

ATTACHMENT 14

Close Circuit Television System Requirements and Specification

1. General Specification

1.1 Connectivity

- A. The DVR shall have the following interfaces:-
 - i) A Local Area Network (LAN) interface, presented as Ethernet through an RJ45 connection.
 - ii) An integrated 3G modem.
- B. The integrated 3rd Generation Mobile Network (3G) modem, there is a preference that this card fits within the Digital Video Recorder (DVR) thus minimising installation costs.
- C. The LAN and 3G modem interfaces shall be password protected and have multiple levels of access i.e. administration, user, read only.
- D. The solution shall provide an open interface accessible via the LAN or 3G modem to allow full control of the DVR. The specification, protocols used and command strings will be provided to London Bus Service Limited (LBSL) on request.
- E. LBSL reserves the right to use these interfaces.

1.2 Function

- A. The image resolution shall be 2CIF or better, 2 CIF will be set as a default.
- B. Each camera input shall be capable of recording at 25 frames per second at the maximum image size and highest image quality concurrently.
- C. The CCTV system shall have the flexibility to select the frame rate for each individual camera up to the maximum rate.
- D. The DVR shall support a minimum total global frame rate of 100 frames per second.
- E. The DVR shall support 16 camera inputs as a minimum.
- F. The DVR shall have an easily removable hard disc for external monitoring or ability to be downloaded via external connection.
- G. Bus data to be recorded on the disc drive
 - i) Bus road speed taken from the GPS, foot brake application and traffic Indicator "left and right" recorded with date and time identification
 - ii) Recording not to be displayed on driver's cab monitor or passenger monitor
- H. All images shall be watermarked or equivalent.
- I. The DVR shall have the capability to record an audio input from two or more microphones.

- J. The DVRs shall use a high compression video codec to encode and store the image data on the hard disk, this shall be one of the following:-
- a. MPEG4 Part 2
 - b. MPEG Part 10 (ISO/IEC 14496-10 version 1)
 - c. ITU-T H.264.
- Note:** the use of any other codec is prohibited
- K. The DVR shall be able to dual stream i.e. code an image at different rates such that a low rate can be stream for Live CCTV and a higher rate recorded to disk for collection later. This shall be possible with one or more of the codecs listed in 1.2J above.
- L. The DVR shall be Live Closed Circuit Television (CCTV) capable so that should LBSL decide to rollout Live CCTV in the future the DVR will support this, more specifically:-
- 1) The DVR shall have the capability to stream video through either of the interfaces, LAN and 3G modem, to a control and management system developed for the solution.
 - 2) The system shall have a documented interface from the control and management system that is made available to TfL for use in a potential Central CCTV Control and Management system.
 - 3) The system's control and management system shall be able to:-
 - i. Manage the video stream i.e. start/stop, pause, Fast Forward, Rewind during the event etc.
 - ii. Select the camera required.
 - iii. Select multiple cameras in thumb nail form.
 - iv. Manage the parameters that control the quality of the video stream.
 - v. Perform System Administration and Operations and Maintenance functions.
- M. The unit shall have an NMEA compatible Global Navigation System interface.
- N. The system clock shall have a resolution of 1 second and the time will be maintained to an accurate to +/- 10 seconds

1.3 Diagnostic Interface

- A. The unit shall have the TfL diagnostic interface implemented and approved for use with iBus.
- B. The LAN interface of the DVR will be made available to LBSL for diagnostics and other uses agreed at a later date.

1.4 Cameras

- A. All cameras shall be analogue and antiglare
- B. The cameras used shall be high quality colour 480TVL day/night or low light.
- C. All cameras must be housed in a Vandal Resistant Dome or Concealed
- D. Wide angle lenses utilised where necessary to improve vision coverage as identified on Bus type layout drawings in Attachment 7

1.5 Displays

- A. The displays shall be LCD colour monitors.
- B. All the displays shall show the time which is derived from the system radio adjusted clock.
- C. The display shall be available in the following sizes:-
 - i) 5" or equivalent suitable for locating in the drivers cab
 - ii) 15" or equivalent suitable for placing in the passenger area

1.6 Type Approval

- A. The CCTV systems shall be designed to operate in a public transport environment. The operator will be required to supply type approval for:-
 - i) e Mark
 - ii) Electromagnetic Compatibility
 - iii) Shock and Vibration
 - iv) Temperature
 - v) Water ingress

Note: the CCTV system comprises the DVR, Cameras, intermediate cables, screens, connectors and any ancillary equipment.
- B. The integrity of the type approval shall be maintained throughout the life of the contract.
- C. The cameras should be rated as IP65 as a minimum.

2.0 Implementation

2.1 Installation

- A. The CCTV systems shall be built in accordance with the TfL CCTV System Installation Guidelines. The key aspects of this are:-
 - i) LBSL approval of the installation, the operator will present the installation instructions for approval prior to build.
 - ii) Documentation, the operator shall maintain the documentation for each build type and make them available for LBSL inspection.
 - iii) Co-existence with iBus, where possible the DVR shall be placed in the same location as the iBus unit.
- B. The DVRs shall be designed to work with the bus native power supply; any additional equipment necessary for this shall be considered part of the CCTV system.
- C. The DVRs shall remain on for 20 minutes once the ignition has been turned off.
- D. Installers of the CCTV system should be accredited to FCS 1362 (formally MPT 1362) or equivalent.
- E. LBSL reserve the right to inspect the installation at source to ensure the standards are being applied appropriately.

2.2 Configuration

- A. The image quality configuration parameters will be set to a TfL default as a minimum.

- B. Each camera will be set to a frame rate as defined by TfL as shown in the table below.

Location	Reference	Frame rate
Entrance/Exit Platform, wheelchair space and Passenger / Driver Interface	A1, A2	4
Rear of interior seated area	A3, C1	4
General passenger space	A4, B1, C2, C4	4
Forward facing to road	A5	4
Driver's Cab	A6	4
Stair Well	C3	4

Note: the reference refers to the camera locations specified in section 2.3.

- C. The operator will ensure that the parameters in Sections 2.2 A and B are maintained throughout the life of the contract.
- D. TfL may choose to change this throughout the life time of the contract.
- E. Note: the parameters will only be changed in exceptional circumstances.
- F. The DVR will provide a minimum of 240 hours of storage space for each bus at the quality and frame rates defined above. The dimensioning of this should account for operating environment i.e. level of movement and lighting conditions.
- G. If the operator uses the CCTV system beyond the minimum requirement set out here any additional CCTV resources that are required shall be supplied by the operator such that minimum requirements set out in this specification are met.

2.3 Camera Locations

The cameras shall be identified on the DVR system by the camera alpha numeric code as shown below (When two are cameras used to cover one location /1 or /2 should be added). Cameras must be located in accordance with the following guidelines for monitored areas with the area identified on channels as shown and as approved on Bus type layout drawings in Attachment 7.

All operator required additional cameras identified on subsequent channels as O13, O14 and above as necessary.

A. Mandatory All Buses (SD, DD)

1. Entrance Platform and Passenger / Driver Interface (Channel 1)
2. Exit Platform, Wheelchair Space and Deployed Ramp Area - Viewing Wheelchair Space only on Single Door Buses under 9m (Channel 2)
3. Two cameras at rear of interior seated area looking forwards covering minimum rear five-way and last four rows of seats. Alternatively use of single camera with a wide-angle lens. (Channel 3 and 4 if two utilised)

4. Between the centre door and the front of the bus which may be mounted either at the front looking rearwards or at the centre door looking forwards. (Channel 5)
5. Forward facing to road ahead of bus (Channel 6)
Optional / Recommended
6. Interior Drivers Cab looking towards Drivers Signalling Window (Channel 7)

B. Additional Mandatory All Single Deck Buses Over 10.4m length

1. Centre door and the rear of the bus, looking rearwards (Channel 8)

C. Additional Mandatory All Double Deck Buses

1. Two cameras at rear of upper saloon interior seated area looking forwards covering minimum rear five-way and last four rows of seats. Alternatively use of a single camera with a wide-angle lens. (Channel 9 and 10 if two utilised)
2. Lower saloon between the centre door and the rear of the bus which may be mounted either at the rear looking forwards or at the centre door looking rearwards. (Channel 11)
3. Top of stairwell looking downwards (Channel 12)
4. Front of upper saloon interior seated area looking rearwards (Channel 13)

Note: Prior to building of the bus the operator shall confirm that the camera layout drawing has an approval reference (as Attachment 7) given by LBSL. In the case where the layout does not meet the LBSL approved reference / guidelines the operator will be required to revise appropriately.

2.4 Displays

- A. There shall be a display in the drivers cab, the display:-
 - i) Shall be a 5" or equivalent LCD colour monitor.
 - Suitably mounted in drivers cab area
 - Monitor to display the system time clock
 - ii) Shall, as default, display the exit platform and ramp deployment area when the centre exit door opens.
- B. There shall be a display in the passenger area, the display:-
 - i) Shall be a 15" or equivalent LCD colour monitor positioned in the lower saloon.
 - ii) Shall be suitably and securely mounted behind a vandal resistant protective screen.
 - Monitor to display the system time clock
 - iii) Shall be generally positioned so that the maximum number of passengers entering the bus will have the opportunity to view the screen when in one of the following positions:-
 - Rearward exit door partition facing forwards
 - Staircase to aisle fascia lower saloon facing inwards to centre of bus
 - Staircase rearward partition facing up the staircase and viewable from lower saloon aisle at staircase entrance.

- iv) Monitor will continuously cycle around all the cameras remaining on each camera for 5 seconds and end with an all camera view.
 - v) Shall be installed in a manner consistent with the current iBus policy.
- C. Use of displays on the upper deck is prohibited.

2.5 Security

- A. The DVR and any additional equipment necessary for Live CCTV shall be enclosed in a secure, lockable and vandal proof enclosure that is located in accordance with the TfL design guides.

3.0 Operation

3.1 Performance

TfL will be providing a diagnostic and reporting capability utilising the current iBus system and will work with the DVR suppliers to ensure the DVR interface (Section 1.3) is developed and approved for use by TfL. The following is based on the use of this capability.

- A. The performance of the CCTV system shall be 98% availability. For a system to be available the following is required:-
 - a. The DVR and ancillaries are fully operational
 - b. The DVR configuration is correct
 - c. The system time is correct to +/- 10 seconds
 - d. All but one of the cameras is working i.e. 1 camera failure is allowed without reducing the availability in the first week. For week 2 and onward the system is considered unavailable.

Availability is defined as:-

$$\frac{\text{Total Time period} - \text{Total Hours unavailable during time period}}{\text{Total Time Period}}$$

Time Period is the sum of all the operational hours of buses operating on contracts compliant with this specification during a period.

Total Hours unavailable during a time period is the sum of all the unavailable hours of buses operating on contracts compliant with this specification during a period

Unavailable Hours are calculated from the time the fault status is made available to the operator to the time the system is fixed.

For a system to be considered as unavailable one or more of the criteria in a. to d. above is not met.

The period is 28 days.

3.2 Audit

- A. The operator will be audited to ensure compliance against the required performance. The operator will be expected to maintain records of:-
 - i) CCTV system inspections.
 - ii) Faults identified and date/time fixed.
- B. The operator will provide Availability reports on request.
- C. LBSL shall have the right to audit against the requirements in this specification to ensure traceability and accuracy of the data recorded.

3.3 Enforcement

Should the operator breach the availability targets then the operator shall put in place a recovery plan.

3.4 Provision of Data

The operator framework agreement contains all information related to the provision of data and should be reviewed as an overview of this Attachment.