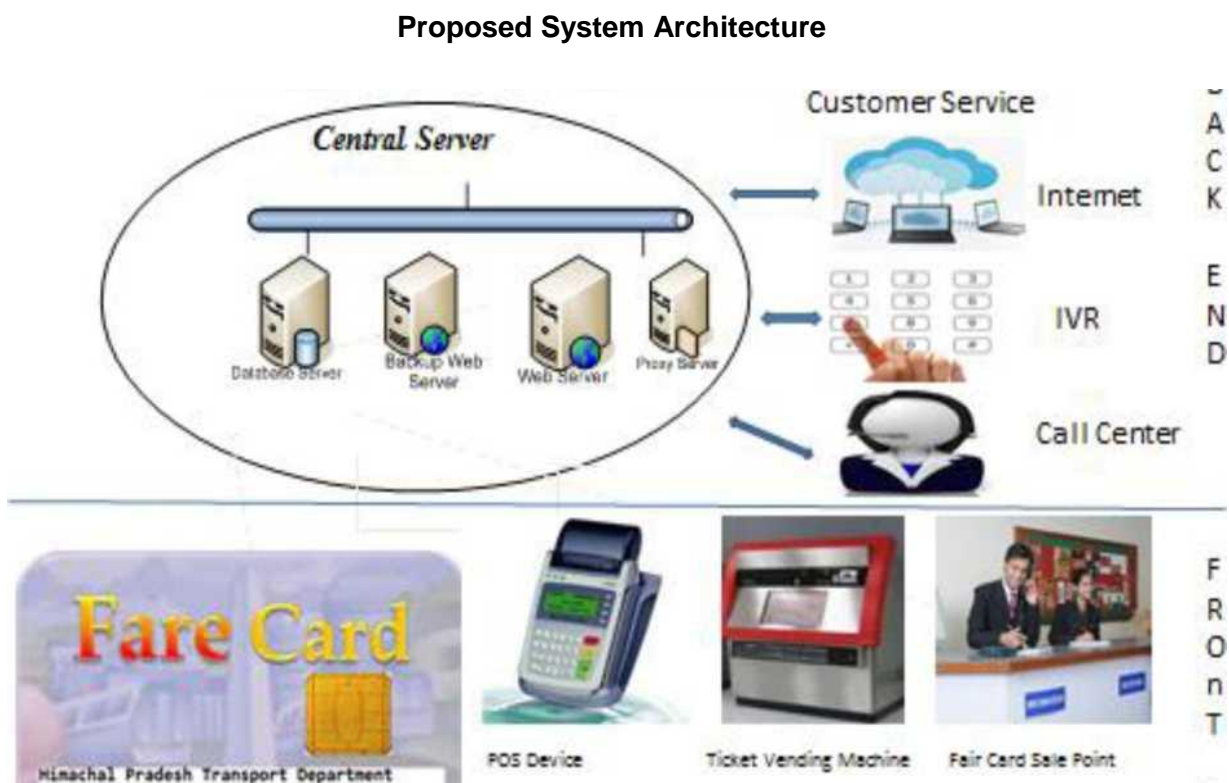
- ✓ **Expensive**. The sheer amount of tickets, tokens and vouchers that must be produced, tracked, and stored mean high ongoing costs just to keep your system running, let alone for upkeep.
- ✓ **Time-Consuming**. Without an automatic fare collection system, endless paperwork can pile up. This can put us hundreds of hours behind and racks up enormous labor costs year in and year out.
- ✓ **Impossible To Track**. Paper-based fare collection systems are easy to manipulate and difficult to manage. This makes reporting an impossible task while leaving a high risk for waste, fraud and abuse.

The TMTD/TransPeshawar will have full rights/access to AFC-BSS databases being maintained in the command & control center. The whole system would be monitored through I.T based solutions and by establishing a command & control /monitoring center for fare & Fleet Management system (F&FM). This will all be undertaken by the I.T company/firm, contracted for this specialized role. In addition to all of the above, 3rd party validation would also be carried out bi-annually for both AFC-BSS and Fleet operators (***Second component***

of BRT, out of the scope of this document).

Initially the AFC-BSS (**Desired Component**) & fleet operations (**The other component of Fleet Operators**) would be supervised by the TMTD and upon the establishment of TransPeshawar, the contract would be transferred to it. Furthermore, once the operations of BRT system are intact on specified routes, the fleet meeting the standards of BRT would be absorbed into it and AFC-BSS will be integrated with BRT system. Therefore, for a Company/Firm wishing to provide AFC-BSS services, it should ensure the integrated services are compliant with the BRT standards for transition phase operations so that same could be absorbed in BRT system and other routes in the future. It is pertinent to mention it here that BRT fleet requirements are for the route(s) where government has planned to introduce BRT system and not for all urban routes.

11. Indicative Scope of AFC-BSS



The above image presents high level system architecture for AFC-BSS. Certain sub-systems share key functions, and can be grouped as tiers that exchange data in a secured way.

The primary benefit envisioned for the AFC-BSS is its security and reliability through this architecture. Data stored in the Central System will be protected by several layers/tiers of applications residing on other sub-systems. Data exchange between tiers does not necessarily happen instantaneously, as it is dependent on the communications interface and business rules. Main Components of above the architecture are as follows:

11.1 Desired Features and Goals of the Ultimate System

1. Validators
2. Fare Media / Tickets
3. Automated Fare Collection and Fare Policy (***Fare policy/rates shall be determined by the government***)
4. Top Ups/Printing Tickets and Refunds
5. Portable Validators (as backup)
6. Bus Scheduling and Vehicle Location System
7. Passenger Information System
8. Disbursement to Operators
9. Communication Highway / Data Network.
10. On Board Intelligent Black Box -OBIB
11. Automatic Vehicle Monitoring (AVM):
12. Simulation model
13. Collision Avoidance System
14. Traffic Signal Integration
15. Handling of 2-Lane to single Lane Intersections
16. Driver Performance Monitoring
17. Energy Auditing and provision of renewable energy sources
18. Inventory Management & Tracking
19. Automated Passenger Counts – APC
20. Safety, Security and Surveillance System
21. Voice Communication Public Address System
22. Advertising Bill boards
23. Revenue Accounting
24. System availability and data backup
25. Station PCs
26. Servers/Storage
27. Manning Buses

28. Call / Complaint Center
29. TMTD/Trans Peshawar Command & Control Center
30. Reporting System

1. Validators

As a policy, for public transport service each mini bus needs to be equipped with one (01) validator and each standard bus needs to be equipped with two (2) validators for onboard ticketing through RFID Smart Fare card. The Validator in the bus shall be used both for Tap-in and Tap-out.

2. Fare Media / Tickets

RFID Smart Cards (stored value) for long term planned repeated journeys is a must, coupled with passenger registration module.

Required number of cards necessary to efficiently serve passenger/commuters volumes must be in stock with the chosen vendor at all points of time – this is must to ensure that no shortages of fare media occur at any given time. At no point should the tickets be short at any sale point on any route(s) specified by TMTD.

Note: Fare rates will be determined by Government of Khyber Pakhtunkhwa and **cost of media** will not be transferrable to passengers purchasing tickets. However, the smart cards will be rechargeable (*can be topped up*) and issued to the general public against a security deposit which will be fixed in the fare policy.

3. Automated Fare Collection and Fare Policy

Passengers/Commuters will be charged distance based fare. Proposed AFC-BSS must be able to handle fare policies based on flat rate, zones/stages, as well as distance travelled. Proposed AFC-BSS must also be able to handle the full fare, concessional fare and free fare policies. Proposed AFC-BSS must cater to on-board as well as off-board ticketing modes and be able to handle transfers across on-board and off-board ticketing modes.

The fare collection mechanism will be evaluated on the basis of local socio-economic realities as well as compatibility with other proposed BRT lines in country. Transactions records generated by the Automatic Fare Collection system AFC will be connected to the central database and be accessible for summary analyses and reports at designated Command & Control/Business Centers.

Public convenience and integrity of fare collection and ticketing is a crucial aspect of the BRT revenue generation. Ticketing system shall be based on both pre-paid electronic coupons/tickets for regular passengers as well as pay as-you-board (if desired).

The AFCS design will allow remote purchase of tickets as well as at bus terminals and on-board manual points. It will accommodate payments through various methods including cash payments, tokens and smart cards (**Desired**). The System design considerations will require interaction with other partnering teams including the Infrastructure designers, client and Operators. Selection of ticketing booths, turnstiles, and access control methods are essential components of the overall design.

4. Top Ups/Printing Tickets and Refunds

Ticket Office Machines are to be made available by the AFC-BSS Solutions Provider, at sale points on specified route(s), to issuing charged cards with the desired amount paid by the passenger/commuter. Ticket office machines will only work if they contain balance amount that can be transferred onto the fare media. Ticket Office Machines (Top up Machines) must reliably transmit transactional data to any intermediary system and/or central database and will be monitored by TMTD/TransPeshawar. Ticket Office must be able to refund any reported incidents of overcharging after due diligence to passenger, if it is agreed that such reimbursements are to be adopted as policy. All such functionality must be a typical feature of proposed Top up Machine and AFC-BSS. Every sale point must have at least one top up machine available in fully functional condition at any point of time.

5. Portable Validators (as backup)

Portable validators will be used as backup medium in case of any failure and to validate entry of passengers in the buses on the specified route(s).

6. Bus Scheduling and Vehicle Location System

Concerned authority of the TMTD/Trans Peshawar must be able to enter bus schedule into the system using Bus scheduler, and view/edit schedules via GIS-based interface. The Bus Scheduling System must have flexibility to plan different travel time for same route within single day. AFC-BSS will generate reports that will form a basis for payments to operators based on agreed formula (**determined by scheduled trips/kilometers, distance travelled as fetched via Vehicle Location System and any other associated/integrated components proposed as part of the solution**).

Every bus will have to be equipped with GPS devices and relevant components (on bus and off bus), that can gather location wise data and transmit to central servers and related software

modules. Data gathered in this fashion will help monitor movement of the bus via GIS interface, in real time against bus schedule defined in the relevant software module. Distance travelled, and number of trips made by every bus, must be reported via AFC-BSS. All such buses need to be equipped with GPS enabled trackers that integrate with the relevant software proposed for implementation as part of the AFC-BSS solution.

The Vehicle Location System shall enable operations team to monitor vehicle movement in real-time and synthesize the field data to deliver the same on the public information system devices installed on Bus Stations, Buses, customer portal etc.

The Driver Console Unit shall be used to provide vehicle tracking accurately and reliably. The back end system shall be able to produce MIS reports of vehicle schedule adherence report and kilometers travelled by each bus, by route and by fleet of each operator.

The Driver Console must be capable of collecting, transmitting and reporting in a prescribed format following data from Controller Area Network (CAN) Bus module installed by the bus operator.

- I. Acceleration and Deceleration
- II. Breaking (All kind of brakes)
- III. Gear Shifting for automatic transmission
- IV. Fuel Information
- V. Engine RPM
- VI. Bus Speed
- VII. Doors Control (Open/Close) Information
- VIII. Bus Saloon Temperature
- IX. Engine Temperature
- X. Battery On/Off Status

The Driver Console should be capable of display messages and play voice recordings accordingly to timely inform passengers of the next approaching station as well as to make any other critical announcements. The Driver Console should also be capable storing these other critical announcements of at least one (01) hour duration and playing some prescribed voice recordings through driver interface.

7. Passenger Information System

Available buses will have display unit(s) to disseminate messages. The Passenger Information System must be able to gather information from Vehicle Location system installed in the bus and display messages and play voice recordings accordingly to intimate passengers of the next

approaching station/stop. There must be provisions to display text messages and play voice messages in English and Urdu. Buses must be equipped with necessary speakers to ensure audible transmission of voice.

A web application will also be developed which will allow commuters to plan their visits and enable the TMTD/TransPeshawar track the data. It will inform about the stations, the frequency of buses at different times of day and the connecting routes of other buses available at each station for the commuters' to plan its itinerary. Third party applications for smart phones for travel related information including schedules, route planning, fares and announcements will assist in providing a level of public comfort and accessibility to the immediate and long term public transport requirements – including Bus Rapid Transit (BRT).

8. Disbursement to Operators

Multiple operators are expected to operate buses on designated Bus Rapid Transit (BRT) routes. The formula for disbursement of revenue to operators will be shared with the qualified bidder which then must be incorporated to proposed AFC-BSS.

9. Communication Highway / Data Network

The communication media or data highway shall be a combination of laid optical fiber, copper and wireless. The suggested wireless technology will be a mix of Wi-Fi and 3G/4G/LTE. At the depot and terminals, Wi-Fi will be the primary mode of communication whereas mobile cellular network operator services can provide a cost effective way for the wireless communication link without requiring investment for private wireless infrastructure. A comprehensive Data load analysis will be initiated for the purpose of detailed network design.

10. On Board Intelligent Black Box - OBIB

This will be the primary link of each bus with the Intelligent Transport System. This acquires and processes signals related to bus engine states, fuel and rpm gages, passenger counts, proximity sensors, driver interactions, passenger information displays, GPS signals and voice communication. The On board device can be used for communicating over the data highway with the external nodes including Traffic Signal controllers, CCTV cameras and with the Command & Control Centers. The on board controller is capable of exchanging video, voice and data.

11. Automatic Vehicle Monitoring (AVM):

The GPS coordinates of each bus will be available within the network for Vehicle Location. Other vehicle centric data gathered by the on board black box shall be available for various purposes including Bus Scheduler, Passenger Information System, and Fleet Management and Bus Maintenance.

12. Simulation Model

The simulation model will simulate the intelligent transport system and will provide the ITS operators with a useful tool for simulating vehicle traffic load patterns, passenger load analyses and training tools for better traffic management, emergency handling conditions e.g. road accidents, road blocks and alternate traffic plans.

13. Collision Avoidance System

A semi-automated collision detection system would produce alerts for path obstruction from the front and sides. These alerts and alarms are provided to the bus driver and simultaneously relayed to the System Control room. Combination of video image display for the driver, coupled with status of traffic signals will provide rear and front distant views guidance to driver for access to bus way.

14. Traffic Signal Integration

Right of way at road intersections will be based on pre-negotiated priorities. This requires harmonization of signaling protocols among traffic signal controllers. Requests for right of ways may be generated by the On- board Intelligent Black Box on buses.

15. Handling of 2-Lane to single Lane Intersections

Some parts of the corridor may have a combination of 2-lane and single lane access. A suitable automated signaling system will assist in guiding the driver. Signal violation will be suitably communicated to bus driver with audio alarms and may also disconnect the bus engine through the OBIB.

16. Driver Performance Monitoring

The system will generate complete on-line reports of the Driver including his attendance, schedules, driving violations e.g. accidents, breaking traffic rules. Biometric identification of driver and attendant/ conductor (if any) will ensure that only authorized personnel will operate the buses.

17. Energy Auditing and provision of renewable energy sources

An on-line energy metering system for terminals and depots would be deployed. This conveys energy consumption analysis and current status of electricity availability. The analysis would be useful for implementing energy conservation policies for the BRT Transit System. Critical nodes which require auxiliary power supply may have redundant sources e.g. Communication equipment may have PV solar source with battery backup.

18. Inventory Management & Tracking

The system will keep track of condition of fixed assets and consumables. It would also monitor rolling stock. Auditing of current status of primary components shall be possible. The data bases will also include pictorial representation of assets.

19. Automated Passenger Counts – APC

Electronic sensors mounted at turn styles and /or near bus doors, will provide passenger head counts for every bus. Data from the APCs will help create passenger load profiles for planning trip frequencies and schedules during different times of days/week for more efficient operation.

20. Safety, Security and Surveillance System

Each bus will be equipped with surveillance cameras that upon demand will provide the view to the central control room. CCTV cameras will also be installed at every station to monitor activities at vantage points along the transit ways, terminal stops and depots. All of these cameras will be networked to the central operations room and to the Security monitoring desk. An emergency call mechanism will also be provided to the driver and support personnel onboard each bus to generate alarms at the nearest Disaster Assistance Center.

21. Voice Communication Public Address System

The PA system shall be at each bus stop terminal. An automated computer generated announcement within the bus and /or terminal station shall be synchronized with approach to each location.

22. Advertising Bill boards

To enhance revenue collection, the buses will display electronic advertisements at Bus Stops, within the buses and externally on the sides. Special messages and time of arrival of next bus will be displayed at dynamic electronic billboards that are mounted at convenient locations

23. Revenue Accounting

Data from ticketing centers will assist in tabulating revenue collection and correlating the same with ridership counts. The integrated on-line system will enable current and reliable data from all nodes within the network. Data integrity during transmission and storage will be ensured.

24. System availability and data backup

AFC-BSS solution (including bus components as well as back-office systems) must be able to function on a 24x7x365 basis. Data backups are critical features of the overall solution. System

should be hosted in adequate data center, providing high availability access. Regular data backups must be maintained.

25. Station PCs

Branded Industrial strength sale point PCs with adequate processing power to efficiently handle traffic patterns. Requisite software licensing components, if any required, must be provisioned to act as an intermediate between data center and PDAs placed in sale points; this will help make sale points self-contained in terms of carrying out operations without complete dependency on the data center. However sale point PCs must synchronize with data center at regular intervals during every hour of operations.

26. Servers/Storage

Setup of servers, storage devices and any other hardware/software necessary for the proposed solution to work efficiently is an integral component of the system. The AFC-BSS solution must be able to handle daily passenger volumes of up to 500,000 in an efficient, uninterrupted manner. Bidder will be responsible for adequate upgrades in the infrastructure as and when necessitated - to ensure that the system can efficiently cater growing passenger volumes.

27. Manning Buses

TMTD/TransPeshawar public transport service buses will be manned with professional sales staff for the initial three (03) months of operations; tentative hours of operation initially are 18 hours a day, seven days a week. Subject to change depending upon need and requirements as illustrated by Purchaser.

28. Call / Complaint Center

TMTD/Trans Peshawar may setup a call center/helpline for passengers/commuters to call into for on bus routes and schedules as well as for any issues on fare. Call center shall be able to log in complaints through call-center operator or via Interactive Voice Response (IVR). This software-based system will have on-line access to updated status of buses schedules as well as latest conditions of the transit way for operators of the Help Desk. Routine text and audio messages will be auto generated and transmitted in response to SMS queries.

29. TMTD/Trans Peshawar Command & Control Center

TMTD/TransPeshawar is also planning to establish a command & control center for authorized TMTD/TransPeshawar staff allocated to the AFC-BSS project in Khyber Pakhtunkhwa.

All data collected via AFC-BSS components (including audit data, statistical, and operational information) shall be made accessible via secure, online interface to authorized TMTD/TransPeshawar staff on real-time basis, by the Contractor/Service Provider.

Bus Scheduling, bus tracking, and bus alert-management, as well as Passenger Information System shall be managed / monitored via the Command & Control Center.

Card initialization and personalization devices shall be centrally located by the Contractor/Service Provider at the Command & Control Center (or other appropriate location designated by TMTD/TransPeshawar). TMTD/TransPeshawar authorized personnel must be able to control all operations performed by these centrally located devices. Contractor/Service Provider is responsible to provide adequate AFC-BSS support staff at the command & control Center.

Central Command and Control Center will house large screen monitors to oversee the current situation of fleet. In case of errors in destination arrival timings, correction speed messages would be auto-generated by the system and dispatched to the affected drivers. The Control Center will send automated messages to the adjacent bus drivers to speed up or slow down to maintain the controlled interval between bus arrivals. A log of bus motion dynamics will also enable examination of the driving habits of drivers.

Current status of buses, terminal stations, CCTV images along the corridor may be selectively displayed at the Command & Control Center which will have several display and analyses features that are software based. These may be replicated at multiple secondary Command & Control Centers with different display sizes e.g. video walls, large and medium sized LCD displays.

30. Reporting System

All AFC-BSS components must be equipped with standard reporting system typically expected from an internationally deployed, Automated Fare Collection System, Vehicle Location System, Bus Scheduling and Passenger information System/product like Fare Media Utilization Report (including time and location of entry and exit of each passenger), Origin-Destination Matrix Report, Ridership Report (for user selected time duration), Card initialization Report, Driver Card log Report, Vehicle tracking report (including time, geo coordinates and speed of each vehicle configurable to one second time interval), Time, Event and Location based vehicle speed monitoring report, trip status reports by route, Passenger Transfer Report between routes, etc. with the provision of at least 30 additional reports that may be required based on data stored in the relevant databases. The solution must also come with a standardized report-writing tool that can be used to generate custom reports as and when required. Bus origin-destination reports and reports regarding bus arrival times, deviations (if any) from the schedule for each day, Daily Trip based Time-Space Diagram must be available in real time.

Reports/summaries of incidents subject to which the penalty clauses may be invoked should also be made available. System must have alarms for speed violations, breakdown, missed trips, missed stop, unplanned stoppage, bus bunching, late start, schedule adherence and other alarms based on CAN module data from bus.