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| **iBUS2 AGREEMENT**  **lot 1 (ON BUS SERVICES)**  **SCHEDULE 2.1**  **Solution Requirements** |

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**SCHEDULE 2.1  
  
SOLUTION REQUIREMENTS**

# SD01 Installation and configuration

## Assets

| **Title and ID** | **Requirement** |
| --- | --- |
| On Bus Asset Specification | |
| Asset design and installation space  (iB2-iBREQ-639) | The Supplier shall ensure that the On Bus Assets are designed to utilise no more than the space(s) allocated to the existing On Bus Assets. |
| On Bus Core  (iB2-iBREQ-627) | The Supplier shall provide and install on each Vehicle, an On Bus Core that is capable of executing functions including:   1. interfacing with other On Bus Assets (in accordance with the applicable Interface Specification); 2. transmitting on-bus data to the Back Office Solution; 3. receiving data from the Back Office Solution; and 4. managing internal memory for storage of data. |
| On Bus Core specifications  (iB2-iBREQ-2444) | The Supplier shall ensure that the On Bus Core design meets the specifications below at a minimum:   1. operating temperatures: -10°C to + 40°C; 2. impact resistance level: IK7; and 3. ingress protection rating: IP54. |
| Vibration resistance  (iB2-iBREQ-2466) | The Supplier shall ensure that the On Bus Core provides resistance to vibration and meets the levels required for Class 5M2 vehicles in accordance with EN 60721-3-5:1997 Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 5: Ground vehicle, as set out in Schedule 2.3 (*Standards*). |
| Driver Display Unit  (iB2-iBREQ-628) | The Supplier shall provide and install on each Vehicle, a Driver Display Unit. |
| Driver Display Unit specifications  (iB2-iBREQ-629) | The Supplier shall ensure that the Driver Display Unit design includes a touch screen. |
| On Bus Core -connection to Card Reader  (iB2-iBREQ-2364) | The Supplier shall ensure that the On Bus Core can communicate with the Primary Card Reader through a connection to a Card Reader Tray in accordance with the Card Reader Tray Specification. The footprint of the Card Reader Tray defines the space allocated for the purposes of Solution Requirement iB2-iBREQ-639. |
| On-bus Antenna  (iB2-iBREQ-630) | The Supplier shall provide, the Antenna matching On-bus Antenna Specification (New). For initial installation the Supplier shall follow Solution Requirement iB2-iREQ-642 and reuse the existing Antenna described in On-bus Antenna Specification (Legacy). |
| On-bus Driver Microphone  (iB2-iBREQ-631) | The Supplier shall, when supplying a new Driver Microphone, ensure that such new Driver Microphone meets the specifications set out in the Driver Microphone Specification. |
| Consumables  (iB2-iBREQ-632) | The Supplier shall, in relation to each Vehicle, install the Consumables set out in the applicable LLVD for that Vehicle. |
| ITxPT network  (iB2-iBREQ-633) | The Supplier shall install as part of the On-bus Solution an ITxPT network which includes:   1. CAN Gateway; 2. Communications Gateway; 3. DHCP server; and 4. MQTT Store. |
| On-bus structured cabling  (iB2-iBREQ-2085) | The Supplier shall ensure that the On-bus Solution utilises ITxPT compliant cabling and cabling kits for all cables connecting ITxPT compliant On Bus Assets. |
| Power supply to On Bus Assets  (iB2-iBREQ-2087) | The Supplier shall ensure that the correct direct current (DC) power outlet is provided to all On Bus Assets. |
| Provision and installation of New OBNSS  (iB2-iBREQ-2113) | The Supplier shall, when supplying a New OBNSS Asset, ensure that the New OBNSS meets the OBNSS Specification of the existing OBNSS as set out in Section 5 (*Housing and Mountings*) of the OBNSS Specification. |
| New OBNSS display functionality  (iB2-iBREQ-2337) | The Supplier shall ensure that New OBNSS Assets provide the same display functionality as the existing OBNSS and provides at least two (2) lines of text. |
| New OBNSS display standards  (iB2-iBREQ-2338) | The Supplier shall ensure that the display of information on New OBNSS Assets complies with:   1. the Equality Act; and 2. RTIG guidelines for display of real time information as referred to in Schedule 2.3 (*Standards*). |
| Future OBNSS display standards  (iB2-iBREQ-2532) | The Supplier shall ensure that the display of information on Future OBNSS Assets complies with:   1. the Equality Act; and 2. RTIG guidelines for display of real time information as referred to in Schedule 2.3 (*Standards*). |
| Assets Electromagnetic Compatibility | |
| EMC standards  (iB2-iBREQ-635) | The Supplier shall ensure that all installed On Bus Assets are compliant with the Electromagnetic Compatibility Regulations 2016: Guidance (GB) ("**EMC Standard**") and CISPR Standard referred to in Schedule 2.3 (*Standards*). |
| EMC and CISPR tests  (iB2-iBREQ-636) | The Supplier shall ensure that all On Bus Assets are EMC and CISPR tested and pass tests related to the EMC Standard (as defined in iB2-iBREQ-635) and CISPR Standard referred to in Schedule 2.3 (*Standards*). |
| Asset installation | |
| On Bus Assets installation  (iB2-iBREQ-637) | The Supplier shall, in accordance with Schedule 6.1 (*Transition and Rollout*), provide, and be responsible for the installation, testing, and commissioning of, all the identified On Bus Assets and related Consumable(s) in accordance with the Rollout Plan agreed between TfL and the Supplier. |
| On Bus Assets per vehicle  (iB2-iBREQ-638) | The On-bus Supplier shall, in relation to each Vehicle, install the On Bus Assets set out in the applicable LLVD for that Vehicle. |
| Installed Assets to be programmed to the Vehicle Type  (iB2-iBREQ-2270) | The Supplier shall ensure that newly installed On Bus Assets and or replacement On Bus Assets on Vehicles are programmed to the configuration applicable to the Vehicle Type on which they are installed. |
| Assets and Consumables installation on new Vehicle builds  (iB2-iBREQ-641) | The Supplier shall supply all On Bus Assets and associated Consumable(s) as set out in the Assets and Consumables per Vehicle List, to the Vehicle manufacturer as notified to the Supplier by TfL from time to time. |
| Assets and Consumables installation on existing bus builds  (iB2-iBREQ-642) | The Supplier shall, when installing the On-bus Solution on a Vehicle on which the On Bus Assets of the Former Supplier System have been installed, reuse On Bus Assets already installed and/ or replace with new On Bus Assets as required in accordance with Paragraph 7 of Schedule 2.2(B) (*Service Management*). |
| Asset register in TfL CMDB  (iB2-iBREQ-2353) | The Supplier shall ensure that each Configuration Item is registered in TfL’s CMDB in accordance with Paragraph 4.7(e) of Schedule 2.2(B) (*Service Management*). |
| Asset register update  (iB2-iBREQ-2354) | The Supplier shall ensure that each record applicable to a Configuration Item is kept up to date in the Configuration Management Database in accordance with Schedule 2.2(B) (*Service Management*). |
| Vehicle Decommissioning | |
| Assets on Vehicle decommissioning  (iB2-iBREQ-2533) | The Supplier shall ensure that when a Vehicle is decommissioned, all Assets are removed from the Vehicle and returned to Spares, except for the Antenna which due to the complexities of installation and deinstallation, will remain on the Vehicle. |

## Connectivity

| **Title and ID** | **Requirement** |
| --- | --- |
| SIM  (iB2-iBREQ-571) | The Supplier shall ensure that the On Bus Core installed on a Vehicle as part of the On-bus Solution has either:   1. an embedded SIM or embedded universal integrated circuit card (eUICC) capable of being remotely provisioned without User interaction for operation on any mobile network; or 2. a dual SIM comprising of both; 3. an embedded SIM or embedded universal integrated circuit card (eUICC) capable of being remotely provisioned without User interaction for operation on any mobile network, and 4. a swappable physical SIM. |
| SIM - Remote Management  (iB2-iBREQ-2483) | The Supplier shall ensure provision of eSIM subscription manager services for remote management of the eUICC as set out in Solution Requirement iB2-iBREQ-571, including enable/disable, profile download and profile swap. |
| Communications - cellular technologies  (iB2-iBREQ-2369) | The Supplier shall ensure that the On-bus Solution is able to communicate using all UK public cellular technologies and bands and is compatible with the latest commercially available 3GPP Release. |
| Communications - Standards  (iB2-iBREQ-2370) | The Supplier shall use open global standards and specifications to support voice and data communication services and the standards and specifications developed by the following standards development organisations:   1. 3rd Generation Partnership Project ("**3GPP**"); 2. Groupe Spécial Mobile Association; and 3. International Telecommunication Union. |

## On-bus interfaces

| **Title and ID** | **Requirement** |
| --- | --- |
| On-bus interoperability  (iB2-iBREQ-575) | The Supplier shall ensure that the On-bus Solution, including each component thereof, complies with the ITxPT Standards set out in Schedule 2.3 (*Standards*). |
| On-bus and Back Office Solution interoperability  (iB2-iBREQ-576) | The Supplier shall ensure that the On-bus Solution is designed and implemented in a way that ensures interoperability between the On-bus Solution and:   1. the Back Office Solution; and 2. the Digital Mobile Radio. |
| Interface with the cellular network  (iB2-iBREQ-605) | The Supplier shall ensure that the On-bus Solution utilises TfL’s cellular connectivity agreement/tariff for any mobile data transactions to and from the On-bus Solution. The Supplier must provide cellular connectivity requirements and any relevant designs as part of the High Level Vehicle Design and Low Level Vehicle Design, for TfL to procure and provide. |
| Voice communication fallback - cellular  (iB2-iBREQ-608) | The Supplier shall ensure that, if the Digital Mobile Radio or Digital Mobile Radio Unit is unavailable in accordance with Solution Requirement iB2-iBREQ-2019, the On-bus Solution utilises TfL’s cellular network to facilitate voice communication. |
| Cellular network attach time  (iB2-iBREQ-2130) | The Supplier shall ensure that the On-bus Solution establishes, where cellular network coverage is available, a cellular network connection not more than fifteen (15) seconds after the On-bus Solution becomes active. |
| Interface with Third-Party devices  (iB2-iBREQ-612) | The Supplier shall ensure that the On-bus Solution can interface with or connect to (as applicable) any TfL, Other iBus2 Supplier, Other Supplier or Third Party ITxPT Assets already installed on a Vehicle, including any such devices procured by TfL during the Term. |
| CAN bus Interface  (iB2-iBREQ-2090) | The Supplier shall ensure that the On-bus Solution can discover, interface with, and retrieve data from the CAN. |
| CAN Data  (iB2-iBREQ-2195) | The Supplier shall ensure that the On-bus Solution provides for each item of CAN data:   1. the CAN channel ID; 2. the CAN channel name; 3. the Parameter Group Number (PGN); 4. the Suspect Parameter Number (SPN); and 5. data values. |
| Update to CAN data channels  (iB2-iBREQ-2196) | The Supplier shall ensure that the On-bus Solution enables a TfL Engineering User to:   1. subscribe to new CAN data channels; or 2. unsubscribe from existing CAN data channels,   so as to update the CAN data transmitted to the Back Office Solution. |

## Driver interface

| **Title and ID** | **Requirement** |
| --- | --- |
| Screen display  (iB2-iBREQ-2107) | The Supplier shall ensure that the Driver Display Unit screen:   1. is large enough; 2. has a sufficiently high viewing angle; and 3. has a sufficiently high resolution,   to enable a Driver to easily view screen content from any seated driving position. |
| Screen contents  (iB2-iBREQ-2106) | The Supplier shall ensure that the On-bus Solution enables a Driver to read the following elements on the Driver Display Unit from any seated driving position:   1. reference text, for example, the Big Red Book; 2. controls; and 3. live navigation content. |
| Screen display - automatic brightness adjustment  (iB2-iBREQ-2479) | The Supplier shall ensure that the Driver Display Unit screen automatically sets the brightness setting to a suitable level based on the current ambient light level. |
| Screen display - manual brightness adjustment  (iB2-iBREQ-2480) | The Supplier shall ensure that the On-bus Solution enables a Driver or Field Engineer to override and manually adjust the brightness level setting of the Driver Display Unit. |
| On-bus DDU Data refresh rate  (iB2-iBREQ-2176) | The Supplier shall ensure that the data displayed on the Driver Display Unit is refreshed every thirty (30) milliseconds. |
| Key information display  (iB2-iBREQ-1883) | The Supplier shall ensure that the On-bus Solution displays all information in accordance with the Accessibility Standards. |
| Views based on content  (iB2-iBREQ-1889) | The Supplier shall ensure that the Driver Display Unit and the OBNSS and any other On Bus Asset on which data is displayed, displays data via views that are designed to optimise the content (being both the display configuration of the applicable On Bus Asset and the formatting of the relevant data) of the data being displayed. |
| Driving context  (iB2-iBREQ-2468) | The Supplier shall ensure that the Driver Display Unit shows content appropriate to the Vehicle's driving mode (in motion or stationary) and when in motion displays content so as to minimise distraction. |
| Driver display - configure default view when in motion  (iB2-iBREQ-2475) | The Supplier shall ensure that the Driver can configure the default view that is displayed on the Driver Display Unit whilst the Vehicle is in motion as either:   1. the Vehicle's position, path and progress of the Expected Path on a map navigation view; 2. the Vehicle's position, path and progress of the Expected Path on a linear representation; or 3. a blank screen. |
| Task completion  (iB2-iBREQ-1885) | The Supplier shall ensure that all tasks to be completed within the On-bus Solution require the minimal number of steps and User interactions to complete. |
| User help and support options  (iB2-iBREQ-1917) | The Supplier shall ensure that the On-bus Solution has integrated help and support options and information throughout. |
| Error displays  (iB2-iBREQ-1919) | The Supplier shall ensure that the On-bus Solution displays errors in a manner that enables a User to understand the error and how to resolve that error (including the next steps to be taken by the User to resolve the error). |
| Plain English language  (iB2-iBREQ-1920) | The Supplier shall ensure that the On-bus Solution uses plain English language throughout and complies with the Editorial Style Guide (see Schedule 2.3 (*Standards*)). |

## On-bus performance

| **Title and ID** | **Requirement** |
| --- | --- |
| User input - response time  (iB2-iBREQ-579) | The Supplier shall ensure that the maximum response time for any User input to the On-bus Solution is thirty (30) milliseconds. |
| Receipt acknowledgement  (iB2-iBREQ-611) | The Supplier shall ensure that the On-bus Solution sends an acknowledgement of receipt to the Source System if requested not more than one (1) second after receiving data from the relevant Source System. |
| AVL accuracy  (iB2-iBREQ-2284) | The Supplier shall ensure that the On-bus Solution can determine Vehicle location to within the applicable number of metres determined in accordance with the AVL Model. |
| AVL Model  (iB2-iBREQ-583) | The Supplier shall ensure that the On-bus Solution uses the model defined in the AVL Model when generating Location Data. |

## Configuration

| **Title and ID** | **Requirement** |
| --- | --- |
| Physical and identifying data  (iB2-iBREQ-2285) | The Supplier shall ensure that the On-bus Solution enables a Field Engineer to record identifying and physical attributes of a Vehicle for use by the On-bus Solution at any time. Parameters include:   1. Vehicle height; 2. Vehicle length; 3. Vehicle gross unladen weight; 4. registration number; 5. Bonnet Number; 6. Vehicle width; 7. passenger capacity, expressed as; 8. seated capacity; 9. wheelchair capacity; 10. standing capacity; and 11. total capacity; 12. Radio ID; and 13. Radio Prefix. |
| Adherence to system configuration values  (iB2-iBREQ-1897) | The Supplier shall ensure that each element of the On-bus Solution complies with the values applicable to that element of the On-bus Solution as set out in the System Configuration Lookup Table. |
| Conformity to Co-ordinated Universal Time  (iB2-iBREQ-2452) | The Supplier shall ensure that the On-bus Solution conforms to the Co-ordinated Universal Time (UTC) time standard. |
| Support for UK clock changes  (iB2-iBREQ-2069) | The Supplier shall ensure that the On-bus Solution supports the change to and from Greenwich Mean Time and British Summer Time without loss of data. |
| Time synchronisation  (iB2-iBREQ-2070) | The Supplier shall ensure that the On-bus Solution synchronises system time with the Back Office Solution using Network Time Protocol. |
| Electronic Serial Number - access  (iB2-iBREQ-2252) | The Supplier shall ensure that the On-bus Solution can access all electronically stored configuration data including the Electronic Serial Number of the On Bus Core and all other On Bus Assets connected to the On Bus Core so that the On-bus Solution can display, transmit and record such information as data. |
| Electronic Serial Number - attached equipment  (iB2-iBREQ-2377) | The Supplier shall ensure that the On-bus Solution can access all electronically stored configuration data including the Electronic Serial Number of any Third Party device connected to the On Bus Core so that the On-bus Solution can display, transmit and record such information as data. |

# SD02 Driver functions

## Driver start-up activities

| **Title and ID** | **Requirement** |
| --- | --- |
| Driver login - enter details  (iB2-iBREQ-482) | The Supplier shall ensure that the On-bus Solution enables a User to log in using their unique login credentials. For a Driver their unique login credentials shall include their Driver number. |
| Driver login - security  (iB2-iBREQ-483) | The Supplier shall ensure that the On-bus Solution validates the User’s login credentials against those held in current Base Reference Data, each time a User attempts to log in to a Vehicle, in accordance with Schedule 2.4 (*Security Management*). |
| Driver login - enable remote login  (iB2-iBREQ-1900) | The Supplier shall ensure that the On-bus Solution enables the Back Office Solution to remotely log a Driver in to the On-bus Solution on the relevant Vehicle. |
| Remote login - notify Driver  (iB2-iBREQ-2380) | The Supplier shall ensure that, when the Back Office Solution remotely logs a Driver in to the On-bus Solution, the On-bus Solution notifies the Driver that they have been logged in remotely. |
| Back Office Solution - send login details  (iB2-iBREQ-552) | The Supplier shall ensure that the On-bus Solution sends to the Back Office Solution the details of each successful and unsuccessful login attempt to the On-bus Solution, including:   1. date of the relevant login attempt; 2. time of the relevant login attempt; 3. location of the relevant login attempt; 4. the unique identifier of the User attempting to login; 5. the Unique Vehicle Identifier of the applicable Vehicle; and 6. whether or not the login was successful. |
| Driver login - prevent unauthorised access  (iB2-iBREQ-484) | If a User who is no longer authorised to access the On-bus Solution attempts to log in to the On-bus Solution, the Supplier shall ensure that the On-bus Solution:   1. denies access to the On-bus Solution to the User; and 2. if the User is a Driver, alerts an Operator Service Controller of the Operator who employs (or previously employed) the relevant Driver. |
| Driver/Field Engineer login - authentication time  (iB2-iBREQ-578) | The Supplier shall ensure that the On-bus Solution authenticates User login to the On-bus Solution not more than two (2) seconds after entry of login credentials. |
| Vehicle checked - acknowledgement  (iB2-iBREQ-497) | The Supplier shall ensure that, where configured by the Back Office Solution, the On-bus Solution enables the Driver, as part of a Run-out, to acknowledge that they have checked the Vehicle is roadworthy and in a fit state to enter service prior to commencing driving, either by ticking a box or as part of a checklist facility. |
| Vehicle checked - remote login acknowledgement  (iB2-iBREQ-2390) | When a Driver has been logged in remotely in accordance with Solution Requirement iB2-iBREQ-1900, the Supplier shall ensure that, where configured by the Back Office Solution, the On-bus Solution enables the Driver, as part of a Run-out, to acknowledge that they have checked the Vehicle is roadworthy and in fit state to enter service prior to commencing driving, either by ticking a box or as part of a checklist facility. |
| Vehicle checked - Interface with checklist  (iB2-iBREQ-2268) | The Supplier shall ensure that the On-bus Solution enables a Run-out Checklist capability to automatically indicate that the Vehicle has been checked as part of Run-out. |
| Driver break  (iB2-iBREQ-504) | The Supplier shall ensure that the On-bus Solution enables the Driver to temporarily lock access to the On-bus Solution. |

## Trip management

| **Title and ID** | **Requirement** |
| --- | --- |
| Trip login - minimum data entry  (iB2-iBREQ-487) | The Supplier shall ensure that the On-bus Solution prompts the Driver for the minimum data required to identify a Route and Trip, which includes Duty and Garage. |
| Trip login - enable remote login  (iB2-iBREQ-1901) | The Supplier shall ensure that the On-bus Solution enables the Back Office Solution to remotely log a Vehicle in to:   1. a scheduled Trip; or 2. a Route Variant. |
| Remote Trip login - notify Driver  (iB2-iBREQ-2381) | The Supplier shall ensure that, when the Back Office Solution remotely logs a Vehicle in to a scheduled Trip or a Route Variant, the On-bus Solution notifies the Driver that their Vehicle has been logged in remotely to the relevant Trip or Route Variant. |
| Trip login - log details  (iB2-iBREQ-490) | The Supplier shall ensure that the On-bus Solution logs details of attempted and successful Trip logins. |
| Trip login - display details for confirmation  (iB2-iBREQ-488) | If, following receipt of the Route Reference Data for the Trip, the Driver is to operate under Solution Requirement iB2-iBREQ-2296, the Supplier shall ensure that the On-bus Solution displays the details of the Trip (including the Route number, start location, end location, scheduled start time, Run and Duty number) to be operated by the Driver and prompts the Driver for confirmation that the Driver will operate the Trip. |
| End of Trip - location as trigger  (iB2-iBREQ-499) | The Supplier shall ensure that the On-bus Solution uses Location Data and the Vehicle’s position at the last Stop on the Service Path (as set out in the Route Reference Data) to determine if the Vehicle is at the end of its current Trip. |
| End of Trip - Last in Run  (iB2-iBREQ-500) | The Supplier shall ensure that, at the last Stop of the last Trip in a Run, the On-bus Solution prompts the Driver to identify a new Trip or log out of the On-bus Solution. |
| End of Trip - Route Variant  (iB2-iBREQ-501) | The Supplier shall ensure that, at the last Stop of a Route Variant, the On-bus Solution prompts the Driver to identify a new Trip or log out of the On-bus Solution. |
| Transmit Trip Data to Back Office Solution  (iB2-iBREQ-1908) | The Supplier shall ensure that the On-bus Solution completes the transmission of Trip Data to the Back Office Solution not more than two (2) minutes after completion of a Trip. |
| Back Office Solution - send details of next Trip  (iB2-iBREQ-553) | The Supplier shall ensure that at the end of a Trip, the On-bus Solution sends a notification of the next Trip in a Run to the Back Office Solution. Such notification shall include the following information regarding the next Trip:   1. the Route; 2. the Duty; 3. the Run; 4. the Trip; and 5. details of any Rail Incident Resolution. |
| Next Trip - display details  (iB2-iBREQ-505) | The Supplier shall ensure that, when the Vehicle reaches its last Stop on the Trip, the On-bus Solution displays to the Driver the details of the next Trip in the Run. |
| Next Trip - prompt Driver  (iB2-iBREQ-506) | The Supplier shall ensure that, when the On-bus Solution displays the details of the next Trip in the Run (pursuant to Solution Requirement iB2-iBREQ-505), the On-bus Solution prompts the Driver to confirm details of, and select or reject, the next Trip in the Run. |
| Next Trip - Driver acknowledgement  (iB2-iBREQ-507) | The Supplier shall ensure that, if the Driver confirms the details of, and selects, the next Trip presented on the On-bus Solution, the On-bus Solution goes into service as if the Driver had logged in to the Trip directly as set out in Solution Requirement iB2-iBREQ-488. |
| Next Trip - Driver rejection  (iB2-iBREQ-508) | The Supplier shall ensure that if the Driver does not confirm the details of, or rejects, the next Trip presented by the On-bus Solution, it prompts the Driver for a new Trip login. |

## Driver logout

| **Title and ID** | **Requirement** |
| --- | --- |
| Logout - Trip  (iB2-iBREQ-518) | The Supplier shall ensure that the On-bus Solution enables the Driver to log out of the current Trip or Route Variant. |
| Logout - Driver  (iB2-iBREQ-519) | The Supplier shall ensure that the On-bus Solution enables the Driver or Field Engineer to log out of the On-bus Solution completely. |
| Logout - enable remote logout  (iB2-iBREQ-2222) | The Supplier shall ensure that the On-bus Solution enables the Back Office Solution to remotely log a Driver out of a Trip or Route Variant or the On-bus Solution completely. |
| Remote log out - notify Driver  (iB2-iBREQ-2379) | The Supplier shall ensure that when the Back Office Solution remotely logs:   1. a Driver out of a the On-bus Solution; or 2. a Vehicle out of a Trip or Route Variant,   the On-bus Solution notifies the Driver that the remote logout has occurred. |
| Back Office Solution - notify of logout  (iB2-iBREQ-555) | The Supplier shall ensure that the On-bus Solution notifies the Back Office Solution when a Driver or Field Engineer logs out. |

## Driver support

| **Title and ID** | **Requirement** |
| --- | --- |
| General | |
| Guidance and policies - on-screen access  (iB2-iBREQ-517) | The Supplier shall ensure that the On-bus Solution enables the Driver to access an interactive on-screen version of the Big Red Book and any other policies or guides provided by TfL from time to time. |
| Driver Loudspeaker - restrict local adjustment  (iB2-iBREQ-2103) | The Supplier shall ensure that the On-bus Solution enables the Driver to adjust the Driver Loudspeaker audio level:   1. above the minimum Driver Loudspeaker audio level; 2. below the maximum Driver Loudspeaker audio level; and 3. prevents the Driver from muting or turning off the Driver Loudspeaker.   The minimum and maximum Driver Loudspeaker audio levels are defined in the System Configuration Lookup Table. |
| Position, path and progress - display to Driver  (iB2-iBREQ-516) | The Supplier shall ensure that the On-bus Solution enables the Driver to see a view of the Vehicle’s progress along its Route and position on its Expected Path on a map navigation view or a linear representation as determined by Solution Requirement iB2-iBREQ-2475. |
| Position, path and progress - default display  (iB2-iBREQ-2035) | The Supplier shall ensure that when the Driver is logged in to a scheduled Trip or Route Variant, the On-bus Solution as a default displays the position of the Vehicle, its Expected Path and progress on the Trip or Route Variant. |
| Stop closure - Driver display  (iB2-iBREQ-2117) | The Supplier shall ensure that the display of a Vehicle’s position, path and progress as set out in Solution Requirement iB2-iBREQ-516 clearly indicates when a Stop is closed. |
| Schedule progress | |
| Schedule Variance - display  (iB2-iBREQ-2053) | The Supplier shall ensure that the On-bus Solution can display to the Driver the variance between the Vehicle’s expected time at its current location and the actual time at its current location. |
| Headway - receive  (iB2-iBREQ-2269) | The Supplier shall ensure that the On-bus Solution can receive from the Back Office Solution in Near Real Time, Headway Data with respect to the Vehicle in front and the Vehicle behind the relevant Vehicle on its Expected Path. |
| Headway - display  (iB2-iBREQ-521) | The Supplier shall ensure that the On-bus Solution can show Headway information to the Driver, for the Vehicle ahead and/or the Vehicle behind the relevant Vehicle, as configured by the Back Office Solution. |
| Timetable Offset - receive  (iB2-iBREQ-2301) | The Supplier shall ensure that the On-bus Solution can receive an instruction to apply or dis-apply a Timetable Offset from the Back Office Solution. |
| Timetable Offset - indicate  (iB2-iBREQ-2250) | The Supplier shall ensure that the On-bus Solution provides a visual indication to the Driver when a Timetable Offset is being applied. |
| Driver Alerts | |
| Driver Alert - send to Back Office  (iB2-iBREQ-527) | The Supplier shall ensure that (when configured to do so by the Back Office Solution) the On-bus Solution sends to the Back Office Solution any Driver Alert generated for the attention of a Service Controller. |
| Driver Alert - log details  (iB2-iBREQ-1904) | The Supplier shall ensure that if a Driver Alert is issued by the On-bus Solution, that Driver Alert and the Driver’s response to that Driver Alert (if applicable) is logged by the On-bus Solution. |
| Driver Alert - configure volume  (iB2-iBREQ-1905) | The Supplier shall ensure that the On-bus Solution enables a Driver to configure the volume of Audio Alerts (but not disable Audio Alerts) above the minimum audio level for Audio Alerts set out in the System Configuration Lookup Table. |
| On Bus Asset faults - alert Operator Service Controller  (iB2-iBREQ-525) | The Supplier shall ensure that if the On-bus Solution detects a fault with an On Bus Asset, it sends an alert to the Operator Service Controller. |
| Driver hours - warn of breach  (iB2-iBREQ-526) | The Supplier shall ensure that if the On-bus Solution receives a Bus Drivers’ Hours Alert from the Back Office Solution, the On-bus Solution issues a Visual Alert to the Driver. |
| Alert Driver - Unproductive / Productive  (iB2-iBREQ-502) | The Supplier shall ensure that the On-bus Solution uses Route Reference Data, Location Data and Diversion information to identify that the Vehicle is moving between a Productive and an Unproductive state and prompt the Driver to confirm such change of state. |
| Limited-height structure - give warning  (iB2-iBREQ-522) | The Supplier shall ensure that if the On-bus Solution detects a limited-height structure (where the height clearance of the structure is less than or within a configurable margin of the height of the Vehicle), it issues both an Audio Alert and a Visual Alert to the Driver. The configurable margin for height clearance is set out in the System Configuration Lookup Table. |
| Limited-height structure - outer proximity  (iB2-iBREQ-2382) | The Supplier shall ensure that the On-bus Solution issues an Audio Alert and a Visual Alert to the Driver at the configured distance from a limited-height structure (unless a defined distance exists in Base Reference Data for a specific limited-height structure).  The configured distance for this Driver Alert shall be further from the limited-height structure than the configured distance for the Driver Alert set out in Solution Requirement iB2-iBREQ-2383.  The default distance for this Solution Requirement is set out in the System Configuration Lookup Table. |
| Limited-height structure - inner proximity  (iB2-iBREQ-2383) | The Supplier shall ensure that the On-bus Solution issues an Audio Alert and a Visual Alert to the Driver at the configured distance from a limited-height structure (unless a defined distance exists in Base Reference Data for a specific limited-height structure).  The configured distance for this Driver Alert shall be closer to the limited-height structure than the configured distance for the Driver Alert set out in Solution Requirement iB2-iBREQ-2382.  The default distance for this Solution Requirement is set out in the System Configuration Lookup Table. |
| Limited-height structure - Collision Alert  (iB2-iBREQ-2138) | The Supplier shall ensure that, when the current direction of travel of the Vehicle intersects with a limited-height structure and the distance from the Vehicle to the limited-height structure becomes less than the configured distance, the On-bus Solution issues a Collision Alert to the Driver.  The configured distance for this Driver Alert shall be closer to the limited-height structure than the configured distance for the Driver Alert set out in Solution Requirement iB2-iBREQ-2383.  The default distance for this Solution Requirement is set out in the System Configuration Lookup Table. |
| Limited-height structure - Driver Alerts differentiation  (iB2-iBREQ-2141) | The Supplier shall ensure that the Audio Alerts and Visual Alerts issued to the Driver by the On-bus Solution on a Vehicle as set out in each of the following Solution Requirements:   1. iB2-iBREQ-2382; 2. iB2-iBREQ-2383; and 3. iB2-iBREQ-2138,   are easily distinguishable from each other and that the Driver Alerts which are issued closer to the limited-height structure are louder and more intrusive than the Driver Alerts which are issued further from the limited-height structure. |
| Collision Alert - ITxPT signal  (iB2-iBREQ-2140) | The Supplier shall ensure that if a Collision Alert has been issued in accordance with Solution Requirement iB2-iBREQ-2138, the On-bus Solution immediately outputs a signal to the ITxPT network. |
| Limited-height structure - Driver display  (iB2-iBREQ-2136) | The Supplier shall ensure that the display of a Vehicle’s position, path and progress as set out in Solution Requirement iB2-iBREQ-516 clearly shows the position of limited-height structures. |
| Limited-height structure - avoid false warnings  (iB2-iBREQ-2137) | The Supplier shall ensure that the On-bus Solution only issues a Driver Alert to a Driver in relation to a limited-height structure if that limited-height structure is on the same road and direction of travel as the Vehicle. |
| Limited-height structure - Productive or Unproductive working  (iB2-iBREQ-2139) | The Supplier shall ensure that the On-bus Solution issues Driver Alerts for limited-height structures when a Vehicle is Productive or Unproductive. |
| Minor Hazard - alert driver  (iB2-iBREQ-524) | The Supplier shall ensure that the On-bus Solution issues an Audio Alert and a Visual Alert at the configured distance from a Minor Hazard (unless a defined distance exists in Base Reference Data for a specific Minor Hazard).  The default distance for this Solution Requirement is set out in the System Configuration Lookup Table. |
| Minor Hazard - Driver display  (iB2-iBREQ-2142) | The Supplier shall ensure that the display of a Vehicle’s position, path and progress as set out in Solution Requirement iB2-iBREQ-516 clearly shows the position of Minor Hazards. |
| Minor Hazards - avoid false warnings  (iB2-iBREQ-2412) | The Supplier shall ensure that the On-bus Solution only issues a Driver Alert to a Driver in relation to a Minor Hazard if that Minor Hazard is on the same road and direction of travel as the Vehicle. |
| Control action | |
| Vehicle speed - monitor  (iB2-iBREQ-2226) | The Supplier shall ensure that the On-bus Solution continuously monitors the speed of the Vehicle when a Vehicle is Productive and Unproductive. |
| Interface with adaptive speed controller  (iB2-iBREQ-613) | The Supplier shall ensure that the On-bus Solution interfaces with third-party adaptive speed controllers on-board a Vehicle, provides the third-party adaptive speed controller with data in relation to the current Vehicle location, current Vehicle speed and the speed limit applicable at the Vehicle’s current location and can accept acknowledgement responses from such adaptive speed controllers. |
| Speed restriction - issue alert  (iB2-iBREQ-523) | The Supplier shall ensure that, irrespective of whether the Vehicle is logged in to the On-bus Solution, when the On-bus Solution detects that the speed of the Vehicle is in excess of the speed limit applicable on the road or track on which the Vehicle is located, the On-bus Solution shall issue an Audio Alert and a Visual Alert to the Driver. |
| Speed Restriction - Output Signal  (iB2-iBREQ-2448) | The Supplier shall ensure that, irrespective of whether the Vehicle is logged in to the On-bus Solution, when the On-bus Solution detects that the speed of the Vehicle is in excess of the speed limit applicable on the road or track on which the Vehicle is located, the On-bus Solution shall output a signal to the ITxPT network to indicate that the Vehicle is travelling in excess of the applicable speed limit. |
| Speed warning - return to below limit  (iB2-iBREQ-2372) | The Supplier shall ensure that, if the On-bus Solution has output a signal in accordance with Solution Requirement iB2-iBREQ-2448 and the speed of the Vehicle subsequently falls below the speed limit applicable on the road or track on which the Vehicle is located, the On-bus Solution sends a signal to the ITxPT network to indicate that the Vehicle is travelling below the applicable speed limit. |

# SD03 Card Reader and Card Reader Display

## Card Reader Display

| **Title and ID** | **Requirement** |
| --- | --- |
| Card Reader Display  (iB2-iBREQ-2308) | The Supplier shall provide and install a Card Reader Display on each Vehicle. |
| Card Reader Display - compliance with Disability Discrimination Act 1955  (iB2-iBREQ-2350) | The Supplier shall ensure that information displayed on the Card Reader Display complies with the Equality Act 2010. |
| Card Reader Display specifications  (iB2-iBREQ-2311) | The Supplier shall ensure that as a minimum, the design of Card Reader Display meets the below specifications:   1. maximum message length - one hundred and sixty (160) characters; 2. message text size - readable from up to fifty (50) centimetres; and 3. minimum operating temperatures: -10°C to +40°C. |
| Card Reader Display - not logged in to Trip  (iB2-iBREQ-2315) | The Supplier shall ensure that, when the On-bus Solution is not logged in to a Trip, the Card Reader Display displays “Not in service”. |
| Card Reader Display - logged in to Trip  (iB2-iBREQ-2316) | The Supplier shall ensure that, when the On-bus Solution is logged in to a Trip or Route Variant, the default display on the Card Reader Display is:   1. Route; 2. next Stop as described in Solution Requirement iB2‑iBREQ‑545; 3. destination; and 4. current time. |
| Card Reader Display - message persistence  (iB2-iBREQ-2321) | The Supplier shall ensure that, when the On-bus Solution is logged in to a Trip or Route Variant, the Card Reader Display reverts to the default display (times out) in accordance with Solution Requirement iB2-iBREQ-2316 after ten (10) seconds, unless a new message is displayed on the Card Reader Display. |
| Card Reader - Display outcome of card transaction  (iB2-iBREQ-2293) | The Supplier shall ensure that, when the On-bus Solution receives summary data for a card transaction originating from the Primary Card Reader in accordance with Solution Requirement iB2-iBREQ-2292 it displays details of the outcome of the transaction on the Card Reader Display and the Driver Display Unit. The outcome of the card transaction may be:   1. failure (error message text is not empty), in which case the Card Reader Display shows the error message text; 2. successful pay as you go transaction, in which case the Card Reader Display shows: 3. ticket type; 4. amount deducted; and 5. pay as you go credit remaining; or 6. successful prepaid ticket transaction, in which case the Card Reader Display shows: 7. the ticket type; and 8. if an expiry date is provided, expiry information. If the prepaid ticket expires within four (4) days, the expiry information displayed is “Expires in x days” where x is the number of days until expiry. If the prepaid ticket expires more than four (4) days after the relevant transaction, the expiry date shall be displayed in the following format: dd/mm/yy. |

## Card Reader interaction

| **Title and ID** | **Requirement** |
| --- | --- |
| Card Reader - secure connection  (iB2-iBREQ-542) | The Supplier shall ensure that the On-bus Solution makes a secure connection to the Card Reader(s) in accordance with the Card Reader Interface Specification. |
| Card Reader - display status  (iB2-iBREQ-550) | The Supplier shall ensure that the On-bus Solution displays the status of the Card Reader(s) connected to it (the status may be “no communication” or a status reported by the Card Reader) in accordance with the Card Reader Interface Specification. |
| Card Reader - communication with Card Reader  (iB2-iBREQ-551) | The Supplier shall ensure that the On-bus Solution maintains a secure connection with the Card Reader(s) at all times. |
| Card Reader message exchange - acknowledge receipt  (iB2-iBREQ-543) | The Supplier shall ensure that the On-bus Solution acknowledges messages from a Card Reader in accordance with the Card Reader Interface Specification. |
| Card Reader - send Asset-related detail  (iB2-iBREQ-2291) | The Supplier shall ensure that the On-bus Solution sends its Electronic Serial Number and Vehicle information to the Card Reader(s) in accordance with the Card Reader Interface Specification. |
| Card Reader - serial numbers  (iB2-iBREQ-2294) | The Supplier shall ensure that the On-bus Solution can extract the serial numbers of attached Card Readers from the communication messages received in accordance with the Card Reader Interface Specification. |
| Card Reader - send Driver login details  (iB2-iBREQ-544) | The Supplier shall ensure that upon entry of valid Driver login details, the On-bus Solution sends those details to the Card Reader(s) and updates the Card Reader(s) on Driver logout, in accordance with the Card Reader Interface Specification. |
| Card Reader - send Trip Data  (iB2-iBREQ-546) | The Supplier shall ensure that when the Driver confirms the details of a scheduled Trip or Route Variant, the On-bus Solution sends such details to the Card Reader(s) in accordance with the Card Reader Interface Specification. |
| Rail Incident Resolution  (iB2-iBREQ-498) | The Supplier shall ensure that the On-bus Solution enables the Driver to enter a Rail Incident Resolution number in order to change the validation logic of the Card Reader(s) without the need to log out of the Trip, with the relevant Rail Incident Resolution to apply to all or part of a Trip, and communicates to the Card Reader(s) in accordance with Solution Requirement iB2-iBREQ-546. |
| Card Reader - receive summary card transaction data  (iB2-iBREQ-2292) | The Supplier shall ensure that the On-bus Solution can receive summary card transaction data from the Card Reader(s) in accordance with the Card Reader Interface Specification. |
| Card Reader - send next Stop information  (iB2-iBREQ-545) | The Supplier shall ensure that, when the On-bus Solution displays the Next Stop Visual Display Message on the OBNSS, it sends the details of the next Stop to the Card Reader(s) in accordance with the Interface Specification defined in the Card Reader Interface Specification. |
| Card Reader - send door status  (iB2-iBREQ-2375) | The Supplier shall ensure that the On-bus Solution notifies the Card Reader(s) in accordance with the Card Reader Interface Specification, when at a Stop that:   1. a door has opened (but not subsequent door openings at that Stop); and 2. all doors have closed. |
| Card Reader - update navigation status  (iB2-iBREQ-547) | The Supplier shall ensure that if the On-bus Solution detects that the Vehicle is no longer on the scheduled Service Path, it updates the Card Reader(s) with the “off-route” status of the Vehicle in accordance with the Card Reader Interface Specification. |

# SD04 Legacy ticketing support

| **Title and ID** | **Requirement** |
| --- | --- |
| Revenue collection support - record non-smartcard tickets  (iB2-iBREQ-557) | The Supplier shall ensure that the On-bus Solution enables a Driver to record different types of non-smartcard tickets as set out in the System Configuration Lookup Table. |
| Non-smartcard ticket - display  (iB2-iBREQ-2320) | The Supplier shall ensure that, when a Driver records a non-smartcard ticket, the On-bus Solution records the ticket type used and displays the ticket type on the Card Reader Display. |
| Non-smartcard ticket - send to Card Reader  (iB2-iBREQ-2374) | The Supplier shall ensure that, when a Driver records a non-smartcard ticket, the On-bus Solution sends the details of the ticket recorded to the Primary Card Reader in accordance with the Card Reader Interface Specification. |
| Badge Number - record and display  (iB2-iBREQ-2251) | The Supplier shall ensure that the On-bus Solution enables a Driver to enter a Badge Number, when the Driver is presented with a Badge Number by a revenue inspection official. When the Driver enters a Badge Number the On-bus Solution:   1. displays the Badge Number on the Card Reader Display; and 2. records the Badge Number in an audit log. |

# SD05 Process Real Time Data

## Send Data

| **Title and ID** | **Requirement** |
| --- | --- |
| Back Office Solution data exchange  (iB2-iBREQ-584) | The Supplier shall ensure that the On-bus Solution exchanges data Over The Air with the Back Office Solution utilising the cellular network. |
| Heartbeat transmission to the Back Office Solution  (iB2-iBREQ-587) | The Supplier shall ensure that the On-bus Solution transmits a Heartbeat to the Back Office Solution at the frequency set out in the System Configuration Lookup Table. |
| Retain data when unable to transmit  (iB2-iBREQ-2404) | The Supplier shall ensure that the On-bus Solution retains all Transaction Data in its internal memory when the transmission channels set out in Solution Requirement iB2-iBREQ-584 are not available. |
| Transmit data when connection restored  (iB2-iBREQ-2405) | The Supplier shall ensure that the On-bus Solution transmits all retained Transaction Data stored in its internal memory to the Back Office Solution when the transmission channels set out in Solution Requirement iB2-iBREQ-584 become available. |
| Internal memory - capacity  (iB2-iBREQ-2406) | The Supplier shall ensure that the On-bus Solution provides sufficient internal memory to enable all Transaction Data generated within a seventy-two (72) hour period to be retained in the internal memory. |
| Internal memory - manual download  (iB2-iBREQ-2407) | The Supplier shall provide a mechanism to enable Transaction Data stored in the On-bus Solution’s internal memory to be downloaded manually to the Back Office Solution. |
| Electric Vehicles - monitor battery status and range  (iB2-iBREQ-2402) | The Supplier shall ensure that, for electric Vehicles, the On-bus Solution monitors the range remaining and status of the battery and includes such status and range remaining within the Heartbeat. |
| Unproductive and Productive - differentiate and record  (iB2-iBREQ-503) | The Supplier shall ensure that the On-bus Solution differentiates between, and records, Productive Mileage and Unproductive Mileage. |
| Back Office Solution - send service Status (Productive/ Unproductive)  (iB2-iBREQ-554) | The Supplier shall ensure that the On-bus Solution includes Productive/Unproductive status (whether detected by use of location and position on Expected Path, or by the Driver logging out) in Location Data. |
| Traffic light approach - initiate TLP messages  (iB2-iBREQ-2211) | The Supplier shall ensure that when the On-bus Solution detects from Base Reference Data and Location Data that the Vehicle is entering a Traffic Light Geofenced Zone, it starts sending Traffic Light Priority Messages to the Back Office Solution. |
| Traffic Light Priority Message - frequency and format  (iB2-iBREQ-2212) | The Supplier shall ensure that the On-bus Solution sends Traffic Light Priority Messages:   1. at the frequency set out in the RTIG Centre-to-centre traffic signal request protocol (RTIGT031) referred to in Schedule 2.3 (*Standards*); and 2. in the format set out in the Radio Link Specification for RTI-driven Traffic Light Priority and Display Cleardown (RTIGT0008) referred to in Schedule 2.3 (*Standards*). |
| Traffic light departure - Stop TLP messages  (iB2-iBREQ-2213) | The Supplier shall ensure that when the On-bus Solution detects from Base Reference Data and Location Data that the Vehicle has departed a Traffic Light Geofenced Zone it stops sending further Traffic Light Priority Messages. |

## Vehicle Events

| **Title and ID** | **Requirement** |
| --- | --- |
| Vehicle Event - configure capture  (iB2-iBREQ-2322) | The Supplier shall ensure that the On-bus Solution records a Vehicle Event (as configured in the Base Reference Data). |
| Vehicle Event - update parameters  (iB2-iBREQ-2413) | The Supplier shall ensure that the On-bus Solution can update the configuration of a Vehicle Event including the parameters controlling its creation and the information it reports when a change is received via the relevant Base Reference Data. |
| Vehicle Event - capture data  (iB2-iBREQ-537) | The Supplier shall ensure that the On-bus Solution records the details of each Vehicle Event. |
| Vehicle Event - record data  (iB2-iBREQ-538) | The Supplier shall ensure that the On-bus Solution records the details of each Vehicle Event and retains such details until the On-bus Solution receives confirmation that the record of such Vehicle Event has been received by the Back Office Solution. |
| Vehicle Event - send alert  (iB2-iBREQ-539) | The Supplier shall ensure that the On-bus Solution, for each type of Vehicle Event captured, packages and sends data as an alert to the Back Office Solution if configured to do so in accordance with the Vehicle Events List. |
| Vehicle Event - record transmission  (iB2-iBREQ-540) | The Supplier shall ensure that the On-bus Solution records the details of each alert in relation to a Vehicle Event in a separate audit log as they are transmitted to the Back Office Solution. |
| Vehicle Event transmission - handle errors  (iB2-iBREQ-541) | The Supplier shall ensure that the On-bus Solution includes an error handling capability in the transmission of Vehicle Event details to the Back Office Solution. |
| Vehicle Events log - send to Back Office Solution  (iB2-iBREQ-2228) | The Supplier shall ensure that the On-bus Solution sends the log of Vehicle Events and alerts in relation to Vehicle Events to the Back Office Solution at, as a minimum, the end of each Trip. |
| Send Third Party Data to Back Office Solution  (iB2-iBREQ-588) | The Supplier shall ensure that the On-bus Solution sends Third Party Data to the Back Office Solution not more than thirty (30) seconds after the On-bus Solution has received the relevant Third Party Data. |
| CAN data transmission to Back Office  (iB2-iBREQ-2197) | The Supplier shall ensure that the On-bus Solution transmits CAN data to the Back Office Solution at the frequency defined in the System Configuration Lookup Table. |

## Passenger information and messaging

| **Title and ID** | **Requirement** |
| --- | --- |
| Service related announcements | |
| Route and destination - display  (iB2-iBREQ-531) | The Supplier shall ensure that the On-bus Solution displays the Vehicle’s Route and current destination on the OBNSS:   1. when the Vehicle is successfully logged into a Trip and at the start of each new Trip; 2. a configurable number of seconds for each Stop after the doors open at a Stop; and 3. between Stops where the next Stop name is not being displayed.   The configurable number of seconds is set out in the System Configuration Lookup Table. |
| Next Stop visual display parameters  (iB2-iBREQ-582) | The Supplier shall ensure that the On-bus Solution:   1. displays the correct Next Stop Visual Display Message not less than the configured distance prior to the Vehicle entering the Stop Zone for the next Stop; and 2. clears the display of each Next Stop Visual Display Message not more than the configured distance after the Vehicle exits the relevant Stop Zone.   The default distances for this Solution Requirement are set out in the System Configuration Lookup Table. |
| Route and destination - announce  (iB2-iBREQ-532) | The Supplier shall ensure that the On-bus Solution announces the Vehicle’s Route and current destination:   1. when the Vehicle is successfully logged into a schedule and at the start of each new Trip; 2. a configurable number of seconds for each Stop after the doors open at a Stop; and 3. between Stops where the next Stop name is not being displayed.   The configurable number of seconds is set out in the System Configuration Lookup Table. |
| Next Stop Audio Announcement parameters  (iB2-iBREQ-581) | The Supplier shall ensure that when the On-bus Solution plays a Next Stop Audio Announcement it:   1. plays the Next Stop Audio Announcement only once per Stop; 2. completes the Next Stop Audio Announcement not less than the configured distance prior to the Vehicle entering the Stop Zone for the next Stop; and 3. plays the Next Stop Audio Announcement from beginning to end without interruption or error.   The default distance for this Solution Requirement is set out in the System Configuration Lookup Table. |
| Audio visual announcement  (iB2-iBREQ-580) | The Supplier shall ensure that the On-bus Solution responds to a manually triggered passenger announcement no more than ten (10) milliseconds after such passenger announcement is manually triggered. |
| Route and destination announcements - construction  (iB2-iBREQ-2092) | The Supplier shall ensure that the On-bus Solution constructs Route and destination audio announcements by selecting the correct Route and destination audio fragments from the Base Reference Data. |
| Current time - display clock  (iB2-iBREQ-2108) | The Supplier shall ensure that the On-bus Solution displays the current time on the OBNSS as default at all times unless another message takes priority, including:   1. that the Vehicle is stopping at a Stop (see Solution Requirement iB2-iBREQ-2317); 2. the name of the upcoming Stop (see Solution Requirement iB2-iBREQ-529); 3. emergency messages (see Solution Requirement iB2-iBREQ-536); and 4. all other passenger information messages described in this Schedule. |
| Next Stop - display name  (iB2-iBREQ-529) | The Supplier shall ensure that the On-bus Solution displays a Next Stop Visual Display Message on the OBNSS for each Stop on the Expected Path in accordance with Solution Requirement iB2-iBREQ-582. |
| Next Stop - announce name  (iB2-iBREQ-530) | The Supplier shall ensure that the On-bus Solution plays a Next Stop Audio Announcement on the Passenger Loudspeaker for each Stop on the Expected Path in accordance with Solution Requirement iB2-iBREQ-581. |
| Next Stop - Stop request  (iB2-iBREQ-2317) | The Supplier shall ensure that the On-bus Solution displays a “bus stopping” message on the OBNSS each time a passenger presses a stop request button. |
| Service disruption | |
| Stop status - update from Back Office Solution  (iB2-iBREQ-2306) | The Supplier shall ensure that the On-bus Solution can receive an update of the status of a Stop from the Back Office Solution. |
| Stop closure - announce at previous Stop  (iB2-iBREQ-2118) | The Supplier shall ensure that when a Vehicle is at a Stop and the next Stop in the sequence of Stops for the Expected Path is closed, the On-bus Solution automatically announces that the next Stop on the Expected Path is closed following the announcement of the Route and destination. |
| Stop closure - announce  (iB2-iBREQ-2119) | The Supplier shall ensure that when the On-bus Solution announces the name of a closed Stop in accordance with Solution Requirement iB2-iBREQ-581, it appends an announcement that the Stop is closed to the Next Stop Audio Announcement. |
| Stop closure - display at previous Stop  (iB2-iBREQ-2120) | The Supplier shall ensure that when a Vehicle is at a Stop and the next Stop in the sequence of Stops for the Expected Path is closed, the OBNSS automatically displays that the next Stop is closed following the display of the Route and destination. |
| Stop closure - display  (iB2-iBREQ-2121) | The Supplier shall ensure that when the OBNSS displays the name of a closed Stop in accordance with Solution Requirement iB2-iBREQ-582 it appends a message that indicates that the Stop is closed to the Next Stop Visual Display Message. |
| Curtailment - announce change of destination  (iB2-iBREQ-533) | The Supplier shall ensure that if a Trip is curtailed, the On-bus Solution announces to passengers that the destination has changed and updates the destination announcement. |
| Curtailment - update destination display  (iB2-iBREQ-2271) | The Supplier shall ensure that if a Trip is curtailed, the On-bus Solution displays a warning on the OBNSS that the destination has changed and updates the displayed destination in accordance with the "On bus Real Time" information policy in Schedule 2.3 (*Standards*). |
| Diversion - announce to passengers  (iB2-iBREQ-534) | The Supplier shall ensure that if a Vehicle is diverted from its Service Path on to a Diversion Path, the On-bus Solution makes an audio announcement to warn passengers that the Vehicle is on Diversion. |
| Diversion - update display  (iB2-iBREQ-2272) | The Supplier shall ensure that if a Vehicle is diverted from its Service Path on to a Diversion Path, the On-bus Solution displays a warning on the OBNSS that the Vehicle is on Diversion. |
| Passenger announcements | |
| Passenger loudspeakers - restrict local adjustment  (iB2-iBREQ-2359) | The Supplier shall ensure that the On-bus Solution enables the Driver to adjust the Passenger Loudspeaker audio level above the minimum Passenger Loudspeaker audio level, and prevents the Driver from muting or turning off the Passenger Loudspeaker via the On-bus Solution.  The minimum Passenger Loudspeaker audio level is defined in the System Configuration Lookup Table. |
| Passenger announcement - live  (iB2-iBREQ-509) | The Supplier shall ensure that the On-bus Solution enables the Driver to make audio announcements to passengers in real time. |
| Passenger announcement - pre-recorded  (iB2-iBREQ-510) | The Supplier shall ensure that the On-bus Solution enables the Driver to select and play a pre-recorded announcement contained in the Base Reference Data from a list. |
| Passenger announcement - corresponding text  (iB2-iBREQ-512) | The Supplier shall ensure that when the Driver selects a pre-recorded announcement, the On-bus Solution displays any corresponding text equivalent on the OBNSS. |
| Service Control - remote messaging  (iB2-iBREQ-535) | The Supplier shall ensure that the On-bus Solution enables an ad hoc announcement and written message to be received from the Back Office Solution for immediate playback and display on the OBNSS. |
| Ad hoc announcement - alert Driver and play  (iB2-iBREQ-515) | The Supplier shall ensure that the On-bus Solution automatically plays an ad hoc audio announcement received from the Back Office Solution and displays a corresponding text display message on the OBNSS, at a frequency defined with the message, and alerts the Driver that such ad hoc announcement is being played. |
| Emergency message - direct control  (iB2-iBREQ-536) | The Supplier shall ensure that the On-bus Solution enables the Back Office Solution to directly access the Passenger Loudspeakers and send text display messages to the OBNSS without any action from the Driver. |

# SD06 Radio

## General

| **Title and ID** | **Requirement** |
| --- | --- |
| Radio - Interface  (iB2-iBREQ-115) | The Supplier shall ensure that the On-bus Solution interfaces with the Digital Mobile Radio in accordance with the Interface Specification for the relevant Interface as set out in the Interface Register. |
| Radio - display status  (iB2-iBREQ-2021) | The Supplier shall ensure that the On-bus Solution displays the Digital Mobile Radio Unit status information on the Driver Display Unit including:   1. whether the Digital Mobile Radio Unit is on or off; 2. signal strength; 3. whether the Digital Mobile Radio Unit is in fallback mode; and 4. Radio ID. |
| Radio - failure of On-bus Solution  (iB2-iBREQ-117) | The Supplier shall ensure that, in the event of the failure of the On Bus Core or the On-bus Solution, the Driver is still able to use the Digital Mobile Radio Unit to make outgoing calls, and to receive incoming calls. |
| Radio - voice communication fallback conditions  (iB2-iBREQ-2019) | The Supplier shall provide a fallback mechanism to enable a Driver to initiate voice communication with a Service Controller if there is:   1. limited or no radio coverage; 2. a failure of the connection between the On-bus Solution and the radio network; 3. a partial failure of the On-bus Solution; or 4. planned downtime of the On-bus Solution. |
| Radio - always accept call  (iB2-iBREQ-110) | The Supplier shall ensure that the On-bus Solution enables a Driver to receive and accept radio calls whilst the Vehicle is either in motion or stationary. |
| Radio - accidental activation  (iB2-iBREQ-103) | The Supplier shall ensure that the On-bus Solution is designed in such a way that prevents a Driver from accidentally activating a Code Blue or Code Red call. |

## Initiate call

| **Title and ID** | **Requirement** |
| --- | --- |
| Radio call setup time  (iB2-iBREQ-2131) | The Supplier shall ensure that the On-bus Solution sends a radio call request to a Service Controller within three (3) seconds after the radio call being initiated. |
| Initiate call - Standard Priority  (iB2-iBREQ-100) | The Supplier shall ensure that the On-bus Solution enables a Driver to initiate a radio call request with a Standard Priority to a Service Controller. |
| Initiate call - Code Blue priority  (iB2-iBREQ-101) | The Supplier shall ensure that the On-bus Solution enables a Driver to initiate a radio call request with a Code Blue priority to a TfL Service Controller. |
| Initiate Call - Code Red priority  (iB2-iBREQ-102) | The Supplier shall ensure that the On-bus Solution enables a Driver to initiate a radio call request with a Code Red priority to a TfL Service Controller. |
| Code Red call - Prevent termination  (iB2-iBREQ-2445) | The Supplier shall ensure that the On-bus Solution prevents a Driver from terminating a Code Red call once initiated. |
| Colour of controls to initiate radio calls  (iB2-iBREQ-2097) | The Supplier shall ensure that the controls used to initiate different types of radio call requests from the Driver Display Unit are coloured as follows:   1. for Code Red calls: red; 2. for Code Blue calls: blue; and 3. for Standard Priority calls: green. |
| Initiate Code Red radio call when DDU unavailable  (iB2-iBREQ-1914) | The Supplier shall ensure that the On-bus Solution enables a Code Red call request if the Driver Display Unit is unavailable. |
| Radio - on-bus Fallback when Vehicle not active  (iB2-iBREQ-2034) | The Supplier shall ensure that the On-bus Solution enables a Driver or Field Engineer to initiate a Code Blue or Code Red radio call request via the Digital Mobile Radio Unit when the Driver or Field Engineer is not logged in to the On-bus Solution. |

## Receive call

| **Title and ID** | **Requirement** |
| --- | --- |
| Radio - receive Broadcast Call  (iB2-iBREQ-2168) | The Supplier shall ensure that the On-bus Solution can receive Broadcast Calls initiated by a Service Controller. |
| Radio - prevent response to Broadcast Call  (iB2-iBREQ-109) | The Supplier shall ensure that the On-bus Solution prohibits a Driver from responding to a Broadcast Call from the Back Office Solution. |
| Radio - Audio Alert  (iB2-iBREQ-2128) | The Supplier shall ensure that the On-bus Solution plays an Audio Alert to a Driver when it receives a radio call. |
| Radio - accept calls  (iB2-iBREQ-108) | The Supplier shall ensure that the On-bus Solution enables a Driver to receive and accept individual calls from the Back Office Solution. |

# SD07 Trams

| **Title and ID** | **Requirement** |
| --- | --- |
| Trams - core  functions  (iB2-iBREQ-  2461) | The Supplier shall provide a version of the On-bus Solution for use on Trams. The Supplier shall ensure that the version of the On-bus Solution for use on Trams shall meet all Solution Requirements except the Solution Requirements set out in the following Paragraphs of this Schedule, which the Supplier shall not be required to provide:   1. in Paragraphs: 2. 3.1; 3. 3.2; 4. 4; 5. 5.3; 6. 6.1; 7. 6.2; 8. 6.3; 9. 8; 10. 10.1; 11. 10.2; 12. 10.3; and 13. 10.4; 14. in Paragraph 1.1(a): 15. iB2-iBREQ 2364; 16. iB2-IBREQ 631; 17. iB2-IBREQ 2113; 18. iB2-IBREQ 2337; and 19. iB2-IBREQ 2338; 20. in Paragraph 1.3: iB2-iBREQ-608; 21. in Paragraph 2.1: iB2-iBREQ-2268; 22. in Paragraph 2.2: iB2-iBREQ-501; 23. in Paragraph 2.4(a): iB2-iBREQ-2103; 24. in Paragraph 2.4(c): 25. iB2-iBREQ-524; and 26. iB2-iBREQ 2412; 27. in Paragraph 2.4(d): 28. iB2-iBREQ-613; 29. iB2-iBREQ-523; 30. iB2-iBREQ-2448; and 31. iB2-iBREQ-2372; and 32. in Paragraph 5.1: 33. iB2-iBREQ-2402; 34. iB2-iBREQ-2211; 35. iB2-IBREQ 2212; and 36. iB2-IBREQ 2213. |
| Tram to iBus2 communication  (iB2-iBREQ-2033) | The Supplier shall ensure that the On-bus Solution interfaces with the Tram Solution in accordance with the C43T Vecom Specification. |
| Tram - key tasks  (iB2-iBREQ-2037) | The Supplier shall ensure that the On-bus Solution is able to process the following key Driver-to-system interactions using the Tram Solution functions:   1. Driver login; 2. Driver logout; and 3. specifying Trip. |
| Tram - non key task responses  (iB2-iBREQ-2039) | The Supplier shall ensure that, with respect to Trams, the On-bus Solution functions without a response to certain messages displayed by the On-bus Solution including any messages displayed by the On-bus Solution which would ordinarily receive a response by a Driver, excluding:   1. those Driver-to-system interactions listed in Solution Requirement iB2-iBREQ-2037; 2. warning or announcement acknowledgements; and 3. emergency alert acknowledgements. |
| Tram - Audio Alerts  (iB2-iBREQ-2040) | The Supplier shall ensure that, with respect to Trams, Audio Alerts are differentiated to ensure that the Driver can identify the Audio Alert without visual reference to the Driver Display Unit. |
| Tram speed alert  - Overspeed  (iB2-iBREQ-2459) | The Supplier shall ensure that when the On-bus Solution detects that the speed of the Tram on which it is installed is in excess of the overspeed threshold (applied in addition to the speed limit applicable to the road or track on which the Tram is located) the On-bus Solution issues an Audio Alert to the Driver. The overspeed threshold is set out in the System Configuration Lookup Table. |
| Tram speed alert  - Violation  (iB2-iBREQ-  2460) | The Supplier shall ensure that when the On-bus Solution detects that the speed of the Tram on which it is installed is in excess of the speed violation threshold (applied in addition to the speed limit applicable to the road or track on which the Tram is located) the On-bus Solution sends an alert to the Back Office Solution. The speed violation threshold is set out in the System Configuration Lookup Table. |
| Tram - configurable functionality  (iB2-iBREQ-2042) | The Supplier shall ensure that the On-bus Solution enables TfL to turn off On-bus Solution functions where such functions are not required, as set out in Solution Requirement iB2‑iBREQ‑2461, or supported by the Tram systems and hardware. |
| Tram - front and rear cabs  (iB2-iBREQ-2043) | The Supplier shall ensure that the On-bus Solution is able to support each Tram’s double-ended configuration. |
| Tram - direction selection  (iB2-iBREQ-2044) | The Supplier shall ensure that the On-bus Solution enables the Driver to select which end of the Tram is active and configure the system accordingly. |

# SD08 iBus Light

| **Title and ID** | **Requirement** |
| --- | --- |
| iBus Light - software application core functions  (iB2-iBREQ-2147) | The Supplier shall provide a software application that is optimised for deployment on a portable device operating on Android that provides basic On-bus Solution functionality on a Vehicle including:   1. the ability to communicate with the Back Office Solution; 2. the ability to receive, acknowledge and update relevant Reference Data; 3. an indication to the Back Office Solution that the Vehicle is equipped with iBus Light; 4. Driver login and logout functions; 5. Vehicle location tracking; 6. Headway; 7. a map-based navigation view with Route and Service Path shown (if known); 8. voice calls via the fallback voice communication mechanism in accordance with Solution Requirement iB2-iBREQ-2019; 9. text-based messaging; 10. Driver Alerts; and 11. integrated help and support options and information throughout in accordance with Solution Requirement iB2-iBREQ-1917. |
| iBus Light - administration portal  (iB2-iBREQ-2472) | The Supplier shall provide an administration portal that enables a TfL User to manage access, grant and revoke licences, and set permissions for the iBus Light application. |
| iBus Light - application availability  (iB2-iBREQ-2473) | The Supplier shall provide the iBus Light application in a file format that can be installed and updated on Android devices. |
| iBus Light - application functionality if no cellular connectivity  (iB2-iBREQ-2474) | If a device that the iBus Light application is deployed on loses cellular connectivity, the Supplier shall ensure that the iBus Light application continues to provide driver-facing functionality. |
| iBus Light - location tracking  (iB2-iBREQ-2150) | The Supplier shall ensure that the iBus Light application can use a Third Party device’s own GPS service to provide the current location of the Vehicle. |
| iBus Light - restrict when in motion  (iB2-iBREQ-2348) | The Supplier shall ensure that the iBus Light application cannot accept user input when the Vehicle the device is deployed on is in motion. |
| iBus Light -configuration  (iB2-iBREQ-2151) | The Supplier shall ensure that when the application used for iBus Light is deployed and activated on a Vehicle, it can be configured with basic elements about the Vehicle itself, including:   1. height of the Vehicle; and 2. registration number of the Vehicle. |

# SD09 Reference Data

## Request Reference Data

| **Title and ID** | **Requirement** |
| --- | --- |
| Base Reference Data - request update  (iB2-iBREQ-2295) | The Supplier shall ensure that, when the On-bus Solution has initialised, it requests an update to its current Base Reference Data from the Back Office Solution, if any update is required. |
| Route Reference Data - request  (iB2-iBREQ-2296) | The Supplier shall ensure that, when a Driver has entered the Trip-identifying data in Solution Requirement iB2-iBREQ-487, the On-bus Solution requests the relevant Route Reference Data from the Back Office Solution within five (5) seconds. |
| Reference Data - update progress  (iB2-iBREQ-2476) | The Supplier shall ensure that the On-bus Solution displays to the Driver an indicator of the progress for the download and update of Base Reference Data and Route Reference Data. |

## Receive Reference Data

| **Title and ID** | **Requirement** |
| --- | --- |
| Distribution - completeness checking mechanism  (iB2-iBREQ-2289) | The Supplier shall ensure that the On-bus Solution can validate that a set of Reference Data has been completely received from the Back Office Solution by using the completeness checking mechanism provided by the Back Office Solution. |
| Distribution - notify of unsuccessful receipt  (iB2-iBREQ-470) | If the update to Reference Data has not been successfully received, the Supplier shall ensure that the On-bus Solution notifies the Back Office Solution within five (5) minutes after the initial request of Reference Data, providing the version number of the Reference Data requested. |
| Distribution - notify of successful receipt  (iB2-iBREQ-471) | The Supplier shall ensure that the On-bus Solution checks that it has received all the Reference Data sent to it and returns a success acknowledgement to the Back Office Solution if the Reference Data received is complete. |

## Update Reference Data

| **Title and ID** | **Requirement** |
| --- | --- |
| Reference Data - update  (iB2-iBREQ-2210) | The Supplier shall ensure that the On-bus Solution updates Reference Data after receipt in accordance with the System Configuration Lookup Table. |
| Reference Data - Operational Impact  (iB2-iBREQ-469) | The Supplier shall ensure that the application of new Reference Data by the On-bus Solution does not interfere with or otherwise impede the operation of any other function of the On-bus Solution. |
| Base Reference Data - configuration content  (iB2-iBREQ-2305) | The Supplier shall ensure that the On-bus Solution is able to extract and apply the system configuration settings passed to it within the Base Reference Data. |
| Update - manage failure  (iB2-iBREQ-479) | The Supplier shall ensure that, if the On-bus Solution fails to fully apply changes to Reference Data, it:   1. continues to use the current version of Reference Data; 2. logs the: 3. Unique Vehicle Identifier; 4. date and time of the failure; 5. Reference Data version number; and 6. applicable error message; and 7. sends a status update to the Back Office Solution with the information included in Paragraph (b). |
| Update - log details  (iB2-iBREQ-478) | The Supplier shall ensure that, if the On-bus Solution successfully applies changes to Reference Data, it:   1. logs the Unique Vehicle Identifier; 2. logs the time and date of the activation; 3. logs the version number of the new Reference Data; 4. logs the version number of the replaced Reference Data; 5. logs that the update has been successful; and 6. sends a status update to the Back Office Solution with the information listed in (a) to (e). |

# SD10 Service Control functionality

## Deviations and Diversion

| **Title and ID** | **Requirement** |
| --- | --- |
| Deviation - detect  (iB2-iBREQ-118) | The Supplier shall ensure that the On-bus Solution automatically detects the Deviation of a Vehicle from the Expected Path. |
| Diversion - Deviation alert accuracy  (iB2-iBREQ-121) | The Supplier shall ensure that the On-bus Solution only creates alerts for legitimate Deviations in accordance with Solution Requirement iB2-iBREQ-120 and Solution Requirement iB2-iBREQ-2274. |
| Deviation - alert Driver  (iB2-iBREQ-120) | The Supplier shall ensure that the On-bus Solution issues a Driver Alert for a Deviation of that Vehicle from the Expected Path. |
| Deviation - send alert  (iB2-iBREQ-2274) | The Supplier shall ensure that when the On-bus Solution detects a legitimate Deviation, it sends an alert to the Back Office Solution. |
| Diversion - receive Diversion information  (iB2-iBREQ-2133) | The Supplier shall ensure that the On-bus Solution can receive Diversion information from the Back Office Solution and issues a Driver Alert of such Diversion information in Near Real Time. |
| Diversion - map or linear view  (iB2-iBREQ-1927) | The Supplier shall ensure that the display of a Vehicle’s position, path and progress as set out in Solution Requirement iB2-iBREQ-516 reflects correct Diversion information, including the revised Expected Path when displaying a map navigation view or linear representation. |

## Curtailment

| **Title and ID** | **Requirement** |
| --- | --- |
| Curtailment - receive instruction  (iB2-iBREQ-150) | The Supplier shall ensure that the On-bus Solution can receive Curtailment instructions from the Back Office Solution in Near Real Time. |
| Curtailment - receive amended instructions  (iB2-iBREQ-2170) | The Supplier shall ensure that the On-bus Solution can receive Curtailment amendment or cancellation instructions from the Back Office Solution in Near Real Time. |
| Curtailment - display information  (iB2-iBREQ-151) | The Supplier shall ensure that the On-bus Solution displays information about an upcoming Curtailment to a Driver in Near Real Time. |
| Curtailment - update Driver  (iB2-iBREQ-152) | The Supplier shall ensure that the display of a Vehicle’s position, path and progress as set out in Solution Requirement iB2-iBREQ-516 displays Curtailment information, including details of the Positioning Manoeuvre when displaying a map navigation view or linear representation. |
| Curtailment - accept Instruction  (iB2-iBREQ-153) | The Supplier shall ensure that the On-bus Solution enables a Driver to accept a Curtailment instruction and, if accepted, sends details of the acceptance to the Back Office Solution. |
| Curtailment - update Trip  (iB2-iBREQ-2134) | The Supplier shall ensure that when a Curtailment instruction is accepted by a Driver, the On-bus Solution updates the current Trip details with the amended Trip information which is contained in the Curtailment instruction. |
| Curtailment - reject Instruction  (iB2-iBREQ-154) | The Supplier shall ensure that the On-bus Solution enables a Driver to reject a Curtailment instruction. |
| Curtailment - update after rejection  (iB2-iBREQ-155) | The Supplier shall ensure that when a Driver rejects a Curtailment instruction:   1. the Vehicle remains on the current Trip; 2. the On-bus Solution sends details of the rejection to the Back Office Solution; and 3. the On-bus Solution prompts the Driver to initiate a Standard Priority call to a Service Controller. |
| Curtailment - Driver request  (iB2-iBREQ-160) | The Supplier shall ensure that the On-bus Solution enables a Driver to compose a request for a Curtailment of a Trip and to provide:   1. the reason entered, from a drop-down list provided in the Base Reference Data; and 2. whether the Driver wishes to initiate a Standard Priority call. |
| Curtailment - not in Reference Data  (iB2-iBREQ-161) | The Supplier shall ensure that the On-bus Solution enables a Driver to compose a request for a Curtailment of the Trip as set out in requirement iB2-iBREQ-160 at a point not defined in the Route Reference Data. |
| Curtailment request - send  (iB2-iBREQ-2471) | The Supplier shall ensure that, when a Driver has completed a request for a Curtailment in accordance with Solution Requirement iB2-iBREQ-160 or iB2-iBREQ-161, the On-bus Solution sends the request to the relevant Service Controller. |

## Text based messaging

| **Title and ID** | **Requirement** |
| --- | --- |
| Text based messages - Solution Based Messaging  (iB2-iBREQ-65) | The Supplier shall ensure that the On-bus Solution uses Solution Based Messaging when sending outbound alphanumeric based communications to the Back Office Solution and is capable of receiving inbound Solution Based Messaging from the Back Office Solution. |
| Text based messages - search  (iB2-iBREQ-69) | The Supplier shall ensure that the On-bus Solution enables a Driver to search for predefined text based message communications which are contained in the Base Reference Data. |
| Text based message - select  (iB2-iBREQ-71) | The Supplier shall ensure that the On-bus Solution enables a Driver to select from a list of predefined text based message communications which are contained in the Base Reference Data. |
| Text based message - display  (iB2-iBREQ-73) | The Supplier shall ensure that the On-bus Solution displays all data relating to a selected text based message in a single scrollable view. |
| Text based message - send  (iB2-iBREQ-84) | The Supplier shall ensure that the On-bus Solution enables a Driver to send selected predefined text based message communications to the Operator Service Controller controlling the Route on which the Active Vehicle is currently operating. |
| Text based message - retry attempts  (iB2-iBREQ-1937) | The Supplier shall ensure that, if a text based message is not successfully transmitted, the On-bus Solution re-sends the relevant text based message (up to a maximum of three (3) times) not more than ten (10) seconds after receipt of each notification of a transmission failure. |
| Text based message - transmission time  (iB2-iBREQ-1946) | The Supplier shall ensure that the On-bus Solution transmits a text based message not more than two (2) seconds after the Driver has initiated the transmission. |
| Text based message - display confirmation  (iB2-iBREQ-2054) | The Supplier shall ensure that the On-bus Solution displays a confirmation to a Driver when their text based message communication has been sent successfully. |
| Text based message - receive in Near Real Time  (iB2-iBREQ-89) | The Supplier shall ensure that the On-bus Solution can receive text based messages in Near Real Time. |
| Text based message - Visual Alert  (iB2-iBREQ-90) | The Supplier shall ensure that the On-bus Solution displays a Visual Alert in Near Real Time to the Driver when a text based message is received. |
| Text based message - Audio Alert  (iB2-iBREQ-2065) | The Supplier shall ensure that the On-bus Solution plays an Audio Alert to the Driver when a text based message alert is displayed. |
| Text based message - display only when stationary  (iB2-iBREQ-92) | The Supplier shall ensure that the On-bus Solution only displays text based messages to a Driver when the Vehicle is stationary. |
| Text based message - send read receipt  (iB2-iBREQ-2124) | The Supplier shall ensure that the On-bus Solution sends a read receipt, if one was requested, to the Back Office Solution when the Driver selects the text based message to read. |
| Text based message - error handling mechanism  (iB2-iBREQ-97) | The Supplier shall ensure that, in relation to text based messages, the On-bus Solution has an error handling mechanism which, if an error has occurred, immediately and automatically reattempts the transmission and records any ultimately failed attempts in an audit log. |

## Remote Immobilisation

| **Title and ID** | **Requirement** |
| --- | --- |
| On-board Immobiliser - applicability  ([iB2-iBREQ-2484](https://tflce.jamacloud.com/perspective.req?docId=2887887&projectId=20354)) | If an On-board Immobiliser is fitted on a bus, the Supplier shall comply with the Solution Requirements in this Paragraph 10.4. |
| On-board Immobiliser - detect presence  (iB2-iBREQ-2485) | The Supplier shall ensure that the On-bus Solution shall be able to detect the presence of an On-board Immobiliser. |
| On-board Immobiliser - Security  (iB2-iBREQ-2486) | The Supplier shall ensure that the On-bus Solution complies with the Standards set out in Annex 5 (*OT* *(Operational Technology) Security Standards*) to Schedule 2.4 (*Security Management*). |
| On-board Immobiliser - register status  (iB2-iBREQ-2487) | The Supplier shall ensure that the On-bus Solution can at all times receive On-board Immobiliser Status Messages. |
| On-board Immobiliser - alert failure  (iB2-iBREQ-2488) | The Supplier shall ensure that when the On-bus Solution detects that the On-bus Immobiliser has stopped sending On-board Immobiliser Status Messages or sends an On-board Immobiliser Status Message indicating an error, the On-bus Solution creates a Vehicle Event indicating that the On-board Immobiliser has a fault. |
| On-board Immobiliser status - send  (iB2-iBREQ-2489) | The Supplier shall ensure that, if the status reported in an On-board Immobiliser Status Message changes (except in accordance with iB2-iREQ- 2488), from that reported in the previous On-board Immobiliser Status Message, the On-bus Solution send the updated On-board Immobiliser Status Message to the Back Office Solution as a Vehicle Event. |
| On-board Immobiliser Instruction - receive  (iB2-iBREQ-2490) | The Supplier shall ensure that the On-bus Solution can receive an On-board Immobiliser Instruction from the Back Office Solution. |
| On-board Immobiliser Instruction - publish  (iB2-iBREQ-2491) | The Supplier shall ensure that the On-bus Solution, when it receives an authenticated On-board Immobiliser Instruction, publishes the message in Near Real Time. |
| On-board Immobiliser Instruction - validate  (iB2-iBREQ-2492) | When an On-board Immobiliser Instruction is received in the On-bus Solution, the Supplier shall ensure that the On-bus Solution authenticates that the On-board Immobiliser Instruction is genuine and has originated from the Back Office Solution. |
| On-board Immobiliser Instruction - reject  (iB2-iBREQ-2493) | When an On-board Immobiliser Instruction is unable to be authenticated as described in Solution Requirement iB2-iBREQ-2492, the Supplier shall ensure the On-bus Solution rejects that On-board Immobiliser Instruction. |

# SD11 Service desk functionality

## Monitoring Tools functionality

| **Title and ID** | **Requirement** |
| --- | --- |
| System Alert - send to Primary Service Desk  (iB2-iBREQ-55) | The Supplier shall ensure that the Monitoring Tools send a System Alert to a TfL Primary Service Desk User, a Supplier Primary Service Desk User, and the Back Office Solution if the parameters of the Operational Baseline are breached. |
| Remote System Fault resolution  (iB2-iBREQ-47) | The Supplier shall ensure that the Monitoring Tools enable a TfL Primary Service Desk User to remotely resolve a System Fault. |
| Interface with the TfL IT Service Management System  (iB2-iBREQ-1866) | The Supplier shall ensure that the Monitoring Tools interface with the TfL IT Service Management System in accordance with the TfL IT Service Management System Interface Specification. |
| TfL IT Service Management System - manually raise Incident  (iB2-iBREQ-1874) | The Supplier shall ensure that the Monitoring Tools enable a TfL Primary Service Desk User to use the details of a System Alert to manually raise an Incident in the TfL IT Service Management System. |
| TfL IT Service Management System - automatically raise Incident  (iB2-iBREQ-2437) | The Supplier shall ensure that, if the parameters of the Operational Baseline are breached, the Monitoring Tools use the details of the associated System Alert to automatically raise an Incident in the TfL IT Service Management System. |
| Monitoring Tools - Available as a service  (iB2-iBREQ-2399) | The Supplier shall ensure that the Monitoring Tools are available to TfL Systems, Other Supplier Systems and Other iBus2 Supplier Systems as application discoverable services. |

## Monitoring Tools data display

| **Title and ID** | **Requirement** |
| --- | --- |
| Data flow status  (iB2-iBREQ-59) | The Supplier shall ensure that the Monitoring Tools display the status of on-board data flows and data flows to the Back Office Solution including Location Data and Traffic Light Priority Messages. |
| On Bus Asset status  (iB2-iBREQ-58) | The Supplier shall ensure that the Monitoring Tools monitor the status of the On Bus Assets. |
| Fault resolution based on On Bus Asset status  (iB2-iBREQ-2061) | The Supplier shall ensure that the Monitoring Tools provide a TfL Primary Service Desk User with System Fault resolution options depending on the status of an On Bus Asset. |

## On-bus Service Mode Tools

| **Title and ID** | **Requirement** |
| --- | --- |
| Service Mode Tools  (iB2-iBREQ-2098) | The Supplier shall provide Service Mode Tools as part of the:   1. On-bus Solution; and 2. Monitoring Tools. |
| Capabilities of the Service Mode Tools  (iB2-iBREQ-2099) | The Supplier shall ensure that the Service Mode Tools enable a Field Engineer or a TfL Primary Service Desk User to, as a minimum, perform the following operations:   1. set date and time of the On-bus Solution; 2. select and view current operational status of an On Bus Asset; 3. select and view hardware status including network status and memory status of an On Bus Asset; 4. if an On Bus Asset is capable of being restarted, trigger a restart of the On Bus Asset; 5. select and view status of On Bus Processes; 6. select and view Vehicle CAN data; 7. configure Audio Output Settings; 8. select and view status of the Third Party systems which interface with the On-bus Solution; 9. view the Radio ID; and 10. view the Radio Prefix. |

1. – User Roles

| **User Role** | **Organisation** | **Definition** |
| --- | --- | --- |
| Driver | Operator | means an Operator User who operates a Vehicle |
| Field Engineer |  | means a User who performs maintenance operations on a Vehicle |
| Mileage Clerk | Operator | means an Operator User responsible for the management of Trip Data and confirms Operator mileage in the Back Office Solution |
| Operator Field Engineer | Operator | means an Operator User who is a Field Engineer |
| Operator Service Control Manager | Operator | means an Operator User who has responsibility for managing Service Controllers and certain administrative functions |
| Operator Service Controller | Operator | means an Operator User who is a Service Controller |
| Operator User | Operator | means a member of Operator Personnel who has access to and uses the Supplier Solution |
| Primary Service Desk User |  | means a TfL User or Supplier User who performs Primary Service Desk functions |
| Service Controller |  | means a TfL User or an Operator User who performs Service Control functions |
| Supplier Field Engineer | Supplier | means a Supplier User who is a Field Engineer |
| Supplier Primary Service Desk User | Supplier | means a Supplier User who performs Primary Service Desk functions |
| Supplier User | Supplier | means a member of Supplier Personnel who has access to and uses the Supplier Solution |
| System Administrator |  | means a TfL User or a Supplier User who has responsibility for the iBus2 system administration and configuration, including management of user accounts |
| TfL Engineering User | TfL | means a TfL User who sets TfL's engineering standards, manages and analyses CAN data |
| TfL Field Engineer | TfL | means a TfL User who is a Field Engineer |
| TfL Primary Service Desk User | TfL | means a TfL User who performs Primary Service Desk functions |
| TfL Service Controller | TfL | means a TfL User who is a Service Controller |
| TfL User | TfL | means a member of TfL Personnel who has access to and uses the Supplier Solution |
| User |  | means a TfL User, an Operator User, or a Supplier User |