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BAA

Heathrow – Terminal 2

Information and Control Systems

CCTV SYSTEM CAMERA
MOSAIC CCTV USER GUIDE

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Mosaic CCTV User Guide

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1   Terms & Abbreviations

This section defines terms and abbreviations used within this document. Rare terms are defined when used.

4CIF	4 x CIF (image resolution 704 x 576 pixels)
AdminCentre	The GUI application used by operators to set-up and configure the Mosaic system.
Archiver	The Mosaic server component responsible for managing physical devices (encoders, decoders, PTZ, etc.) and recording video, audio and metadata.
AVI	Audio Video Interleave
CAT5	Category 5 (cable)
CCTV	Closed Circuit Television
CD	Compact Disk
CIF	Common Intermediate Format (352 x 288 pixels)
ControlCentre	The Mosaic GUI application used by operators to control the system.
DCS	Digital CCTV System
Directory	The Mosaic server component that stores and distributes system configuration information.
DVD	Digital Versatile Disk or Digital Video Disk
D1	Broadcast TV standard for PAL, image resolution 720 x 576 pixels
EDB	Event Distributor. The Mosaic server component responsible for managing and distributing alarms and events.
FMO	Forward Management Office
GUI	Graphical User Interface
HAL	Heathrow Airport Ltd
HD	Hard (disk) Drive
IGMP	Internet Group Management Protocol
IP	Internet Protocol
JPEG	Joint Picture Expert Group
LAN	Local Area Network
LCD	Liquid Crystal Display
Mosaic	Tyco's Integrated Control System platform.
MPEG	Moving Picture Expert Group or Motion Picture Expert Group

NVMS	Network Video Management System.
NVR	Network Video Recorder.
NVR	Network Video Recorder
PAL	Phase Alternating Line
PC	Personal Computer
PCM	Pulse Code Modulation
PTZ	Pan, Tilt & Zoom
RAID	Redundant Array of Independent Disks
RAM	Random Access Memory
SAN	Storage Area Network
SCSI	Small Computer System Interface
SQL	Structured Query Language
SVGA	Super Video Graphics Array
TCP	Transmission Control Protocol
TFIS	Tyco Fire & Integrated Systems
TSC	Terminal Service Centre
TVC	TV Controller. A processor used to directly control a local CCTV system consisting of one or more switches, keyboards, and cameras.
TVC	Television Controller
TVNP	TVNP (TV Network Protocol) or Open Protocol is a specification that provides a standard method for seamlessly connecting CCTV systems from different manufacturers to allow picture sharing and camera control either from the central control room or from multiple control rooms. (TSC & FMO)
UDP	User Datagram Protocol
VESA	Video Electronics Standards Association
VGA	Video Graphics Array
XML	Extended Mark-up Language

2 System Design

2.1 Introduction

The CCTV System at Heathrow runs on the Mosaic system, with background exports from Latitude 6.2 DVTEL, which can be exported via the iSOC admin center. The main system runs from the TSC in T2A Apron Level and displayed on the Videowall, with a secondary system in the FMO in T2B.

Tyco Fire & Integrated Solutions' Mosaic Integrated IP Control System is an open-architecture control platform for security and surveillance applications. It enables seamless control of both traditional analog systems and the latest IP security technology. The advanced network-based architecture provides integrated control of complex multi-function systems, while the support for legacy analog systems provides a perfect migration path to the latest IP technology.

From an integrated GUI-based operator workstation, on a fully integrated system each operator can control live video from IP or analog cameras, retrieve and replay recorded video, handle alarms and events from multiple systems, and manage other connected systems such as access control, fire detection, intercom, intruder alarms, etc.

2.2 Technical System Overview

- Control of all cameras can be performed via the Mosaic interface or the associated control panel.

- The video is encoded and transmitted using multicast over the Heathrow network.

- Each encoder produces two video streams from each camera:
    i.   25fps live stream
    ii. A lower frame rate archived stream

- The system is configured to retain video for a various number of days based upon the level of safeguarding or necessity in the specific area. Length of video storage ranges from 1 day – 7 days and 30 days. After this it can be overwritten on an oldest- first basis.

- Any video of interest can be locked or exported for more permanent retention.

- In the TSC additional PCs provide video inputs into monitors around the control room and offices. Video can be switched to these remote monitors via a plugin in the Mosaic interface as well as using the multi screen display of the videowall.

- The tile layouts on these monitors can be changed between a number of preset layouts via the same Mosaic ControlCentre plugin.

- 66 servers host a number of individual services and manage the video transfer to the fibre-attached storage array.

- The equipment rack is powered via an online UPS to avoid problems due to power outages.

- The servers have dual redundant power supplies and the disks containing the operating system, Mosaic program files and system databases are mirrored to provide resilience against disk failure.

- The disk array used for video storage is configured as RAID 5 to provide resilience against disk failure.

2.3 System Components

The Mosaic control system platform consists of the following software components:

2.3.1 Server Components:

For the Terminal 2 system, the components for the server are distributed on multiple servers..

- Directory – this maintains and distributes and a database of all system configuration settings.
- Archiver – this manages the encoders and the storage of video, audio and metadata.
- Event Distributor – this manages alarms and events and distributes them to other systems components (Directory for logging, Archiver for automatic recording etc. and ControlCentre for operator handling).

These services are monitored by a service host application known as SafRun. This is itself a service which starts automatically on startup and manages the staggered startup of the services it is hosting. The overview screen for SafRun gives a concise indication of current status, uptime and the number of restarts of each of the services.

2.3.2 Client Components:

These are installed on all Workstations.

- AdminCentre – this is the client application for system administration.
- ControlCentre – this is the client application for monitoring live and recorded video and audio, handling alarms and events, and controlling system resources.

3 ControlCentre User Functions

3.1 Basic Functions

3.1.1 Logon

Start the ControlCentre Application.   There is a shortcut to ControlCentre on the desktop for ease.

At the prompt, enter your username password.

If the Directory field is not populated, type in the IP address of the server, icc-dir1.

The application takes a few moments to verify the logon details and start up.

3.1.2 Selecting Live Video

Video can be selected from the "Camera Tree" or treeview on the left-hand side of the screen by clicking and dragging onto one of the blue tile areas, or double-clicking on the camera in the list, which will place the video in the next available tile.

The camera groups can be expanded or minimised as required. There is a search function, which can be used to locate a specific camera by name. This is accessed by clicking on the dashed line immediately above the Camera Tree / Navigation Tree panel.

Cameras can also be selected via the control panel. 101 Mon and 102 Mon move the focus between the two screens and Mon 1 – x selects the tile. The camera number followed by the Cam key will switch the camera feed to the active tile.

N.B. The yellow border on the tile indicates the tile under control.

3.1.3 Spot Monitor Tile

To retain a set layout with one tile changing on demand as a spot monitor, right click on the desired tile and select the Spot Monitor option. This tile will then be the destination of any camera which is selected with a double click from the Camera Tree. Cameras can be dragged into any other tiles as before.

3.1.4 Clearing Video Tiles

To remove a video image from a tile either drop another image over the top of it; drag and drop the image off the screen; right-click and select *Remove*; or highlight the tile and click the small dustbin icon at the bottom of the tile layout.

3.1.5 Camera PTZ control

The on-screen PTZ control can be used to control the cameras with PTZ (Pan-Tilt-Zoom) capability. These appear in the Camera Tree as small dome cameras. The fixed cameras have a different camera icon.

To control a camera the required camera must be visible in the active tile. Clicking on the Control button then activates the control functions. If the control remains 'greyed-out' the user does not have the required privileges of the camera has no PTZ control capability.

The pan and tilt functions on many of the cameras are variable speed; speed is relative to the distance from the centre of the control. The +/- buttons in the centre of the control operate the zoom.

The camera presets can be set and navigated between by entering the preset number in the text box and the edit, set and go buttons.

Camera wipe and wash functions can be accessed where available.

3.1.6 Tile Layouts

The system provides a number of Tile Layouts which can be used by the operator within ControlCentre. A tile layout consists of a tile pattern, content (the entities displayed on the tiles), and arming states (audio layouts are associated only with content).
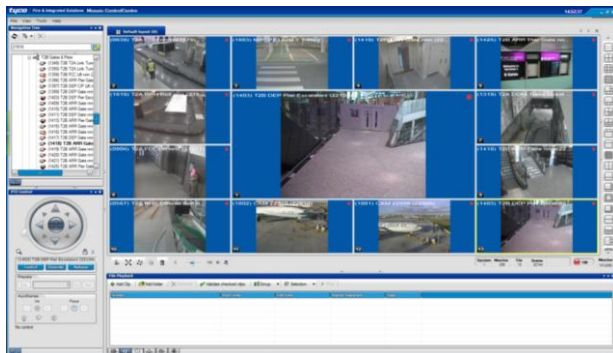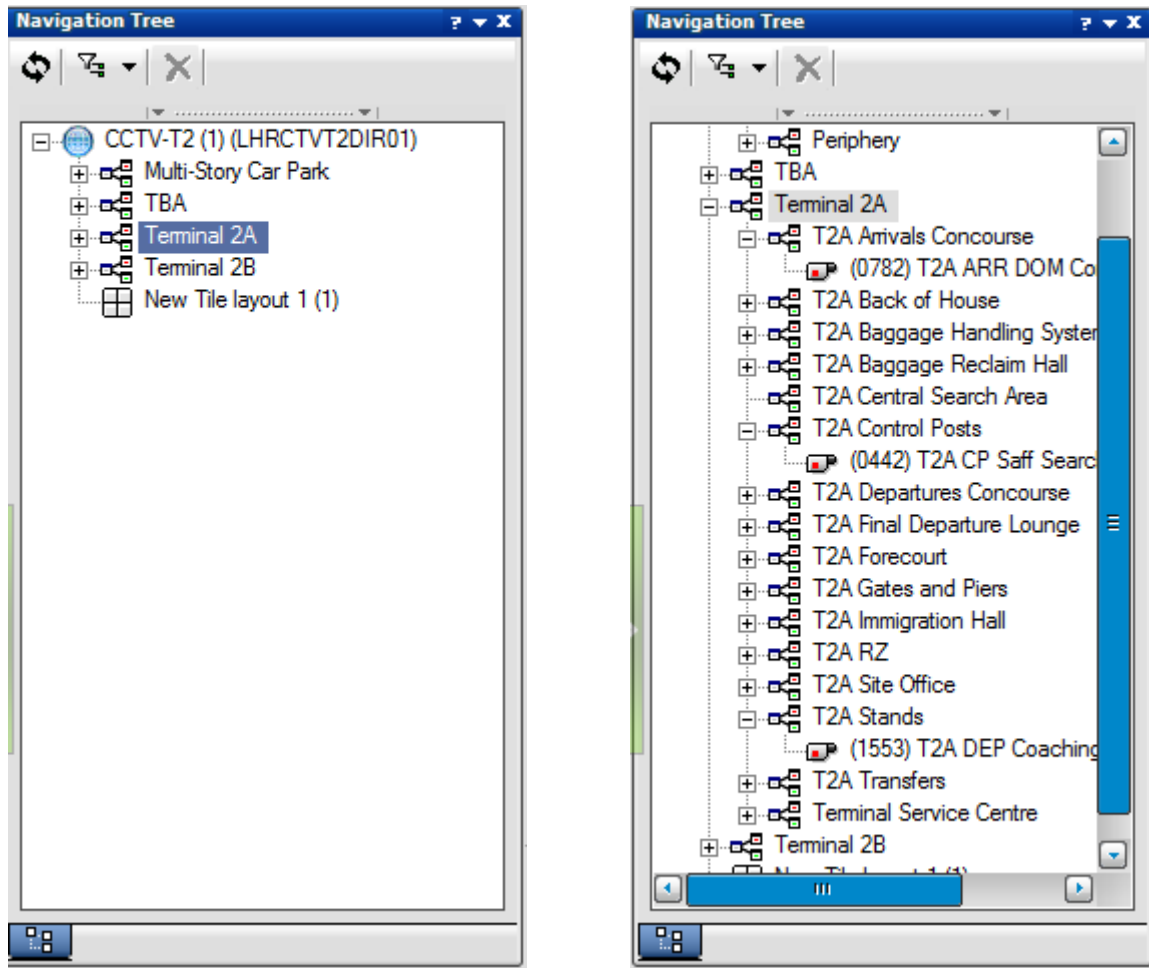

Multiple Tile Display

Full Screen Single-Tile Display

3.2 Navigation Tree

The Navigation Tree presents a hierarchical view of the system's logical entities (e.g. sites, cameras, monitors, etc.). It is most commonly used to start displaying live video or playing live audio within the application or via external output devices (i.e. analogue monitors and speakers).

In a large system, the Navigation Tree may contain thousands of cameras and other entities. The Filter box at the top of the Navigation Tree can be used to filter the tree to only show specific entities. For example, entering 'Baggage' in the filter-box as above will only display cameras which contain the text 'Baggage' within their description.

To display a camera or map scene on a tile	Drag and drop the scene onto a viewing tile or double-click it to display on the first unoccupied tile (or the Spot tile, if one is configured). If audio streams are associated with a camera, they will activate.
To display a camera on a monitor	Drag and drop the scene onto the desired analog monitor in the Navigation Tree. Audio streams linked to a camera utilize the audio input/output devices linked to the monitor, if any are defined.

The *state* of an entity (camera or other device shown in the Navigation Tree) is reflected in the appearance of its icon as shown in entity trees throughout the system, including those in the Navigation Pane.

A red dot is integrated into the icon of any entity being recorded.

A small ⛔ symbol is superimposed over the icon of any disconnected or unavailable entity.

A small 🔰 symbol is superimposed over the icon of any input/output pin device in an abnormal state.

A small ❓ symbol is superimposed over the icon of any input/output pin device in an unknown state.

Note that multiple state symbols may be shown at once, as with the icon for a camera linked to a microphone and being recorded: 📢

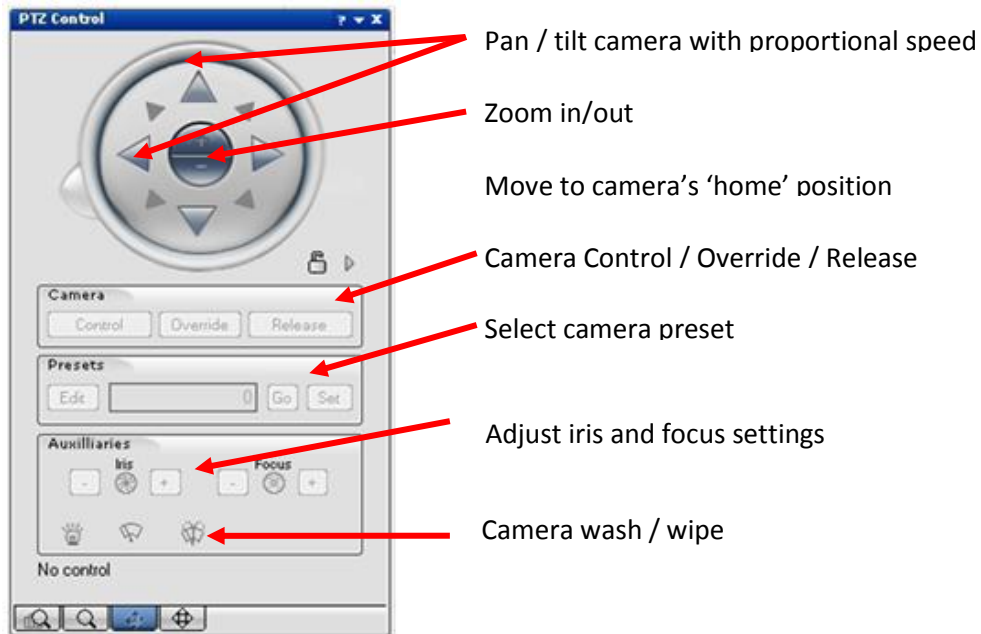<u>Example Entity States</u>

Communicating & Recording   Device Failure   Communicating <u>Not</u> Recording

Controlling a Camera.

The on-screen PTZ pane provides controls for manipulating a PTZ camera displayed in the focused viewing-tile.

Pan / tilt camera with proportional speed

Zoom in/out

Move to camera's 'home' position

Camera Control / Override / Release

Select camera preset

Adjust iris and focus settings

Camera wash / wipe

To control a camera from the PTZ pane:

1. Set input focus to the camera to be controlled by dragging it to a viewing-tile, or clicking on the corresponding viewing-tile of the camera is already displayed.

2. Select <Control> to take control of the camera.

3. If the camera has been locked for exclusive control by another operator, then press <Override> to seize control (you must have sufficient permissions to do so.)

4. Press the pan / tile / zoom controls as required to position the camera. The speed of movement is proportional to the distance of the mouse-pointer from the centre of the control.

5. To select a camera preset, enter the preset number and press [Go].

6. Press <Release> to release control of the camera.

To control camera auxiliaries:

1. Set input focus to the camera to be controlled by dragging it to a viewing-tile, or selecting it to a monitor.

2. For Focus / Iris control select the appropriate [-] or [+].

3. For Wash / Wipe press either [wash] or [wipe]

3.2.1 Instant Replay Function

When viewing cameras in the video panes or on the Video wall in the TSC, the Instant Replay function can be utilised for quick and easy viewing of the last 30 seconds of the camera recording. Hovering the cursor over the lower right hand corner of a live scene tile will reveal an Instant Replay icon: [IR] . Select and Arm (for alternate content) an empty viewing pane tile, then click the instant replay button in the live tile and the live scene will be displayed in the armed tile playing with a 30 second lag. A playback timeline will appear in the workspace pane which is navigable in the same way as for conventional file playback.
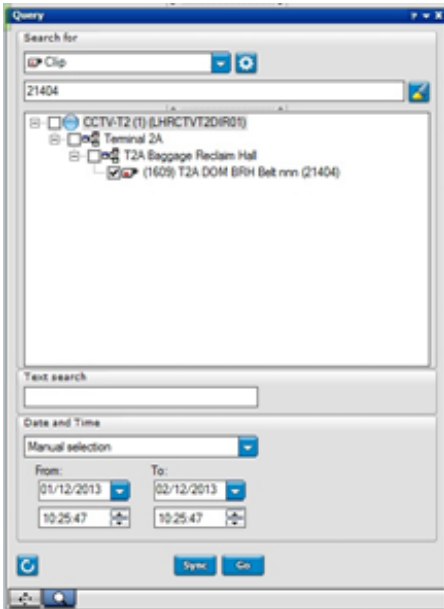
The instant replay recording will run at a lower fps than live stream.
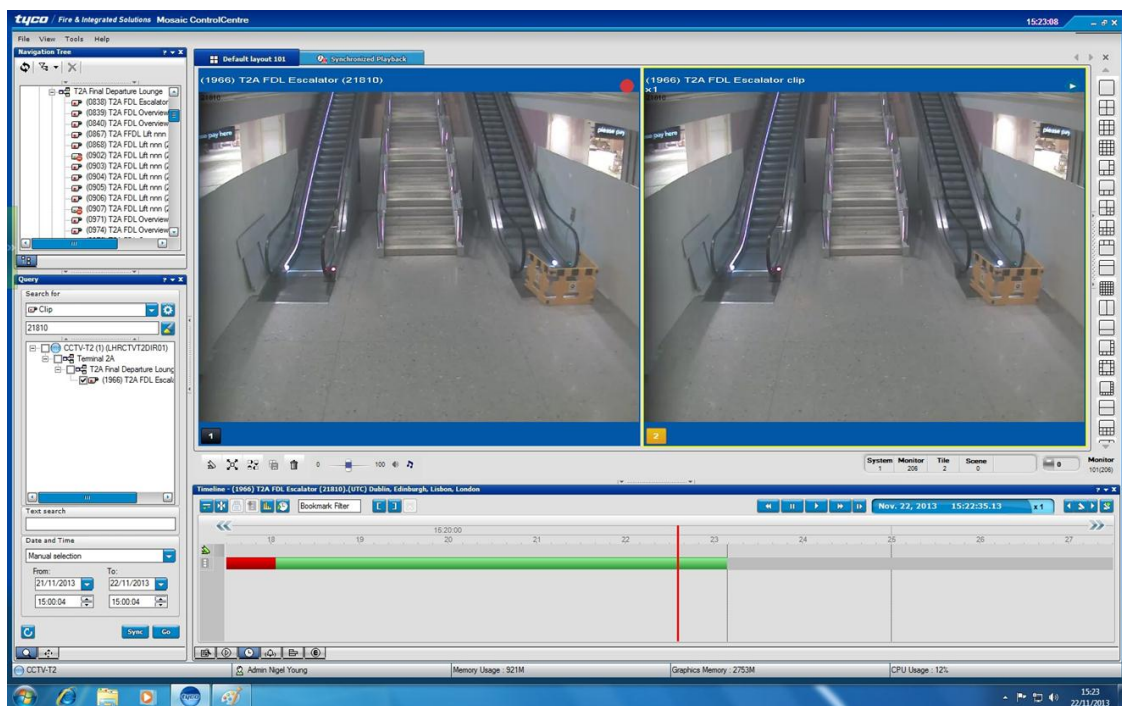
In-video controls on the tile displaying the replayed video can be activated by hovering the mouse over the tile. The replay speed is displayed in the OSD text, which can be enabled or disabled via the Tools menu as necessary.
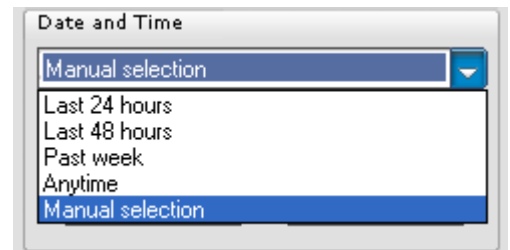
3.3 Archived Video

3.3.1 Searching for Archived Video

Clicking on the magnifying glass tab in the bottom left of the screen opens the Query Pane.

The search criteria can be set by camera from the list, by text within the camera name or by name and date

The date range can be selected from a number of predefined options or *Manual selection* - setting start and end points.

Having defined the search, click "Go".

3.3.2 Search Results

The matching query results are displayed in the Query results panel at the bottom of the screen. The individual clips can be viewed by double-clicking or dragging onto a video tile.

| Scenes	Start time	End time	Expiration time	Archiving trigger	System Name
FRB 302 - South Span (902)	13/09/2011 00:00:00	13/09/2011 12:45:21	20/09/2011 12:44:57	Schedule	Transport Scotland …
FRB 303 - South Main-Tower (903)	13/09/2011 00:00:00	13/09/2011 12:45:21	20/09/2011 12:45:09	Schedule	Transport Scotland …
FRB 305 - North Span (905)	13/09/2011 00:00:00	13/09/2011 12:45:21	20/09/2011 12:44:23	Schedule	Transport Scotland …

Alternatively, selecting "Sync" on the Query pane will open a Synchronised Playback pane in which the query result clip(s) will be dispayed.

4   Video Replay in ControlCentre

The quickest and easiest way to review recorded video is to retrieve and replay it in the Mosaic ControlCentre operator GUI. From here, it is possible to instantly retrieve any video recorded within the video retention period from any one or more cameras. It is also possible to retrieve video older than the video retention period that has been specifically locked to prevent it from being overwritten. This can be done by suitably authorised users from any Mosaic ControlCentre workstation – the operator Workstations in the CCTV control-room, the review-suite workstation, additional workstation PCs which may be added to the network. It could even be possible to directly access recorded video via a secure internet connection if necessary.

4.1.1 Video Replay

Video can be reviewed at its correct speed, pause, frame-advanced and played forwards and backwards at a number of different speeds, including fractions of the real speed.
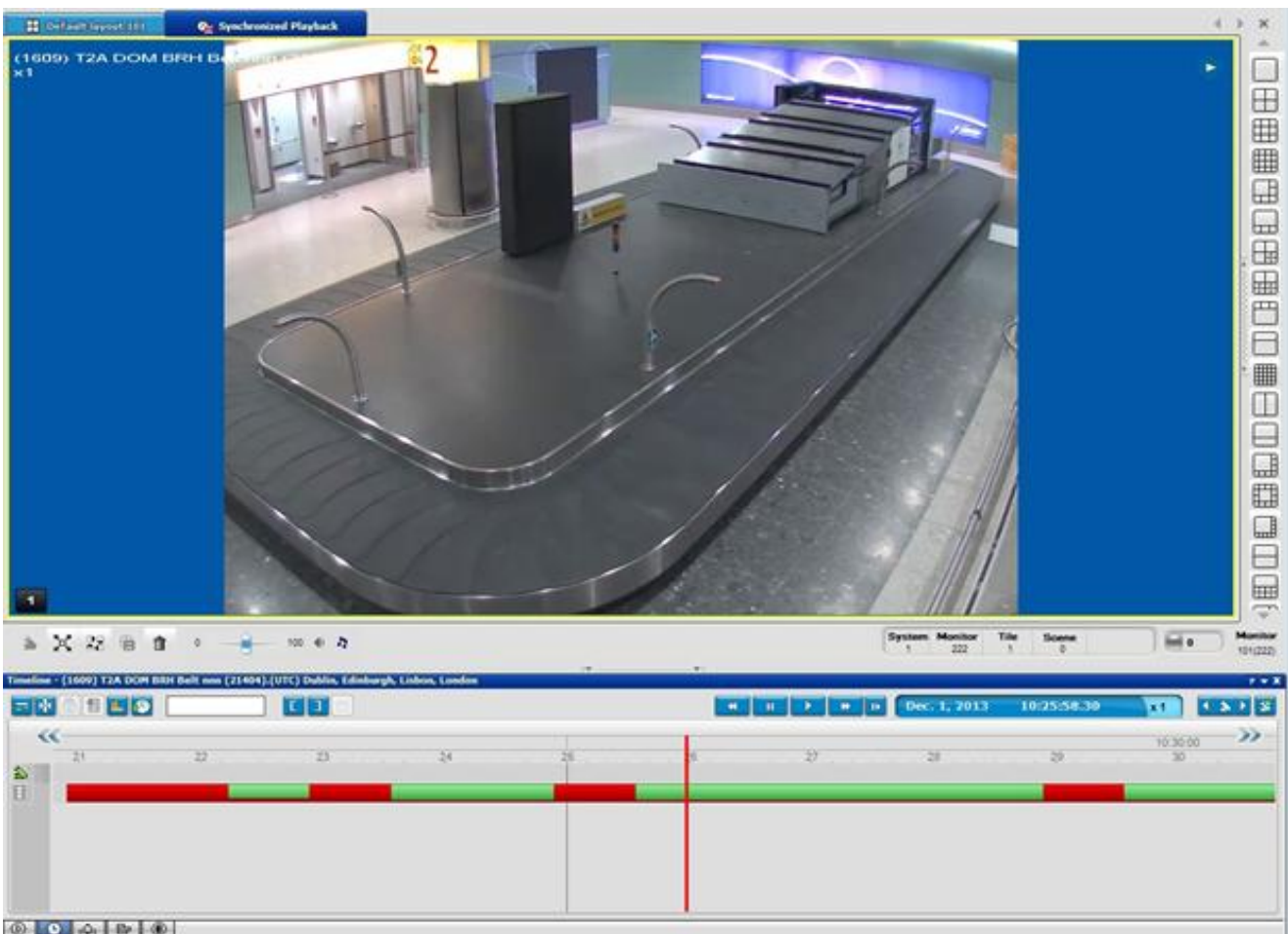
4.1.2 TimeLine

The vertical red line indicates the position in time of the video being viewed. This can be dragged around or moved by double-clicking on another part of the timeline. The playback buttons can be used to review the video at different forward and reverse speeds, paused and frame-advanced. The time and date panel indicates the exact time and date of the footage being reviewed and the replay speed and direction.

The scale of the timeline can be scaled by clicking and dragging on the time indication bar. The jump forward and back chevrons can be used to move forward or back in time.
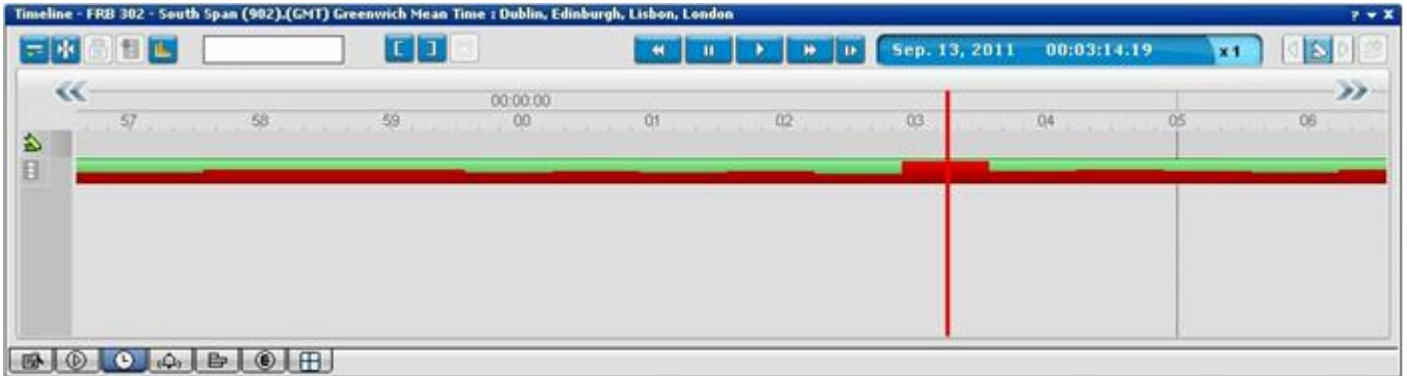
The motion indication, which appears as a modulated red bar on top of the otherwise green bar, can be turned on or off. This provides an at-a-glance view of where the motion appears in the video content.

The TimeLine toolbar controls can be used to manipulate the playback and monitor the video date/time and the playback speed.

4.2 Export in Mosaic DVT Format

The primary means to extract video from Mosaic is to export it in Mosaic's digital DVT format. This is an exact digital copy of the recorded video, as required by the Home Office guidelines [Reference 1]. The exported data can be stored to a central file-share on the network for later analysis, or can be saved to a CD or DVD-R.

4.3 How to Export Video

Exporting video clips to CD or DVD is a two-stage process:

- Select the required video clip and export it from ControlCentre. This exports the selected recording to a pre-configured file location on the local PC or on a network share.
- Use the Mosaic DVD Exporter tool to write the export file to CD or DVD in the required format.

4.4 Exporting a Clip in ControlCentre

The first step is to review the recording in ControlCentre and identify the clip to be exported. The longer the exported clip is, the longer it will take to export, and the longer it will take to replay from the CD. As a guideline, the maximum length of a clip that should be exported is 1 hour, but if possible it is better to limit it to 15 minutes.

1. To export a sub-section of a recording, first click and drag on the recording time-bar in ControlCentre to select a segment of the recording to be exported:
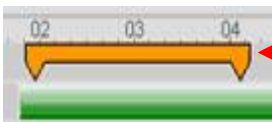

Click & drag to select recording
segment to be exported

2. Either right-click on the highlighted recording segment and select 'Export', or press the Export button

on the Timeline to export the selected recording segment.

3. Do <u>not</u> save the exported video to a folder other than the pre-configured location or a subfolder within this location. Do <u>not</u> change the file-name from the default or the DVD Exporter will not be able to parse the filename and determine the camera name and date/time.
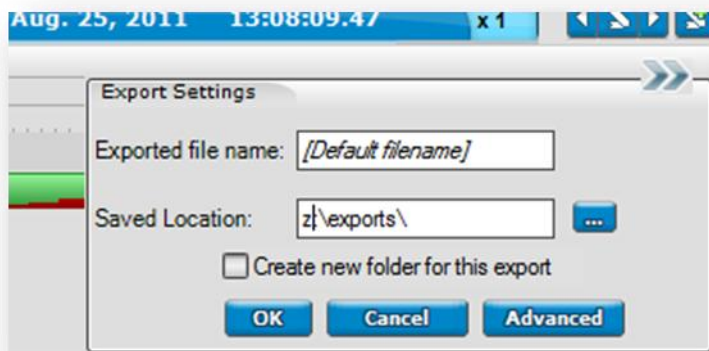
4. While the video is being exported, you can check its progress in the Export Status pane at the bottom of the screen. The time taken to complete the export will normally be about ¼ of the length of the clip, so a 1 hour clip will take about 15 minutes to export. If you have requested multiple exports then they will be queued and started sequentially. You can also cancel one or all of the outstanding exports from here by pressing the 'Stop' button.
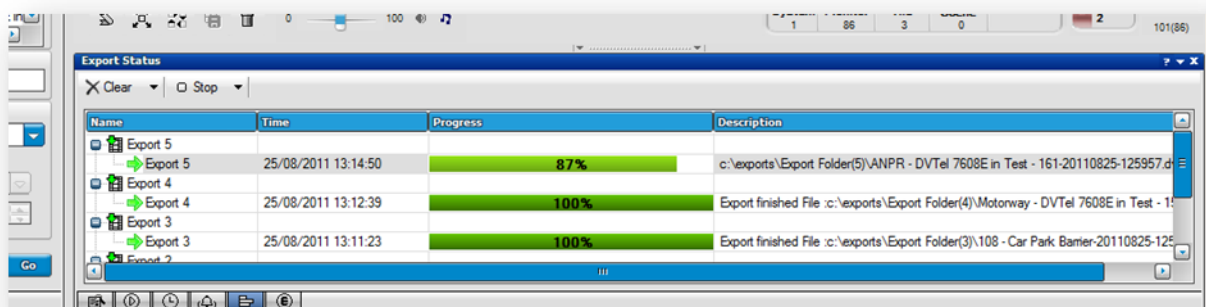
The exported file is an exact bit-by-bit copy of the original recording in the Mosaic NVR, as required by the Home Office video export guidelines. It is also encrypted so that it cannot be read by any other application, and is digitally watermarked to protect against tampering.

5.   Locking Video

To protect a clip from being overwritten after the scheduled retention period (locking), the process is similar to that used to export clips and is included here for that reason: first select the clip of video from the timeline with a click and drag (or using the bracket buttons) and then select the padlock icon or right-click menu to select "Lock".

4.5 Additional Functions

4.5.1 Bookmarking Video

Bookmarks can be added to video to mark significant events and act as a marker to relocate specific events at a later date. They can be searched for in the query pain or skipped between in the TimeLine.

4.5.2 Arming Tiles for Instant Replay

A video tile can be armed by clicking on the tile number. Clicking it once turns the indicator orange. This is to enable this tile to be used to display instant replay (IR) video. If an event of interest occurs on a live image being monitored, by clicking on IR icon in the relevant tile, video from 30 second previously is displayed in the armed tile. This can then be manipulated as archived video without have to perform a query.

4.5.3 Alarms

Alarms will be raised within the Mosaic ControlCentre view. These can be acknowledged or 'snoozed' to be raised again later. The system configuration determines which users receive which alarms.

4.5.4 Sequences/Autocycles

Autocycles can only be configured via the AdminCentre application but they can be viewed using ControlCentre. They can be selected from the Cameratee in the same way as a camera. The cycle can be paused via the hover over controls and restarted as required. Pre-sets of specific cameras can be set to cycle through a pre-defined list of cameras. For instance, a pre-set can be made of all baggage cameras, or perhaps a run through of a passengers path through the terminal from check in-security-boarding to a gate.

4.5.5 File Playback Function

The File Playback pane is used to play exported clips in DVTel Format or SceneTracker files. It enables the concurrent playing of multiple media clips that occurred at the same time and were recorded by different cameras or audio sources. In addition, media clips that were exported in segments can be played as one clip. In the File Playback pane, you can also validate the authenticity of any DVTel Format clip, and indicate whether or not a clip has been tampered with.
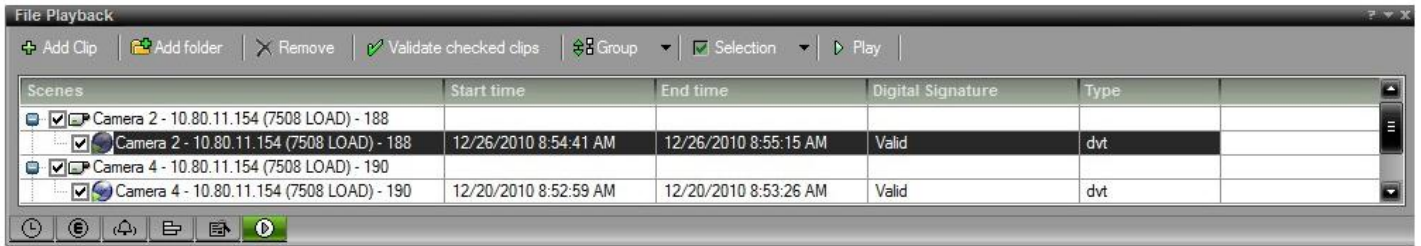
The top of the pane contains the following buttons:

Button	Description
✚	Click this button to add files or folders to be played in the File Playback pane.
✕	Click this button to clear an alarm or alarm related action from the table. An alarm may be cleared only after it has been acknowledged or forwarded.
✔	Click this button to validate the selected files .
⇕	Click this button to group the files.
☑	Click this check box to select or deselect files.
▷	Click this button to play files.

4.6 Adding Clips to the File Playback Pane

You can select individual clips or whole folders to be added to the File Playback pane.

Note: You can only add folders that contain clips. The content of sub-folders are not automatically added.

To add clips:

1.   Click the   button to add a file.

   The Open dialog box appears.

2. Select the desired clip, and then click Open.

  You can select one clip at a time.

  The selected clip is added to the File Playback pane.

To add folders

1. Select the drop-down menu, and select Add folders.

The Browse for Folders dialog box appears.

2. Select the desired folder.

You can select one folder at a time. Make sure the folder contains clips. Clips that are located in sub folders will not be added automatically.

3. Click OK.

The selected folder and the clips contained in it are added to the File Playback pane.

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4.7 Removing Clips from the File Playback Pane

You can remove clips from the File Playback.

To remove clips or folders

1. Select the desired clips or folders

2. Click the ✕ button.

A confirmation message appears, asking you whether or not to delete the selected items.

3. Click OK to remove the clip(s).

4.8 Validating the Digital Signature

Every clip exported in the DVTel Format contains an encrypted watermark to ensure that the data cannot be tampered with. You can validate the files in the DVTel Format and indicate whether or not the files have been tampered with in the File Playback pane.

It is possible to playback files even if they are indicated as invalid. The validation status of the clips appears in the Digital Signature column. A clip can be validated, unchecked or not valid.

To validate the digital signature of a clip

1. Select the desired clip(s).

2. Click the ✔ button.

While the system is validating the clips, the Digital Signature column will display the Validating status.

After the validation process is complete, the Digital Signature of the clip will display as valid or not valid.

4.9 Playing the Clips

Once a clip has been added to the File Playback pane, it can be played and will be displayed in the Viewing pane.

· It is possible to play clips continuously, using Loop Playback.

· It is possible to play multiple clips simultaneously by selecting several clips at once.

· In addition, it is possible to play clips synchronously. For more information, see Synchronized Playback.

Once a clip is played, the Timeline pane is displayed.

To play clips

To play a clip, do one of the following:

· Double-click the desired clip(s) in the File Playback pane.

· Drag and drop the desired clip to a tile in the Viewing pane.

· Select the desired clip(s) in the File Playback pane, and then click the ▷ button.

It is recommended when you are finished viewing a clip that you remove it from the tiles, Timeline and File Playback pane.

Note: If you log out of the associated iSOC system, files loaded in this pane will remain available for offline playback.

4.10 Removing Privacy Mask During Synchronized Playback

If you have loaded a clip that was exported with a Privacy Mask, it will be password protected. Once you enter a Privacy Mask password for a scene, the system will remember it during your current session and you will not need to enter it again.

If a clip has been added and is playing you can right-click and select Deactivate Privacy Mask.
You will be prompted for the password for the file you clicked on. Enter the password of the file and click OK.

If you have multiple exported clips with different passwords but for the same scene, you need only enter the latest password to unlock all of the scene.

Caution: If you leave an exported clip which you have entered a password for loaded in the ControlCenter and you log out from the iSOC, the ControlCenter will only switch to offline and the passwords you entered will remain for each video still loaded in the offline ControlCenter panes. It is recommended when you are finished viewing a clip that you have entered a Privacy Mask password for, that you remove it from the tiles, Timeline and File Playback pane.

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5   Video Wall Control

Video can be displayed on various monitors around the system; in the case of the TSC there is the additional Videowall, via a ControlCentre Plugin.


Select the required video wall which you use to control. Once this has been selected the wall mimic will show the current status of the video wall including its current layout and its content. If the wall is offline an error message will be displayed.

Once the wall is selected pressing on one of the layouts will change the layout on the video wall.

Cameras can be dragged from the treeview or from a ControlCentre tile to the wall mimic.

Note: That holding the ctrl key while you drop onto the wall tile will remove the content from Control centre otherwise it will be left in place.

Video can be cleared from the wall by double clicking in the tile in the wall mimic, or via the right-click menu.
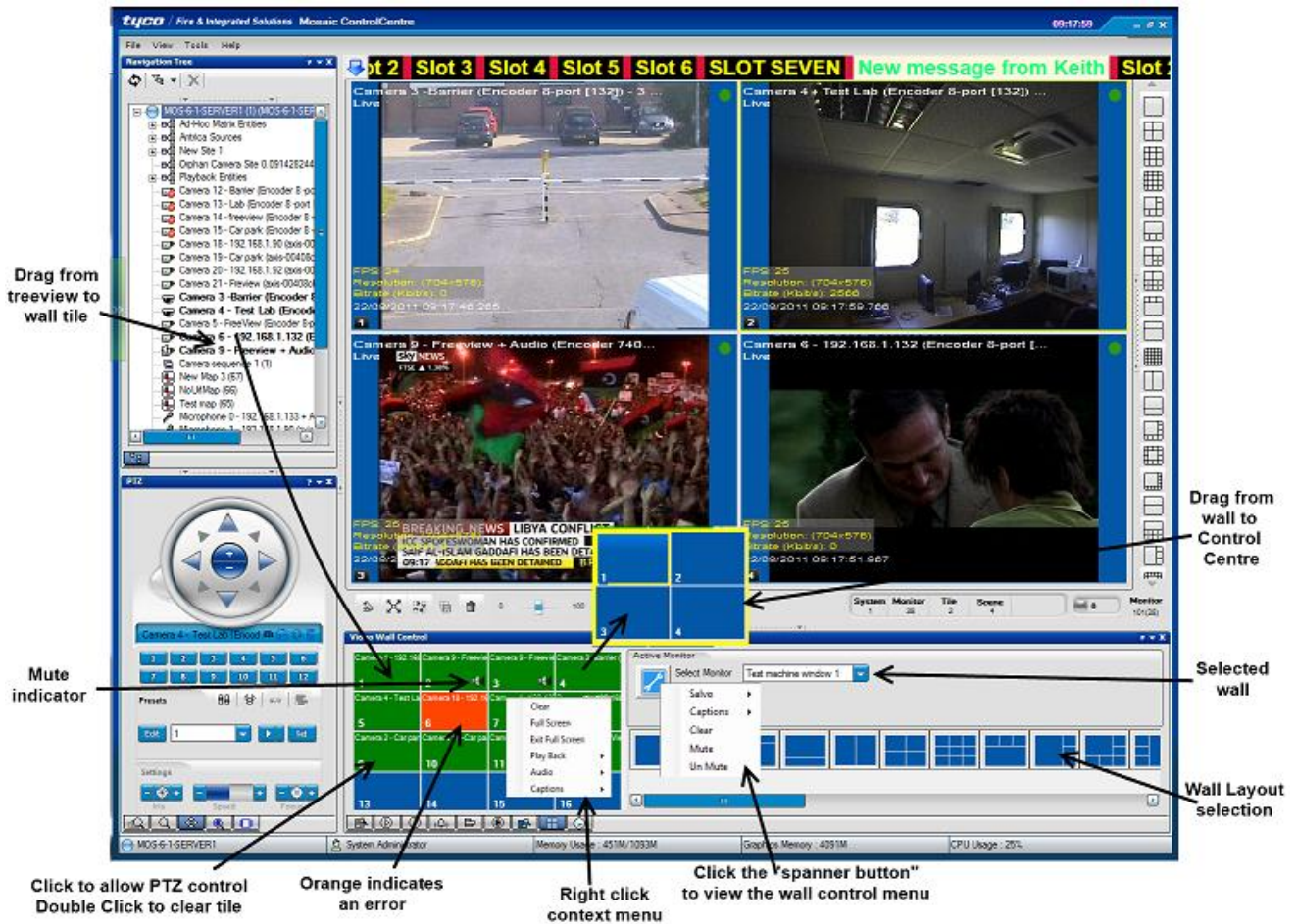
Clicking on the selected video wall tile will allow PTZ control of the camera via the PTZ control.

Video can be dragged from a Green wall tile will produce a fly-out that mimics the current layout in ControlCentre. It can then be dropped into one of the tiles to view in ControlCentre.
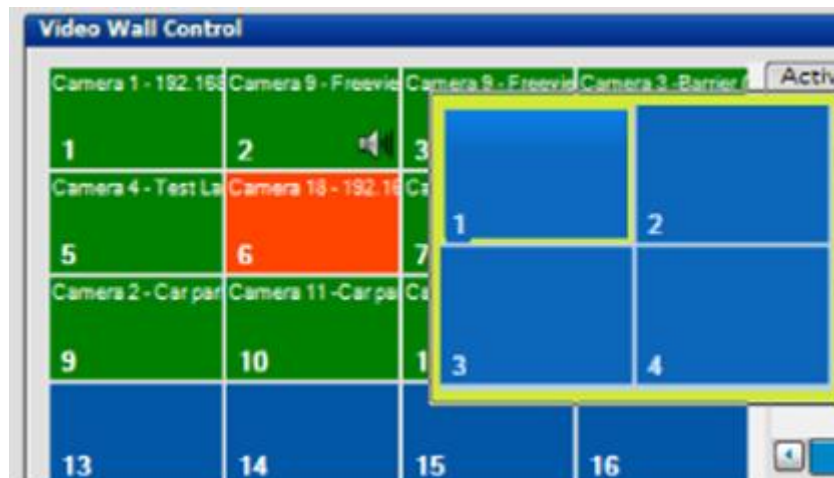
A green colour indicates video display is reported as OK, an orange colour indicates an error. Hovering the mouse over the tile reveals the error in a tool-tip

Hovering over a tile will produce a tool-tip this will show the camera name as well as the site and camera number along with any indicated error.
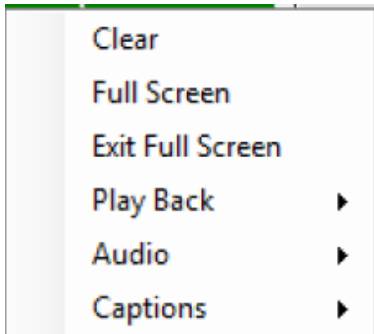
Right click on a tile will produce a context menu with the following operations.

- *Clear* – This will clear the selected tile
- *Full Screen / Exit* – Flips between full screen for the selected tile
- *Play Back* – Pulls up a context menu with the usual playback controls Pause, FF,REW etc.
- *Audio* – Not applicable here
- *Captions* – Not applicable here

Functions applicable to the whole monitor display are accessed via the. 'Spanner Button'
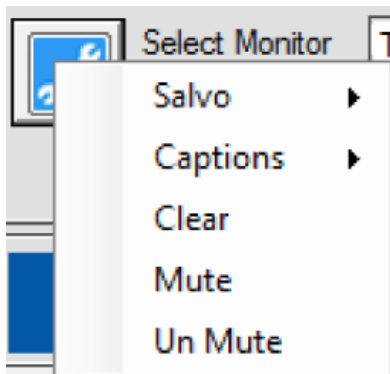
- *Salvo* – This menu allows salvos to be saved or restored.

- *Captions* – Not applicable here

- *Clear* – This will clear all content from the wall

- *Mute Control* – Not applicable here

The salvo menu gives the option to save and restore salvos. A salvo in this context is the selected walls layout and its content. There are five fixed Salvos (Salvo 1- 5) that are saved and restored locally (on the machine running ControlCentre) so are available only to users of that machine.