# AMENDMENT HISTORY

| REVISION STATUS | AMENDMENT(S) |
|---|---|
| 0 | First submission |
| | |
| | |
| | |

# 1. Introduction

Roctec technology limited has been awarded a contract (No.: 2718EM19M) to replace Overhead Display Board system And Information Display System for the Lok Ma Chau Spurline Control Point

## 1.1 About this document

### 1.1.1 Scope

This document describes the requirement and design specification on the ODS for the replacement project.

### 1.1.2 Target group

The target group of this document is technical and commercial decision-makers.

# 2. Abbreviations and Definitions

## 2.1 Definitions

The following words and expressions shall have the meanings hereby assigned to them except when the context otherwise requires.

1. "The LMCSCP" means the Lok M Chau Spurline Control Point.
2. "ODS" means Overhead Display Board System
3. "Install" means to erect, mount and connect, complete with related accessories and generally finish to a state ready for testing or commissioning and operation.
4. "Similar" or "Equal" means equal in materials, weight, size, design, and efficiency of specified product.

## 2.2 Abbreviations

| | |
|---|---|
| DLP | Defects Liability Period (which is same definition as the Guarantee Period) |
| E&M | Electrical and Mechanical |
| EMSD | Electrical and Mechanical Services Department |
| EPD | Environmental Protection Department |
| ESG01 | General Requirements for Electronic Contract (EMSD, HKSAR) |
| ESG15 | General Technical Specification for Uninterruptible Power Supply (UPS) (EMSD, HKSAR) |
| HKSAR | Hong Kong Special Administrative Region |
| IMMD | Immigration Department |
| MTBF | Mean Time Between Failures |
| MTTR | Mean Time To Repair |
| O&M | Operating and Maintenance |
| RSE | Registered Structural Engineer |

## 2.3 Reference Documents

1) Particular Specification of 2718EM19M
2) ESG01 General Requirements for Electronic Contract (EMSD, HKSAR)
3) ESG15 General Technical Specification for Uninterruptible Power Supply (UPS) (EMSD, HKSAR)

# 3. System Description and Configuration

## 3.1 System Description

The Overhead Display Board System is comprised of LCD Display Panels, Control Keypads, ODS Controllers, ODS Server, ODS Control Workstations and the associated network equipment. The ODS Server at 2/F and ODS Control Workstation at 1/F shall be power backup by the 1kVA UPS..

## 3.2 System Outline

**Overhead Display Board System**

1) The Overhead Display Board System is comprised of LCD Display Panel, Control Keypad, ODS Controller, ODS Server, ODS Control Workstations and the associated network switches. The ODS Server at 1/F and ODS Control Workstation at G/F shall be power backup by the 1kVA UPS.
2) The ODS shall be a system of networked LCD displays installed over the Control Point. All displays shall show combination of video, graphic and text with commonly available effects including scrolling to left, right, up and down; Fading-in and -out; and Popup in English, Traditional Chinese, Simplified Chinese, Numerals Punctuation and Symbols simultaneously in different partitions within the same display. Any size of Chinese and English characters shall be selectable for displaying message(s) anywhere on the displays. Scrolling speed and delay band between effects must be user definable.
3) The ODS shall consist of one (1) server and two (2) workstations, one to be installed at the duty office of G/F and another to be installed at the duty office of 1/F. In case there is no available network between duty offices of G/F and 1/F. Both workstations shall be able to be configured as standalone unit to separately control the ODBs in G/F and 1/F respectively without connection with ODS server.
4) Message shall be constructed in any combinations of Chinese (Traditional and Simplified) and English characters numeral, animated graphic, videos and symbols, as well as colors and other various display effects.
5) The system shall display different types of information in commonly used formats including variation of Excel, Word, Power Point, PDF, Bitmap, JPEG, MJPEG, MPEGW, MPEG4, H.264, etc.
6) The layout, partitioning and sizing of areas on the displays for showing different information shall be flexible and in free-style, i.e. without limitation of pre-set layouts. The system shall allow user to broadcast information individually or in a group of any combination of displays from the control workstations.

7) The system shall allow users to select pre-defined message and assign ad-hoc message to be displayed in specific LCD display(s) or groups of LCD display immediately.
8) The system shall allow users to choose whether the ad-hoc message is displayed in full screen or in a specified partition only.
9) Users are required to confirm the action in a pop-up dialogue box before sending ad-hoc messages to LCD displays.
10) The system shall allow users to blank the LCD screens via both control workstation and local control button/keypad. A separate button shall be installed at the counter or designated location to power on/off for each LCD display in case of emergency.
11) When some displays were scheduled to display the same content, it could be text, graphic and/or video, the relevant displays within the same area shall be synchronized such that there shall not be noticeable delay between displays. Under no circumstances the delay may be over one (1) second.
12) The system shall be able to show in the control workstation the content being displayed on a LCD display.
13) The system shall be able to monitor the following system status as a minimum:
    i. LCD display on/off status
    ii. Local controller on/off status
    iii. Status of on-going display
    iv. Health status of network connections
    v. Progress of schedule download
    vi. Date and time of completion for each download
    vii. Storage utilization of control workstation and local controllers
    viii. Temperature of local controller
14) Alarms shall be generated to the control workstation for the following system faults;
    i. LCD display is disconnected/no response
    ii. Local controller is disconnected/no response
    iii. Schedules cannot be download to a local controller
    iv. Storage has been used to a certain threshold (configurable)
    v. Temperature of local controller exceed a certain threshold (configurable)
15) Preview function shall be provided for different kinds of created message, content and schedule. Users shall be able to preview the information, with identical

layout, contents and effects when displayed on the LCD display via the preview screen.

16) User authorization shall be given to different parties to update and/or modify the schedule, contents and the system configuration.

17) All displays shall be stand-alone units that all power supply and controller shall integrated together in one slim piece. The local controller of LCD displays shall be very slim type and mounted, as well as hidden from view at the back of the LCD displays and of construction without moving parts, i.e. no fans, no hard disks, etc. Yet there shall be sufficient heat management maintaining the display and all control elements within its designed operational temperature range.

18) The LCD displays shall be designed and installed such that power may be turned on remotely from the control workstation.

19) There shall not be any brand name and/or model name visible in the front of all LCD displays.

20) All control workstations shall operate in a round-the-clock base. Therefore, the hard disks shall be housed in quality removable drawers and completely setup spare hard disks with all application and system software installed shall be provided for urgent replacement. In additional, a compressed image of these spare hard disks including all necessary software license and media shall be provided in one or more CD-R(s)/DVD+-R for system recovery.

21) The controller of the LCD should be equipped with hardware watchdog and software watchdog module; the hardware watchdog will restart the controller if the controller OS has no response in a certain period. The software watchdog module will check the process status every minute (configurable), if the watchdog found the process was terminated or no response, it will start the process again immediately and lop down the software terminated time and restart time.

22) The system shall support dual display mode, where each ODS controller can connect to two identical LCD display boards at the same time by using HDMI cable. This allows the two adjacent LCD displays to be combined into one big simple screen with a total width of 3840 pixels, i.e. a total resolution of 3840 x 1080 pixels.

23) Monitoring the status for HDMI connection to LCD Display: When the HDMI cable to the LCD display is disconnected accidentally, the ODS Server will pick up the defect signal and have local alarm and send out the email alert. When the HDMI cable is normal, the ODS Server will pick up the normal signal.

24) Monitoring the status for LAN connection to the ODS Server: When the LAN cable to the controller has disconnected accidentally, the ODS Server will pick the defect signal and have local alarm and send out the email alert. When the connection of LAN cable is normal, the ODS Server will pick up the normal signal.

25) Monitoring the power on/off status: When the controller is power-off, the server will pick up the defect signal and have local alarm and send out the email alert. When the LCD Display is power-off, the server will pick up the defect signal and have local alarm and send out the email alert. When the power supply is normal, the ODS server will pick up the normal signal.

26) Monitoring of ODS Controller's software application: If the software app stops running for one minute, the ODS Controller will auto-restart the software application immediately, and the ODS Server will also send an email alert. If the Windows hands, the user can use a Re-start command to re-start any ODS Controller remotely from the ODS Control workstation.

27) When there is an emergency situation, and the ODS Server cannot be accessed by staff, a portable ODS Control Workstation (e.g. notebook PC) can be assigned form emergency control of all or any ODS Controllers. The notebook PC requires user access rights with biometric security access login. When the whole network is out of order, the notebook PC can store ad-hoc emergency messages into the USB device, and plug the USB into the ODS Controller to upload the ad-hoc messages manually.

**Software and User Interface Requirements:**

i. The users can operate the ODS Control Workstation at the designated locations.

ii. The users can issue the command through ODS Control Workstation to ODS Server, and the ODS Server shall upload the content of video and images to the ODS Controllers.

iii. The ODS Controller shall control and transmit the images /videos to the connected LCD boards at prescribed schedules. For the counters, the user can select the pre-stored text message, images or videos by button control boxes associated with the LCD panels.

iv. Visual light indicators on the button control boxes shall reflect the current messages displayed on the LCD panels.

v. The users can operate the ODS Control Workstation at the duty offices and kiosk supervisor offices, of any other designed locations as required. The users can issue the command through ODS Control Workstation to ODS Server, and the

ODS server shall upload the content of video and images to the ODS Controllers. (VII) The LCD boards shall be able to display text in Chinese, English, graphics and animation.

vi. Six (6) sets of software for creating the above displays shall be included with the valid licenses.

vii. The text, graphic, animation and image files shall be programmed to be displayed in a sequence. The sequence can be scheduled. The sequence and schedule shall be defined in the ODS Server via ODS console in a user-friendly manner.

viii. The system shall be configurable for individually or group display for each LCD board. The LCD boards can be grouped to display message in text, photo and video format

ix. Six (6) sets of editing software with graphical user interface (GUI) for text, image and video shall be provided for creating and editing the text, image and video to be displayed.

x. The system shall run on the latest Windows, with well-designed user- friendly interfaces as per the comments from the Engineer, the Engineer's Representatives and the Users. Installation disc and licenses for all operating system, application software, commercial software, etc., shall be provided.

xi. Application software in the ODS Control Workstation and server shall allow the user to input/edit any free-from text message in Chinese and English, draw graphics picture, create and display animation. All master software and permanent licenses shall be included.

xii. After initiation of the send commend via the ODS computer console, the new message shall be displayed on the LCD boards within five (5) seconds. (XVI) After pushing the button(s) of button control box for Counter display, the new message shall be displayed on the LCD display boards within on (1) second. The visual indicator(s) of the button control box shall then be lit up to feedback the status of the ODS players for the new message, irrespective the inputs through the button control box, ODS Control Workstation or ODS server.

xiii. The priority of command of button control box, ODS Control Workstation and the ODS server shall able to be set. ODS computer console can also be able to disable/enable the button control box instantly and for a specified time period. (xviii) The ODS Controller shall be able to display multi-message, e.g. texts, video, images on the same (panel) screen in multi-windows format. The texts shall be overlaid on the image or video. For counter display, the associated ODS

Controller shall accept both commands received via the button control box, the selected pre-stored message shall be displayed on the screen of the pre-defined area of the screen (in multi-windows mode) instantly.

xiv. Chinese, English or alphanumeric messages shall be input through the system control workstation and then be displayed in the display boards.

xv. The user shall be able to set via the system Control Workstation the period and duration for animation, graphic, Chines message, English message or alphanumeric message.

xvi. There shall be a time schedule display function so that the operator shall be able to pre-set files of graphics, messages animation to be displayed in sequence at the specified year, month, day and time.

xvii. Emergency message display shall be allowed. When selected to display emergency message, all other displays including schedules shall be paused. The previous message could be resumed if required after displaying the emergency message. The emergency message shall be displayed in individual display or group of displays. The emergency message can be customized for each display and group of displays.

xviii. The system shall have facilities to create, edit, save, rename, copy, delete, preview, import, open and close files of graphics, messages, animation and video.

xix. The software shall be able to work with the Chinese input pend so that Chinese Characters could be input for editing and display. This function shall not preclude the input of Chinese Characters by the keyboard.

xx. There shall be a preview function so that the display information can be previewed before actually send out for display.

xxi. The ODS Control Workstation and Server shall install with antivirus and latest updates and patches for Operating System (OS), Antivirus and software installed. The ODS server and ODS Control Workstation shall be configured to allow individual user privilege and group privilege Setting, the login password policy shall follow the departmental IT Guideline and security policy of immigration Department.

xxii. The Contractor shall collect user requirements from IMMD Users to design and implement workflows. Each workflow shall have at most five user input steps for setting up messages on the particular LCD boards or particular group of LCD boards.

**Information Display Board System**

The Information Display System shall comprise of LCD Display Panel and the associated equipment, Media Player/Editor Workstation and Digital Advertising Panel.

1) The LCD Display Panel shall display information in any combination of Chinese(traditional Chinese and simplified Chinese)and English characters, numerals, graphics, animated graphics, punctuation, symbols, video and sound broadcasting. The LCD Display Panel shall be compatible with the current HDTV resolution, extended and improved television standards (1080p, 1080i, 720p) and all computer graphics formats from VGA, S-VGA, XGA and SXGA. The LCD Display Panel will support true color text and motion video with sound and support video files in DVD disk, AVI, MPEG- 1, MPEG-2,MPEG-4and WMV. Each display panel in Arrival Hall shall playback the same video source and vice versafor Departure Hall.
2) The Media Player/Editor Workstation is installed in Customs Duty Office which shall provide video signal to the distant LCD Display Panel via DVI/HDMI extender through Cat/6 cable or optical fiber. The media player/editor workstation shall be capable of providing two different video signals to LCD Display Panel in Arrival and Departure Hall respectively. The Media Player/Editor Workstation shall be equipped with anindustrialgrade computer, a 24" LCD Monitor, mouse, keyboard and human-machine interface(HMI)for creating/modifying the schedules and production of the media contents for the both the digital advertising panels and LCD Display Panels.
3) HMI shall enable the operatort on:
4) Create play schedules of media content to be broadcasting a loop basis; ii.) Edit video clips & conversion;
5) Preview the visual display and audio broadcast;
6) Retrieve the broadcasting logs and fault reports; VideoproductionfacilityinMPEG4andH.264formatandresolution up to 1080p, and at least 25fps and 1OMbps compression bitrates; vi.) Static graphical production facility in bitmap and jpeg format;
7) Animated graphical production facility in html and flash format;
8) Audio production facility for audio files in MP3and AAC;
9) Scheduling facilities in daily, weekly and monthly basis to create/modify/delete/copy the schedule of multi-mediacontentsfor IDS Page12 Quotation No. : 2718EM19M PARTICULARSPECIFICATION LCD Panels.
10) Import of multi-media files via USB port or external devices.

11) The Digital Advertising Panel shall deliver advertising and multimedia entertainment to the passenger. The media contents on the digital advertising panels shall be in the format of video, text and graphics and shall include the following media type: JPEG,GIF, Bitmap, PNG, TIFF, MPEG1,MPEG2,WMV, AVI, MOV, MP3, MPEG4,RMVB,H.264 etc. The digital advertising panel shall be capable of importing the media files via the USB port.

## 3.3 System Configuration

Following figure illustrates Lok Ma Chau Hall – ODS System Diagram comprises with the followings elements:

1. ODS Server;
2. Network switches;
3. LCD Display Boards;
4. ODS Controller;
5. ODS Control workstation with 24” LCD monitor;
6. Keypad
7. Button control box
8. 1kVA UPS
9. 1.5kVA UPS
10. IDS LCD Panel
11. IDS Media Player/Editor Workstation
12. IDS HDMI/DVI video splitter
13. IDS HDMI/DVI video extender

**Figure 1 ODS Diagram**

# 4. System Component

## 4.1 Overhead Display Board System

The ODS will consist of the following break-down components:

### 4.1.1 ODS Server

#### Location

| | |
|---|---|
| Location | 2/F of Immigration Duty Office |

#### Functions

| | |
|---|---|
| Media distribution | The ODS server shall upload the content of video and images to the ODS Controllers. |
| System monitoring | Monitoring the status for HDMI connection to LCD Display: When the HDMI cable to the LCD display is disconnected accidentally, the ODS Server will pick up the defect signal and have local alarm and send out the email alert. When the HDMI cable is normal, the ODS Server will pick up the normal signal |
| Email alert | 1. Monitoring the status for HDMI connection to LCD Display: When the HDMI cable to the LCD display is disconnected accidentally, the ODS Server will pick up the defect signal and have local alarm and send out the email alert. When the HDMI cable is normal, the ODS Server will pick up the normal signal.<br>2. Monitoring the status for LAN connection to the ODS Server: When the LAN cable to the controller has disconnected accidentally, the ODS Server will pick the defect signal and have local alarm and send out the email alert. When the connection of LAN cable is normal, the ODS Server will pick up the normal signal.<br>3. Monitoring the power on/off status: When the controller is power-off, the server will pick up the defect signal and have local alarm and send out the email alert. When the LCD Display is power-off, the server will pick up the defect signal and have local alarm and send out the email alert. When the power supply is normal, the ODS server will pick up the normal signal. Monitoring of ODS Controller's software application: If the software app stops running for one minute, the ODS Server will also send an email alert. |

### 4.1.2 ODS Control Workstation with 24" LCD monitor

## Location

| | |
|---|---|
| Location | 1/F & 2/F of Immigration Duty Office |

## Functions

| | |
|---|---|
| Remote restart command to ODS Controller | If the Windows hands, the user can use a Restart command to restart any ODS Controller remotely from the ODS Control workstation |
| Message editing function | 1. Chinese, English or alphanumeric messages shall be input through the system control workstation and then be displayed in the display boards.<br>2. The user shall be able to set via the system Control Workstation the period and duration for animation, graphic, Chinese message, English message or alphanumeric message.<br>3. The system shall have facilities to create, edit, save, rename, copy, delete, preview, import, open and close files of graphics, messages, animation and video.<br>4. The software shall be able to work with the Chinese input pend so that Chinese Characters could be input for editing and display. This function shall not preclude the input of Chinese Characters by the keyboard.<br>5. Application software in the ODS Control Workstation and server shall allow the user to input/edit any free-from text message in Chinese and English, draw graphics picture, create and display animation.<br>6. There shall be a preview function so that the display information can be previewed before actually send out for display.<br>7. Any size of Chinese and English characters shall be selectable for displaying message(s) anywhere on the displays. |

| | |
|---|---|
| | 8. Scrolling speed and delay band between effects must be user definable. |
| Pre-defined message and ad-hoc message function | 1. Allow users to select pre-defined message and assign ad-hoc message to be displayed in specific LCD display(s) or groups of LCD display immediately.<br>2. Allow users to choose whether the ad-hoc messages displayed in full screen or in a specified partition only.<br>3. Confirm the action in a pop-up dialogue box before sending ad-hoc messages to LCD displays. |
| Emergency message display function | When selected to display emergency message, all other displays including schedules shall be paused. The previous message could be resumed if required after displaying the emergency message. The emergency message shall be displayed in individual display or group of displays. The emergency message can be customized for each display and group of displays. |
| Blank screen function | Blank the LCD screens via control workstation |
| Message priority setting | The priority of command of button control box, ODS Control Workstation and the ODS server shall able to be set. ODS computer console can also be able to disable/enable the button control box instantly and for a specified time period. |
| Enable/disable control box function | Disable/enable the button control box instantly and for a specified time period. |
| Time schedule display function | 1. There shall be a time schedule display function so that the operator shall be able to pre-set files of graphics, messages animation to be displayed in sequence at the specified year, month, day and time.<br>2. The sequence and schedule shall be defined in the ODS Server via ODS console in a user-friendly manner. |
| User privilege and group privilege | The ODS server and ODS Control Workstation shall be configured to allow individual user privilege and group privilege Setting, the loping password policy shall follow the departmental IT Guideline and |

| | |
|---|---|
| setting | security policy of immigration Department. |
| Able to Standalone without network | The workstations shall be able to be configured as standalone unit to separately control the ODBs in 1/F & 2/F respectively without connection with ODS server. |

### 4.1.3 ODS Controller with LCD Display Board located in Arrival Hall and Departure Hall

## Location

| | |
|---|---|
| Location | Arrival and Departure counters |

## Functions

| | |
|---|---|
| Display content, effect, language and partition | All displays shall show combination of video, graphic and text with commonly available effects including scrolling to left, right up and down; Fading-in and -out; and Popup in English, Traditional Chinese, Simplified Chinese, Numerals Punctuation and Symbols simultaneously in different partitions within the same display. |
| Transmit video signal to Display | The ODS Controller shall control and transmit the images /videos to the connected LCD boards at prescribed schedules |
| Texts able to overlaid-on the image or video | The ODS Controller shall be able to display multi-message, e.g. texts, video, images on the same (panel) screen in multi-windows format. The texts shall be overlaid-on the image or video. |
| Emergency message function | When selected to display emergency message, all other displays including schedules shall be paused. The previous message could be resumed if required after displaying the emergency message. The emergency message shall be displayed in individual display or group of displays. The emergency message can be customized for each display and group of displays. |
| Time Schedule display function | The text, graphic, animation and image files shall be programmed to be displayed in a sequence. The sequence can be scheduled. |
| Hardware watchdog | The hardware watchdog will restart the controller if the controller OS has no response in a certain period. |

| | |
|---|---|
| Software watchdog | The software watchdog module will check the process status every minute (configurable), if the watchdog found the process was terminated or no response, it will start the process again immediately and lop down the software terminated time and restart time. |

### 4.1.4 Keypad Panel

## Location

| | |
|---|---|
| Location | Arrival and Departure counters |

## Functions

| | |
|---|---|
| Sending pre-stored message | The user can select the pre-stored text message, images or videos by button control-boxes associated with the LCD panels. |

### 4.7 Button Control Box

## Location

| | |
|---|---|
| Location | Arrival and Departure counters |

## Functions

| | |
|---|---|
| Blank screen | Blank the LCD screens via both control workstation and local control button/keypad. |

### 4.1.5 UPS for ODS Server/Control Workstation

## Location

| | |
|---|---|
| Location | • 1/F<br>• 2/F |

## Functions

The major function of the UPS is to provide power backup for the ODS Server and workstations at Arrival Duty office and Departure office

### 4.1.6 IDS controller with Display Panel

## Location

| | |
|---|---|
| Location | • 1/F<br>• 2/F |

## Functions

The major function of the UPS is to provide power backup for the ODS Server and workstations at Arrival Duty office and Departure office

## 4.2 Information Display Board System

The IDS will consist of the following break-down components:

### 4.2.1 IDS Media Player/Editor Workstation with 24" LCD monitor

**Location**

| | |
|---|---|
| Location | Customs Duty Office |

**Functions**

| | |
|---|---|
| HMI | 1) Create play schedules of media content to be broadcast in a loop basis;<br>2) Edit video clips & conversion;<br>3) Preview the visual display and audio broadcast;<br>4) Retrieve the broadcasting log sand fault reports;<br>5) VideoproductionfacilityinMPEG4andH.264formatandresolution up to 1080p, and at least 25fps and 1OMbps compression bitrates;<br>6) Static graphical production facility in bitmap and jpeg format; vii.) Animated graphical production facility in html and flash format;<br>7) Audio production facility for audio files in MP3and AAC;<br>8) Scheduling facilities in daily, weekly and monthly basis to create/modify/delete/copy the schedule of multi-media contents for IDS LCD Panels.<br>9) Import of multi-media files via USB port or external devices. |
| Display features | display information in any combination of Chinese(traditional Chinese and simplified Chinese)and English characters, numerals, graphics, animated graphics, punctuation, symbols, video and sound broadcasting. |
| Supporting media format | The format of video, text and graphics and shall include the following media type: JPEG,GIF, Bitmap, PNG, TIFF, MPEG1,MPEG2,WMV, AVI, MOV, MP3, MPEG4,RMVB,H.264 etc. |
| Importing media | capable of importing the media files via the USB port. |

## 4.3 IDS LCD Panel/ IDS Digital Adverting Panel

### Location

| | |
|---|---|
| Location | Departure Hall and Arrival Hall |

### Functions

| | |
|---|---|
| Display features | Display the video signal from Media Play/Editor Workstation |

## 4.4 IDS LCD Panel/ IDS Digital Adverting Panel

### Location

| | |
|---|---|
| Location | Departure Hall and Arrival Hall |

### Functions

| | |
|---|---|
| Display features | Display the video signal from Media Play/Editor Workstation |

## 4.6 IDS DVI/HDMI Splitter

### Location

| | |
|---|---|
| Location | Custom Duty Office at 2/F |

### Functions

| | |
|---|---|
| Video signal replication | Take video signal from Media Play/Editor Workstation and replicates it over multiple Video Extender |

## 4.7 IDS DVI/HDMI Extender

### Location

| | |
|---|---|
| Location | • Custom Duty Office at 2/F<br>• Departure Hall and Arrival Hall |

### Functions

| | |
|---|---|
| Video Signal Extension | Extend the video signal from DVI/HDMI Splitter to IDS LCD Panel |

# 5. Keypad Panel Design

The ODB will equip with a keypad and communicate with it accordingly. The pre-stored message can be sent by the keypad panel after pressing the selected hard-key digit button.

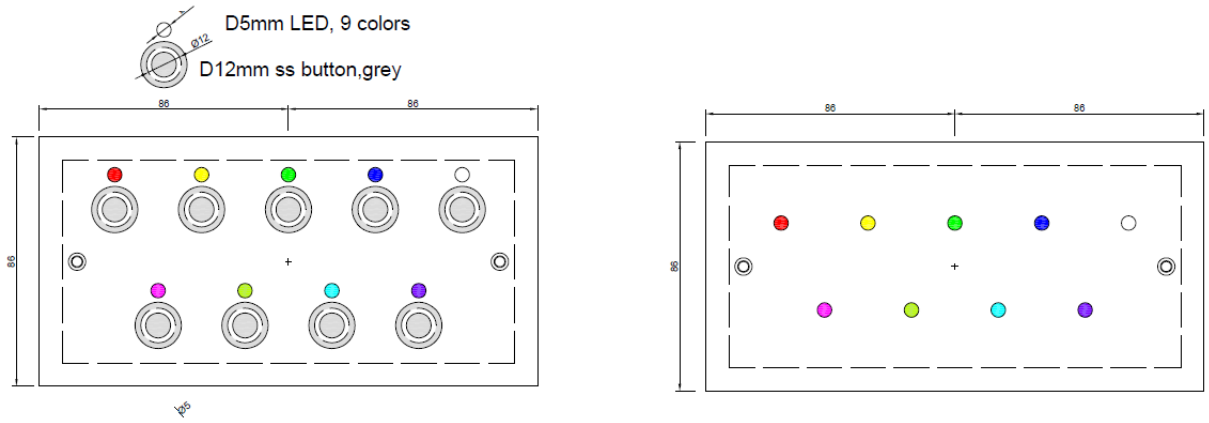



**Figure 2 – Keypad Panel Design**

The following paragraphs describe the detailed information of the keypad panel functions.

## 5.1 Sending Pre-stored messages

The following procedure should be used to sending pre-stored messages

1) Send pre-defined message by pressing the configured separated buttons, for example “Msg 1” to the display.
2) Visual light indicators on the button control boxes shall reflect the current messages displayed on the LCD panels.
3) After pushing the button(s) of button control box for Counter display, the new message shall be displayed on the LCD display board-within 1 second. The visual indicator(s) of the button control box shall then be lit up to feed back the status of the ODS players for the new message, irrespective the inputs through the button control box, ODS Control Workstation or ODS server.

Example: Sending pre-stored message 1 to display

# 6. Button Control Box Design

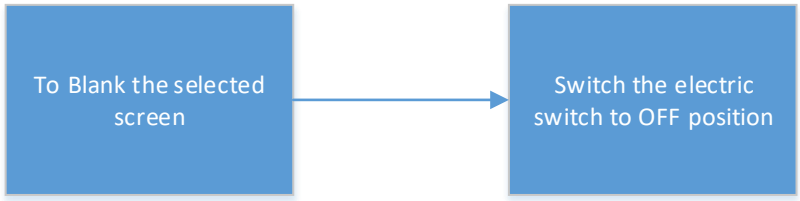
## 6.1 Blank/Un-Blank the display

The following procedure should be used to blank the display.

To Blank the screen of selected display

a. Blank the screen by switch the Electric Switch to the OFF position
b. The selected screen shall be turned off

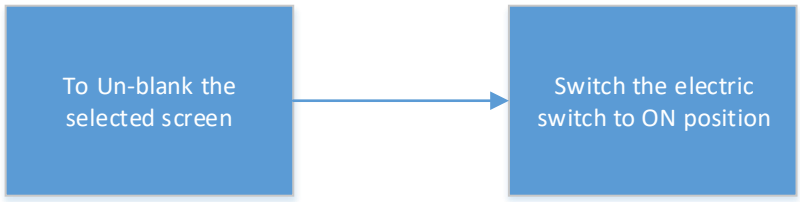
Example: Blank the display




2) To Un-Blank the screen of selected display

a. All blanked ODB can be un-blanked and resume normal scheduled ODB operations by switching the Electric Switch to the ON position
b. The selected screen shall be turned on

Example: Un-blank the display



# 7. Software Design

By the nature of software design, elaboration and amendment will take place during the software design phase. Therefore, operational groupings and associated software functionality identified in this section may change during software design.

A suitable module design method will be used to enable the software to be easily modified or configured to cope with additional functionality, Input/output dialogues, peripheral equipment and controlling equipment.

# 8. System Fault Monitoring and Alarm Reporting

## 8.1 System Status

In case of the following components, the status would be detected and logged by ODS Server for monitoring.

| System Status |
|---|
| LCD display on/off status |
| Local controller on/off status |
| Status of on-going display |
| Health status of network connections |
| Progress of schedule download |
| Date and time of completion for each download |
| Storage utilisation of control workstation and local controllers |
| Temperature of local controller |

## 8.2 System Faults and Alarms

In case of the following components, the fault would be detected and logged by ODS Server for monitoring.

| Alarm |
|---|
| LCD display is disconnected/no response |
| Local controller is disconnected/no response |
| Schedules cannot be download to a local controller |
| Storage has been used to a certain threshold (configurable) |
| Temperature of local controller exceed a certain threshold (configurable) |

All the Alarms will be shown in ODS Workstation MMI.

# 9. Anti-virus software

Anti-virus software shall be installed for all workstation and servers. The Contractor shall be responsible to update the software signature during the contract period.

# 10. Other Related Design Information

## 10.1 Message Priorities

The following tables list the source and their corresponding message type:

| Originator | Message Type |
|---|---|
| Keypad | Per-defined message |
| ODS Control Workstation | Schedule message |
| | Per-defined message |
| | Ad-hoc message |
| | Emergency message |
| | Blank screen Message |

The following tables lists the priorities for ODS message with 1 representing the highest priority

| Priority Level | PIDS message type | Originator | Available Destination ODB | Interrupt Mode | Stop Mode |
|---|---|---|---|---|---|
| 1 | Blank screen message | Workstation | All | Interrupt current message | Wait for the reset command |
| 2 | Emergency message | Workstation | All | Interrupt current message | Wait for the reset command |
| 3 | Ad-hoc message | Workstation | All | Interrupt current message | Wait for the reset command |
| 4 | Pre-defined message | Keypad | All | Interrupt current message | Wait for the reset command |
| 5 | Pre-defined message | Workstation | All | Interrupt current message | Wait for the reset command |
| 6 | Schedule message | Workstation | All | Interrupt current message | Wait for the reset command |

- Button Control box at counter display can turn off the power of LCD display to Blank the screen.

# 11. System Equipment

Below briefly describe the equipment that shall be applied for the project, details refer to corresponding Material and Equipment Specification submissions.

## 11.1 Schedule of ODS Equipment Located in 2/F

| Equipment | Qty |
|---|---|
| ODS Server | 1 |
| 1kVA UPS | 1 |
| ODS Workstation | 1 |
| 24" LCD Display | 1 |
| Network Switch | 1 |

## 11.2 Schedule of ODS Equipment located in Arrival Hall

| Equipment | Qty |
|---|---|
| ODS Controllers for LCD | 19 |
| LCD Display Board | 38 |
| Keypad | 38 |
| Button Control Box | 38 |

## 11.3 Schedule of ODS Equipment Located in Departure Duty Office

| Equipment | Qty |
|---|---|
| 1kVA UPS | 1 |
| ODS Workstation | 1 |
| 24" LCD Display | 1 |
| Network Switch | 1 |

## 11.4 Schedule of ODS Equipment located in Departure Hall

| Equipment | Qty |
|---|---|
| ODS Controllers for LCD | 20 |
| LCD Display Board | 40 |
| Keypad | 40 |
| Button Control Box | 40 |

## 11.5 Schedule of IDS Equipment located in Customs Duty Office at 2/F

| Equipment | Qty |
|---|---|
| 1.5kVA UPS | 1 |
| Media Player/Editor workstation | 1 |
| DVI/HDMI Transmitter | 5 |
| DVI/HDMI Splitter | 2 |
| 24" LCD Display | 1 |

## 11.6 Schedule of IDS Equipment located in Arrival Hall at 2/F

| Equipment | Qty |
|---|---|
| IDS LCD Panel | 3 |
| DVI/HDMI Receiver | 3 |

## 11.7 Schedule of IDS Equipment located in Departure Hall at 1/F

| Equipment | Qty |
|---|---|
| IDS LCD Panel | 2 |
| DVI/HDMI Receiver | 2 |

# 12. Network Hardware Design

The Materials and Equipment, please refer to Materials and Equipment Specification.

The following tables list the technical specification of required equipment at Shenzhen Bay.

## 12.1 ODS LCD Display Panel

| | |
|---|---|
| Diagonal Size: | 46" (16:9) |
| Resolution: | 1920 x 1080 or better |
| Maximum Brightness | 4000 cd/m2 |
| Active Area: | No less than 1000mm (H) x 570mm(W) |
| Contrast Ratio: | 5000:1 or better |
| Viewing Angle | 178 (H)/(V) |
| Response Time G-to-G | 6ms or better |
| Display Colours | 16.7 million/8bit |
| Output | HDMI 2.0, Video, Audio |
| Input: | HDMI 2.0 x 2, Display Port 1.2, USB 2.0 |
| Storage: | USB, RJ45 (network) |
| Power Consumption: | ≤ 350 W, Sleep Mode/Off Mode: ≤ 0.5W |
| Mounting and Enclosure: | Custom made mount design to fit the environment<br>Enclosure: Stainless Steel 316 or equivalent, hairline finish, or other material and design approved by the Engineer. |
| Operating Temperature: | 0° C to 40° C |
| Features: | Temperature Sensor Control via RS232, but not limited to On/Off, brightness, contrast |
| Operation Hours: | Support 24 hours and 7 days operation |

## 12.3 ODS Server

| | |
|---|---|
| CPU: | Intel Xeon E Series 3GHz or above |
| RAM: | 32 GB or better |
| Storage | 2 x 6T in RAID 1 configuration |
| Network Interface | 1Gb DP (Dual Port) Network interface x 2 nos. with link aggregation support |
| Video Output | HDMI Port and DVI Port |
| Accessories | 16x DVD-RW Keyboard and Mouse |
| Operating System | Windows Server 2016(backward compatible) or equivalent including media kit, Microsoft SQL Database |
| Application Software | Anti-virus software, Content Management and Scheduling System Software |
| Operation Hours: | Support 24 hours and 7 days operation |

## 12.4 ODS Controller for LCD Display Board

| | |
|---|---|
| CPU: | 8th Generation Intel i7 or above |
| Video Display Output | Intel HD Graphic 600 or above, HDMI x 2 |
| RAM: | 8GB or above |
| Storage | SSD 128 GB or above |
| Input/Output | RS232 x 4, RJ45 for Gigabit LAN x 2, HDMI x 2 , USB 3.0 x 4, Audio in/out |
| Operating System/Software | Windows 10 IoT Embedded or equivalent<br>Certified Anti-virus Software |
| Accessories | Equipped with a control keypad with at least 1-9 sets of visual/light indicators and buttons |
| Video Format/Image format/Audio: | Video Format: MOV, WMV, MPEG-4, AVI, FLV<br>Image Format: JPEG, MBP, GIF, TIFF, PNG<br>Audio Format: MP3, WMA, WAV |
| Mounting | Custom mounting bracket to suit for installation inside the message board, wall mount, pole mount or ceiling mount design |
| Operating Temperature: | 0° C to 40 ° C |
| Power consumption | No more than 40W |
| Weight | No more than 1KG |
| Operation Hours: | Support 24 hours and 7 days operation |

All displays shall be stand-alone units that all power supply and controller shall integrated together in one slim piece. The local controller of LCD displays shall be very slim type and mounted, as well as hidden from view at the back of the LCD displays and of construction without moving parts, i.e. no fans, no hard disks, etc. Yet there shall be sufficient heat management maintaining the display and all control elements within its designed operational temperature range.

The controller of the LCD should be equipped with hardware watchdog and software watchdog module, the hardware watchdog will restart the controller if the controller OS has no response in a certain period. The software watchdog module will check the process status every minute (configurable), if the watchdog found the process was terminated or no response, it will start the process again immediately and log down the software terminated time and restart time.

## 12.5 ODS Control Workstation

| | |
|---|---|
| CPU: | 8th Generation Intel i7 or above |
| RAM: | 16GB or above |
| Storage | SSD 256 GB or above + 1T Hard disk |
| Input/ Output | RS232, Ethernet port, HDMI, Memory Card Reader, USB 3.0 |
| Monitor | 24" anti-glare LCD monitor with monitor stand |
| Operating System | Windows 10 Professional or equivalent |
| Application Software | Anti-virus software, Content Management and Scheduling System Software (all software shall accept inputs and displays of English and Chinese) |
| Accessories | Traditional Chinese Keyboard, Writing pad for English, Simplified Chinese and Traditional Chinese input, mouse, headset, digital phone, integrated sound card or external sound card for microphone input and headphone output, 16x CD-RW drive |
| Operating Temperature: | 0° C to 40° C |
| Functionality | Accept user command and inputs, issue command to ODS players and IDS servers, live monitoring for the content and fault/errors of individual LCD message display panels with ODS Players |
| Form Factor | Tower/Min-tower or smaller |
| Operation Hours: | Support 24 hours and 7 days operation |

## 12.6 UPS for ODS Server/Control Workstation at 1/F/IDS Media Player/Editor Workstation

| | |
|---|---|
| Power Capacity | 1kVA for ODS and 1.5kVA for IDS |
| Operating Temperature | 0° C to 40° C |
| Operating Humidity | 5 – 95% |
| Backup Time | At least 30 minutes |
| Recharge Time | Not more than 8 hours |
| Alarm | Low battery and overload |
| Operation Hours: | Support 24 hours and 7 days operation |

## 12.7 IDS Media Player/Editor Workstation

| | |
|---|---|
| CPU | 8th Generation Intel i7 or above |
| RAM | 16GB or above |
| Storage | SSD 512 GB + 1T Hard disk |
| Display | 24" LCD monitor of 1980 x 1080 resolution or above with stand; Anti-glare |
| Operating System | Windows 10 Professional or equivalent |
| Graphic Card | Dual Graphic Card with 4GB Video Ram each, 3D graphic accelerator, HDMI and DVI outputs |
| Sound Device | 16 bits sound card and external speakers |
| Input/Output | USB 3.0x 4 & Ethernet port x 2 |
| Input Device | Keyboard, mouse and Chinese Writing pad |
| Storage Device | 24 x CD-RW DVD writer with double layer capability |
| Operating Temperature | 0° C to 40° C |
| Operation Hours: | Support 24 hours and 7 days operation |

## 12.8 IDS LCD Panel

| | |
|---|---|
| Diagonal Size: | 65" (16:9) |
| Resolution: | 1920 x 1080 |
| Brightness | 500cd/m2 |
| Contrast Ratio: | 4000:1 or better |
| Viewing Angle | 178 (H)/(V) |
| Response Time G-to-G | 8ms or better |
| Display Colours | 16.7 million/8bit |
| Output | HDMI 2.0, Video, Audio |
| Input: | HDMI 2.0 x 2 . Display Port 1.2, USB 2.0 |
| Storage: | USB, RJ45 (network) |
| Power Consumption: | ≤ 350 W, Sleep Mode/Off Mode: ≤ 0.5W |
| Mounting: | i) Custom made mount design to fit the site environment<br>ii) Provision of mounting bracket for wall-mounted or ceiling-mounted<br>iii) Safety wire to connect LCD Panel and mounting |
| Operating Temperature: | 0° C to 40° C |
| Features: | Remote control |
| Speaker | Built in Loudspeaker x 2 with volume control |

## 12.9 IDS Digital Advertising Panel

| | |
|---|---|
| Diagonal Size: | 55" (16:9) |
| Resolution: | 1920 x 1080 or above |
| Display Size | Not less than 680mm x 1210mm |
| Orientation | Portrait orientation |
| Brightness | 2000 cd/m2 |
| Panel | LED Backlits |
| Contrast Ratio: | 4000:1 or better |
| Viewing Angle | 178 (H)/(V) |
| Response Time G-to-G | Not more than 10ms |
| Display Colours | 16.7 million |
| Input: | HDMI 2.0 x 2, Display Port 1.2, USB 3.0 |
| Power Consumption: | ≤ 350 W, Sleep Mode/Off Mode: ≤ 0.5W |
| Operating Temperature: | 0° C to 40° C |
| Enclosure Material | Metallic case, Tempered glass |
| Interface | VGA/HDMI/USB |
| Features: | Built in media player equipped with LAN port interface, import media files via USB port; Movable Stand |
| Audio/Speaker | 2x 10W Speakers |

## 12.10 Notebook PC

| | |
|---|---|
| Diagonal Size: | 55" (16:9) |
| Resolution: | 1920 x 1080 or above |
| Display Size | Not less than 680mm x 1210mm |
| Orientation | Portrait orientation |
| Brightness | 2000 cd/m2 |
| Panel | LED Backlits |
| Contrast Ratio: | 4000:1 or better |
| Viewing Angle | 178 (H)/(V) |
| Response Time G-to-G | Not more than 10ms |
| Display Colours | 16.7 million |
| Input: | HDMI 2.0 x 2, Display Port 1.2, USB 3.0 |
| Power Consumption: | ≤ 350 W, Sleep Mode/Off Mode: ≤ 0.5W |
| Operating Temperature: | 0° C to 40° C |
| Enclosure Material | Metallic case, Tempered glass |
| Interface | VGA/HDMI/USB |
| Features: | Built in media player equipped with LAN port interface, import media files via USB port; Movable Stand |
| Audio/Speaker | 2x 10W Speakers |

# 13. Design Calculation

The Design Calculation document will cover the following items:

1. Network Bandwidth
2. Power Consumption and Heat Dissipation
3. Image/Display Capability
4. Storage Capacity
5. Spare Capacity
6. System Response Time

# 14. Reliability & Availability Model and Calculations

## 14.1 Mean Time to Restore (MTTR)

The Mean Time to Repair is defined as the average repairing time.

## 14.2 System Design Life

The Delivered System and its associated equipment will be designed to meet the asset life requirements as not less than 15 years

## 14.3 System Availability

The System Availability is defined as:

Availability = 100% x (Total operating time of the system) / (Total operating)

# 15. Appendix A – Network Summary

Please refer to 2720EM19M_ODS.SDS-NETWORK_SUMMARY(Shenzhen Bay).xlsx