**Functional and non-functional requirements**

**The frame of account based ticketing system – a modular and integrated data architecture for availability all kind of the operation of extended functions (business processes) and services:**

1. Integrated software for public transport operator that provide planning, scheduling, rostering and dispatching:
	1. development and supporting of route network by the topological instruments and related elements;
	2. planning of timetables and scheduling;
	3. fleet management and rostering resources per the data from elements as per previously points.
	4. online fleet management and supervision/control at high automatization level and geographical representation.
2. Software that provide central CCTV management - video surveillance management system with general management console.
3. Vehicles on-board installed equipment that includes integrated functionality of software:
	1. unified data communication platform for local networking and mobile data channel (as LTE / G4) supporting;
	2. ABT validators and their components;
	3. components for automatic vehicle location (AVL) system;
	4. components for passenger information system (PIS);
	5. components for observation of the technical condition and safe driving supporting;
	6. CCTV components;
	7. General driver information and management console for all onboard equipment.
4. Mobile application available for iOS and Andriod operating systems for passengers that provide integrated solution for trip planning, ticketing and third party services (MaaS level as well).
5. Delivery shall include:
	1. all objects of licenses, the rights of use of the software and related trademarks, as well as provision of certifications pursuant to Latvian national legal acts;
	2. deployment of software and data bases should set as a private cloud service by including at least 2 separated farms (clusters) that provide test and production sites;
	3. detailed descriptions and performance assessments of the required technical and configuration level for setup of the private cloud environment.

**Organizational aspects of delivering**

1. The Operator shall reserve the right to accept and choose the any offer for ABT supply on the below listed delivery provisions, such as:
	1. DBFOM – Design, build, finance, operate, maintain;
	2. DBOM – Design, build, operate, maintain;
	3. DBM+O – Design, build, maintain + operate;
	4. DB+OM – Design, build + operate, maintain;
	5. FPaaS – fare payment as a service;
	6. SaaS – System as a service.
2. In case of the all kind of services, the supplier (service provider) shall be obliged to ensure that the all resources of services (also data storages and backups) shall keep site and sub partners stay in the Member state of EU or EEA.

**Functional requirements**

\* in the column, please make a corresponding note about the readiness to include the requested in final delivery offer or not.

|  |  |  |
| --- | --- | --- |
| **ID** | **Requirement or supported function** | **YES / NO \*****deliverable** |
| **FP.1.** | **Type of tickets** |  |
| FP.1.1. | Single ticket – a) without transfer, b) with transfer within time window, c) Origin-Destination, d) for multiple trips |  |
| FP.1.2. | Single route or operator |  |
| FP.1.3. | Zonal |  |
| FP.1.4. | Distance-based – a) stop to stop, b) distance from point A to B |  |
| FP.1.5. | Multi-mode / Multi-operator |  |
| FP.1.6. | Time based – a) one-hour, b) day or multi-day, c) passes (day, business days, holidays, week, month, annual) |  |
| FP.1.7. | Value (Pay-as-you-go or check-in / check-out) – a) by numbers of taps, b) by distance |  |
| FP.1.8. | Event-based (combines with the ticket for event) |  |
| FP.1.9. | Fixed price for luggage, pets, etc. |  |
| FP.1.10. | Park & Ride combination  |  |
| FP.1.11. | Multi-single (“carnet”) |  |
| FP.1.12. | Group ticket / Family ticket |  |
| FP.1.13. | Peak/Off-Peak |  |
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| **FP.2.** | **Tariffs and fares** |  |
| FP.2.1. | Flat |  |
| FP.2.2. | Route |  |
| FP.2.3. | Zonal |  |
| FP.2.4. | Service-based (bus, tram, trolleybus)  |  |
| FP.2.5. | Distance-based |  |
| FP.2.6. | Event-based  |  |
| FP.2.7. | Fare-Capping (IN/OUT or interval combinations) |  |
| FP.2.8. | Multi-modal |  |
| FP.2.9. | Loyalty-based |  |
| FP.2.10. | subsided (National or Municipal level) |  |
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| **FP.3.** | **Registration, authentication and usability on CUSTOMER WEBSITE** |  |
| FP.3.1. | To use anonymous account |  |
| FP.3.2. | To use personalized account |  |
| FP.3.3. | Authentication by system account service  |  |
| FP.3.4. | Authentication by social networking accounts (Google, Facebook) **\*due to security risks, for that kind level will be provide limited scope of services** |  |
| FP.3.5. | Authentication by local Smart-ID service https://www.smart-id.com/ |  |
| FP.3.6. | Authentication by local eID / mobile eID service https://www.eparaksts.lv/en/About\_eSignature |  |
| FP.3.7. | self-service portal for authenticated users |  |
| FP.3.8. | Customizable messaging service (by e-mail, SMS or notifications in app) provided by self-service portal |  |
| FP.3.9. | Customizable content on the self-service portal |  |
| FP.3.10. | Ticket selling and account management |  |
| FP.3.10. | purchase reports, transaction history, activity log |  |
| FP.3.10. | Integrated tool for trip planning, real time information and best price calculation |  |
| FP.3.11. | Management of the related payment methods (bank cards, e-money, coupons) |  |
| FP.3.12. | Management of related accounts (family level) |  |
| FP.3.13. | Management of related third party’s services and products |  |
| FP.3.14. | Management of Personal data, settled by GDPR. For acceptation of the person itself to access, correct and supplement the personal data, to obtain personal data and copies of personal data, to accept the provisions for the use of data and the consent for data processing, acceptation or not acceptation of the Cookies policies as required by EU law. |  |
| FP.3.15. | Connectors for data import from state level system, such as Office of Citizenship and Migration Affairs, Road Transport Administration… |  |
| FP.3.16. | Integrated online support services (chatbot, AI) |  |
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| **FP.4.** | **Registration, authentication and usability on CUSTOMER MOBILE APP** |  |
| FP.4.1. | User mobile application for smart devices  |  |
| FP.4.2. | Available on Android and iOS |  |
| FP.4.3. | Adaptation of functions FP.3. to the app |  |
| FP.4.4. | on-line and off-line ticketing solution - purchase, payments and validation according to the user account and type of ticket |  |
| FP.4.5. | Customized user interface – by own user or by system offer (origin and destination stop, selection of route or time, fare relief indication or request) |  |
| FP.4.6. | MaaS concept for multi-modal route and on-demand services |  |
| FP.4.6. | Additional mobility services – positioning, route planning, real-time forecast planning: |  |
| FP.4.6.1. | Dynamic planning based on real-time forecast |  |
| FP.4.6.2. | Modeling of best scenarios of trips (generated by mathematic algorithms selection of duration and distance) |  |
| FP.4.6.3. | Provide GDPR requirement - user permissions to use data and location service for detection of the load of routes and optimal route scheduling. |  |
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| **FP.5.** | **Channels for selling and fare collection** |  |
| FP.5.1. | Website (requirements FP.3.) |  |
| FP.5.2. | Mobile APP (requirements FP.4.) |  |
| FP.5.3. | eMV payment |  |
| FP.5.4. | integrated payments by bank issued cards |  |
| FP.5.5. | Online payments by local bank services |  |
| FP.5.6. | integrated third party payments and e money services (Google Pay, Apple Pay, PayPal, Mobilly, Bolt, etc.) |  |
| FP.5.7. | Automatic balance replenishment |  |
| FP.5.8. | included retail services by API connectors |  |
| FP.5.9. | By 3rd party solutions (application) based on open API or SDK |  |
| FP.5.10. | ticket vending machines (TVM) |  |
| FP.5.11. | On-board sales at the driver – by bank cards, by cash |  |
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| **FP.6.** | **Ticket inspectors** |  |
| FP.6.1. | Solution that work on any Android provided by 3rd party manufacturers device |  |
| FP.6.2. | Real-time contactless inspection |  |
| FP.6.3. | Addition services - sales, ticket check, blocking or unblocking of user account |  |
| FP.6.4. | back-office solution for planning and monitoring of inspection |  |
| FP.6.5. | Detailed requirements described in attached file “**Annex FP6-Control**” |  |
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| **FP.7.** | **System administration and back-office role** |  |
| FP.7.1. | Management of user and administrator rights and access levels  |  |
| FP.7.2. | Metrics for updating data (white or black lists, fare data, prices, …) at all levels for 1 hour |  |
| FP.7.3. | Data exchange between all internal modules of system - fleet management, schedules, routes, etc. |  |
| FP.7.4. | Data exchange between external systems or services for data input or output |  |
| FP.7.5. | Proposal generation of best offer that based on data of user profile |  |
| FP.7.6. | Management for user accounts, media, products, black lists and white lists |  |
| FP.7.8. | All kind of transaction reports for controlling of payments, correction, conformity and repayments  |  |
| FP.7.9. | Financial and operational data reports, export to power BI tools, export to file (xml, csv, pdf) |  |
| FP.7.10. | Automatic notifications, fraud detection rules |  |
| FP.7.11. | Supported Intermobility - 3rd parties (operators) tickets selling and revenue sharing |  |
| FP.7.12. | Management console for on-line administration of devices and equipment  |  |
| FP.7.13. | Services for log registering – system level activities, data exchange activities, user activities, error log (see FP.8.) |  |
| FP.7.14. | management of processing and clearing, payment gateways log |  |
| FP.7.15. | client profile GDPR option: search, get and extract the personal data, identification of the purpose of personal data processing, processed personal data categories, recipients of the personal data. |  |
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| **FP.8.** | **Audit records and data storages:** |  |
| FP.8.1. | Log of user activity: |  |
| FP.8.1.1. | in web |  |
| FP.8.1.2. | in mobile APP |  |
| FP.8.1.3. | in back-office of user role (relation to processing of user account information) |  |
| FP.8.1.4. | in back-office of system administrator role |  |
| FP.8.2. | Audit records in relation to client data in the scope sufficient for the control and tracking of personal data processing – activities with personal data (manual or automated) such as recording, structuring, storage, adaption or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction |  |
| FP.8.3. | Log (audit records) of data exchanges between systems (recording of the event and time of connection) |  |
| FP.8.4. | Log of technical level errors of all modules of system |  |
| FP.8.5. | recording of payment transaction information according to related legal acts |  |
| FP.8.6. | Real-time information about sales, validation and inspection transactions |  |
| FP.8.7. | Rules of data saving lifecycle term due to the reasons of period of availability – separately for system or data level and for log of audition. Also, an automated decision to delete or anonymize. |  |
| FP.8.8. | Backup solution with versioning – at data level and at system level. All archived data are encrypted and available for restricted users only. |  |
| FP.8.9. | Automated depersonalization of data |  |
| FP.8.10. | Special access control for log of audit (audit trails). |  |
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| **FP.9.** | **extended functions (business processes) and services** |  |
| FP.9.1. | Description in file “**Annex FP91-PassengerInformationSystem**” |  |
| FP.9.2. | Description in file “**Annex FP92-FleetManagement**” |  |
| FP.9.3. | Description in file “**Annex FP93-Resource planning and rostering**” |  |
| FP.9.4. | Description in file “**Annex FP94-TicketingInspection**” |  |
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**5. non-Functional requirements**

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| **ID** | **Requirement or supported function** |
| **NF.1.** | **Supported media and tokens** |
| NF.1.1. | Contactless EMV |
| NF.1.2. | QR code (printed or in mobile app) |
| NF.1.3. | National identity card (eID) |
| NF.1.4. | NFC standard transmission (phone, smartwatch, white card) |
| NF.1.5. | ISO14443 A standard smart cards (Desfire and Mifare UltraLight C) |
| NF.1.6. | ISO14443 B standard smart cards (Calypso) |
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| **NF.2.** | **Security requirements for media and validation:** |
| NF.2.1. | Compliance to CIPURSE™ open standard specification per OSPT Alliance instructions |
| NF.2.2. | Compliance to CNA/PayCert standard specification per STA (alliance) instructions |
| NF.2.3. | Compliance to secure electronic payment standards supported by SamsungPay, GooglePay and ApplePay |
| NF.2.4. | Compliance to safety standards: |
| NF.2.4.1. | For any validator - EMV L1/L2, PCI-PTS/SRED |
| NF.2.4.2. | For POS - EMV L3 |
| NF.2.4.3. | For any data transfers - End to end PCI certification  |
| NF.2.4.4. | For Inspector terminal - PCI DSS |
| NF.2.4.5. | TVM – national legislation for cash registers |
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| **NF.3.** | **Environmental requirement for on-board equipment:** |
| NF.3.1. | Compliance to environment/operation/storage temperature – TX [-30 + 40 / -30 +70 / -30+80] per standard EN50155 “Electronic equipment used on rolling stock” or equivalent |
| NF.3.2. | Compliance to the requirements of vehicle vibration level testing methods: Fc[sinusoidal vibration] - according to IEC standard EN60068-2-6 or equivalent; Fh[Vibration, broadband random (digital control) – according to IEC standard EN60068-2-64 or equivalent |
| NF.3.3. | Compliance to Environmental Impact Protection Index ≥ IP54 (if construction contains components with index IP42 or lower, they must be built in hermetic sections or containers), components placed outside the vehicle must comply with the index IP65 |
| NF.3.4. | Compliance to Impact Protection Rating – IK 07 (2J) |
| NF.3.5. | Compliance to power supply voltage 24 V DC (operating voltage range 16.8-28.8 V DC), power supply transmissions must be connected to ensure the power supply overvoltage protection from the accumulator |
| NF.3.6. | Overvoltage, overload or short-circuit protection ensured for all technical devices  |
| NF.3.7. | Compliance to requirements for device on-board installation per United Nations Organization Requirements No 107  |
| NF.3.8. | Devices or equipment or any related components must not impact the operation of another electronic devices or equipment, including interruptions that can cause the injuries to passenger or the driver |
| NF.3.9. | Groups of on-board functions to be consolidated on one control device or group of devices with uniform control unit (console) |
|  |  |
| **NF.4.** | **Interoperability protocols, data exchange with 3rd party system, frames of ABT** |
| NF.4.1. | API (JSON/REST) based protocols |
| NF.4.2. | Comply with definition in NFP.2. |
| NF.4.3. | GTFS flex (RT) protocols |
| NF.4.4. | SIRI protocols |
| NF.4.5. | Integration with national system AVIS https://viss.gov.lv/lv/Informacijai/Dokumentacija/Vadlinijas/AVIS |
| NF.4.6. | Integration with national e-Identity platform web service (REST API web service) with OAuth 2.0 authorization protocol per the Regulation on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation) |
| NF.4.7. | Integration with national Online-banking services (Swedbank, SEB, Citadele, Luminor/Nordea) |
| NF.4.8. | Integration with authentication service of State service web portal Latvija.lv https://viss.gov.lv/lv/Informacijai/Dokumentacija/Vadlinijas/LatvijaLv\_portals |
| NF.4.9. | 3rd party authentication services provided by Google, Samsung, Facebook |
| NF.4.10. | Encryption of personal data for data exchange to external systems |
| NF.4.11. | comply with standard requirements CSN EN 15320 |
| NF.4.12. | comply with standard requirements ISO 24014-1:2015 |
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| **NF.5.** | **National level requirements** |
| NF.5.1. | Regulation No 442 “Procedures for the ensuring conformity of information and communication technologies systems to minimum security requirements” issued by the Cabinet of the Republic of Latvia – requirements as for increased security systems. |
| NF.5.2. | Regulation No 95 “Regulations regarding technical requirements for electronic devices and equipment for the registration of taxes and other payments” issued by the Cabinet of the Republic of Latvia |
| NF.5.3. | Regulation No 96 “Procedures for the use of electronic devices and equipment for the registration of taxes and other payments” issued by the Cabinet of the Republic of Latvia |
| NF.5.4. | Certification of devices in State Revenue Service of the Republic of Latvia, thus attesting the conformity to Regulations No 95 |
| NF.5.5. | Security checking of data transferred upon WEB service request |
| NF.5.6. | Users are entitled to access the functionality due to the defined role. Users cannot escalate their rights of access. |
| NF.5.7. | Only encrypted data exchange must be provided |
| NF.5.8. | Protection against system application security exploits (OWASP Top Ten Web Application Security Risks) for web resources |
| NF.5.9. | Prohibited to use any modules or equipment if the manufacturer does not support spare part production or supply updates within a period of 5 years from the start of installation. |
| NF.5.10. | in case of error only minimal information will presented to the user |
| NF.5.11. | Regular updates of software due to adjustments to be implemented under the national legal acts must be supported |
| NF.5.12. | not allowed any E-money emission services that are regulated by the national Law “Payment services and electronic money”. |
| NF.5.13. | The supplier (service provider) is ISO27001 and ISO27701 standards certified |
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| **NF.6.** | **Performance** |
| NF.6.1. | Number of vehicles – up to 1000 |
| NF.6.2. | Number of possible authorization and validation equipment per vehicle – from 3 to 7 units in average |
| NF.6.3. | Number of inspector terminals – up to 200 |
| NF.6.4. | Number of routes – up to 200 |
| NF.6.5. | Number of displays to be installed in the stops - up to 150 |
| NF.6.6. | Number of unique registered users – up to 1 million |
| NF.6.7. | Number for Annual authorizations or validations – up to 500 million |
| NF.6.8. | Number of simultaneous system-level users – up to 200 |
| NF.6.9. | Number of simultaneous clients (web) – up to 3000 |
| NF.6.10. | Number of simultaneous mobile application clients (APP) – up to 5000 |
| NF.6.11. | Number of retailers – up to 1000 |
| NF.6.12. | Number of client operators – up to 50 |
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| **NF.7.** | **Availability, MTBF (Mean time between failures) and scalability** |
| NF.7.1. | System is provided as the modular solution that does not affect the operation of separate modules |
| NF.7.2. | Hot backup solution implemented |
| NF.7.3. | Test platforms (site) and all testing environment should provide |
| NF.7.4. | Backup management solution for system-level and data base level – requirement definition, continuously backups, performance control, integrity control, version control, rollback function without system interruptions |
| NF.7.5. | Availability of system (SLA) not under 99.8% |
| NF.7.6. | Any validation or token generation time not longer than 0.5 sec |
| NF.7.7. | system is scalable and can be added gradually |
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| **NF.8.** | **General requirements**  |
| NF.8.1. | User interfaces of software and applications should realize in several languages – Latvian, English, Russian |
| NF.8.2. | User Interfaces of equipment should realize in Latvian language |
| NF.8.3. | General documentation and technical description of system should realize in English or Latvian language |
| NF.8.4. | End-user instructions and manuals should realize in Latvian language |
| NF.8.5. | Support of Latvian national standard – character encoding Windows-1257, time zone and automated seasonal change, time representation, currency representation |
| NF.8.6. | Onsite trainings of the personnel at organizing, technical, support and user levels |
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| **NF.9.** | **Upgrade and (existing) data migration** |
| NF.9.1. | Integration of the issued ISO14443 B Calypso smartcards as token |
| NF.9.2. | Import of users’ data and statuses from old system |
| NF.9.3. | Import of existing tickets and products |
| NF.9.4. | Replacement of the equipment |
| NF.9.5. | Client account balancing – import and synchronization of the actual balance |
|  |  |
| **NF.10.** | **Applicable requirements of General Data Protection Regulation (GDPR):** |
| NF.10.1. | Control of data availability and the terms of use. Different storage period due to the type of data |
| NF.10.2. | Integrated rules for automatic data deletion |
| NF.10.3. | Integrated rules for anonymization for further use |
| NF.10.4. | Structured data transmission (move, copy or transfer personal data) in common and machine-readable format as stated in Article 20 of the GDPR. |
| NF.10.5. | Data accuracy checking and related failures detection, rules for their corrections. Possibility to insert a statement on correction of personal data.  |
| NF.10.6. | The system restricts the processing of personal data and indicates that further processing is limited, as stated in Article 18 of the GDPR |
| NF.10.7. | If a person enters data into the system or accesses the system, it shall ensure that persons are informed of the processing of their personal data |
| NF.10.8. | If the processing of data in the System is with the person's own consent and is obtained through the system, then the system must have additional requirements directly related to consent. |

END of Annex