

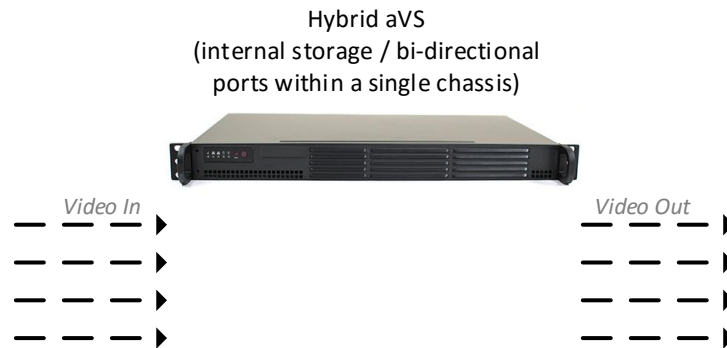


# *aQ Broadcast Engine (QuBE): System Examples & Block Diagrams*

*July 2016*

*‘making broadcast magic’*

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*A Hybrid aVS provides storage and I/O within a single chassis. Size, capacity and the number of ports is flexible. A 1U chassis can provide two or four ports with typically 2 / 3 / 6 TB internal storage. A 2U chassis can provide four or six ports, with typically 5 / 10 / 15 / 20 TB internal storage.*

*Input/output connections are normally SDI with embedded audio, but an option for the 2U chassis includes analogue video and audio connections. All ports are bi-directional – their individual operation can be switched immediately between recording and playback.*

*The Storage is accessible over the network as a standard SAMBA/SMB share and optionally via FTP.*

*In some cases, Hybrid units can support additional functionality, such as sub-clip, trim, transcoding, upload, stream, etc.*

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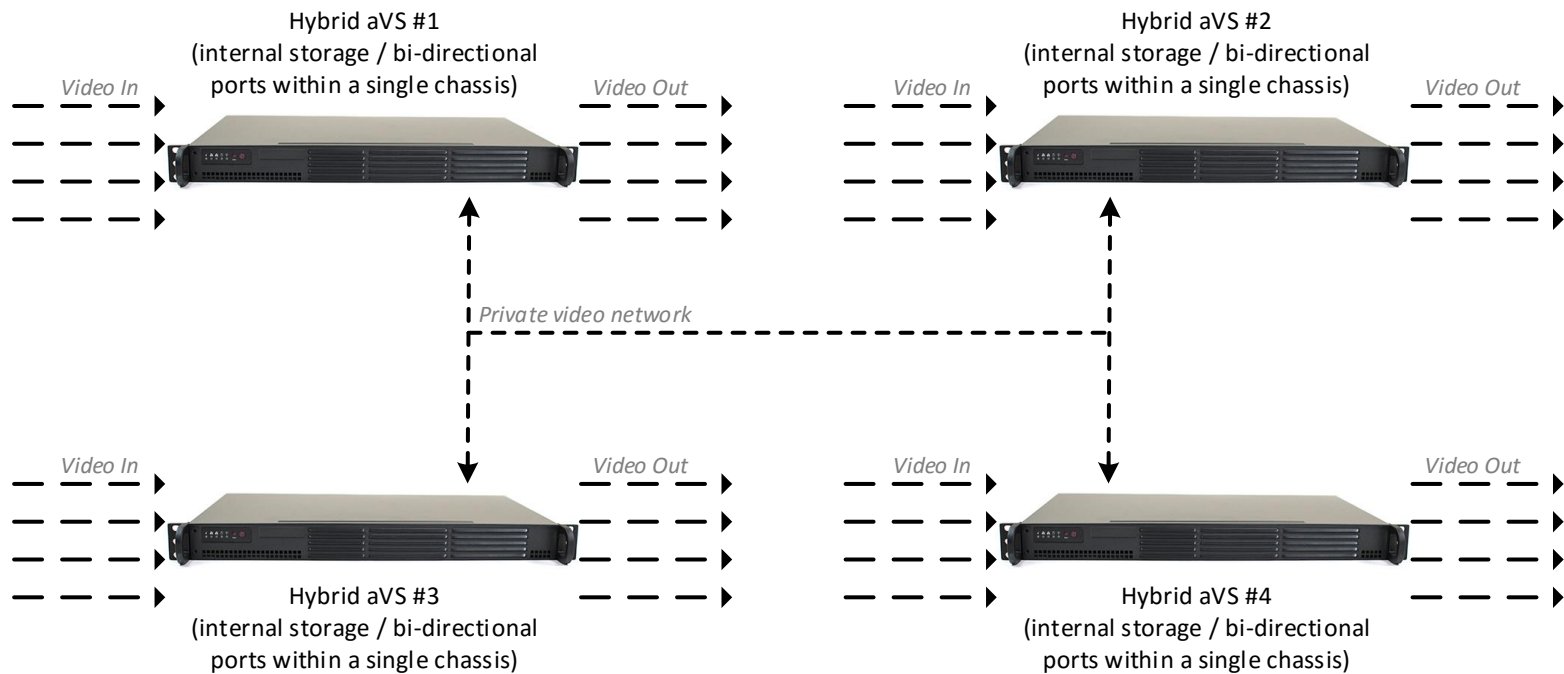
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aQ Broadcast system examples –  
standalone aVS Hybrid unit

NH

3 Feb '16

v1



*In this configuration, ports will normally play content from their own local storage, under local control from their own GUI (or via remote control, e.g. using VDCP from a switcher). But with correct configuration, the overall system can offer a great deal of flexibility:*

- any port can record content into the storage on any unit
- any port can play back content from the storage on any unit
- any GUI can take control of any port on any unit
- any GUI can view and manage media stored on any unit
- any GUI can initiate a direct transfer of media between any two units – e.g. to copy a clip from one server to another

*A Hybrid aVS provides storage and I/O within a single chassis. Size, capacity and the number of ports is flexible. A 1U chassis can provide two or four ports with typically 2 / 3 / 6 TB internal storage. A 2U chassis can provide four or six ports, with typically 5 / 10/ 15 / 20 TB internal storage.*

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*In some cases, Hybrid units can support additional functionality, such as sub-clip, trim, transcoding, upload, stream, etc.*

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#### aQ Broadcast system examples – multiple aVS Hybrid units

NH

10 Jun '16

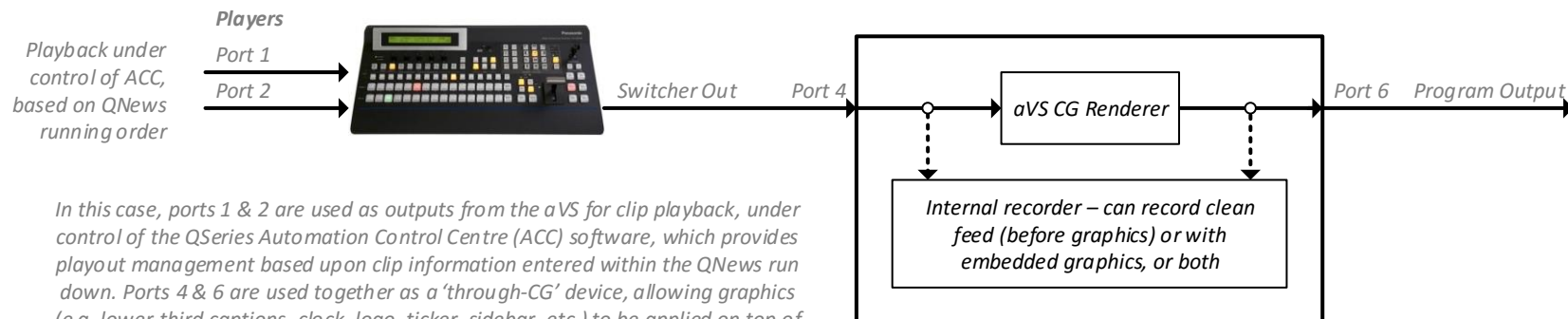
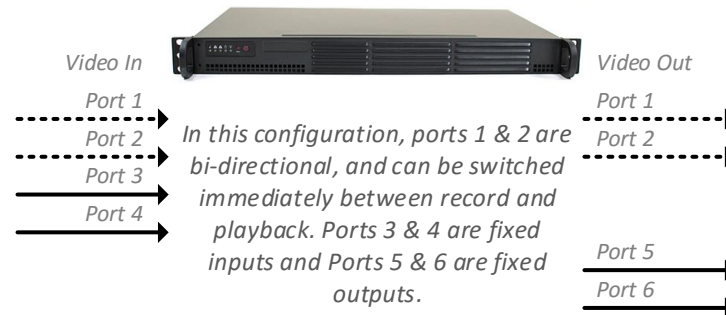
v1

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Input/output connections are normally SDI with embedded audio, but an option for the 2U chassis includes analogue video and audio connections. All ports are bi-directional – their individual operation can be switched immediately between recording and playback.

The Storage is accessible over the network as a standard SAMBA/SMB share and optionally via FTP.

### Six-Port Hybrid aVS (internal 3 TB storage & ports within a single chassis)



In this case, ports 1 & 2 are used as outputs from the aVS for clip playback, under control of the QSeries Automation Control Centre (ACC) software, which provides playout management based upon clip information entered within the QNews run down. Ports 4 & 6 are used together as a 'through-CG' device, allowing graphics (e.g. lower-third captions, clock, logo, ticker, sidebar, etc.) to be applied on top of the switcher output. These graphic elements, particularly lower-third straps, can also be controlled from the ACC, based on automation events entered by the journalists within their scripts.

The internal routing capability of the aVS means that it is possible to record the incoming clean feed (pre-graphics) and/or the combined graphics output without requiring external cabling or a separate port.

In this example, ports 3 (input) and 5 (output) are still available for use as required.

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aQ Broadcast system – 6-port aVS  
Hybrid example with graphics

NH

13 Jun '16

v1

## aVS Store node (internal storage but no I/O ports)



An aVS Store node provides dedicated storage. Size and capacity is flexible, but will typically be 2 – 4U, and from 5 TB to many hundreds of TB. All units have redundant PSUs and storage is always provided based on hardware RAID configurations.

The Storage is accessible over the network as a standard SAMBA/SMB share and optionally via FTP. Standard units provide multiple 1GigE network connections, but an option for dual 10GigE connections is available.

In most cases, Store nodes can support additional functionality, such as sub-clip, trim, transcoding, upload, stream, etc. Proxy viewing is also available in various forms.

Media content

## aVS Port node #1 (bi-directional ports but no internal storage)



Video In  
— — — — —  
— — — — —  
— — — — —

Video Out  
— — — — —  
— — — — —  
— — — — —

## aVS Port node #2 (bi-directional ports but no internal storage)



Video In  
— — — — —  
— — — — —  
— — — — —

Video Out  
— — — — —  
— — — — —  
— — — — —

## aVS Port node #3 (bi-directional ports but no internal storage)



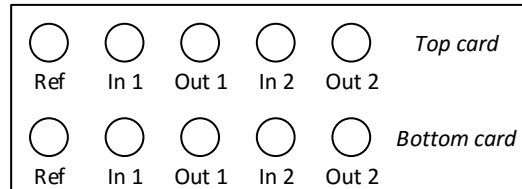
Video In  
— — — — —  
— — — — —  
— — — — —

Video Out  
— — — — —  
— — — — —  
— — — — —

An aVS Port node provides dedicated I/O, typically two or four ports in a 1U chassis with redundant PSU. Input/output connections are normally SDI with embedded audio, but an option for the 2U chassis includes analogue video and audio connections. All ports are bi-directional – their individual operation can be switched immediately between recording and playback. Alpha channel support is available as an option, with two ports configurable as linked key+fill or as independent connections.

aVS Port nodes are connected to an aVS Store node via a private network link. Port and Store nodes can be connected in any combination – multiple Ports -> one Store, one Port -> multiple Stores or multiple Ports -> multiple Stores. Any port can record content to, or playback content from, any Store.

### Video I/O Connections (example):



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### aQ Broadcast system examples – Store and Port node configuration

NH

10 Jun '16

v1

aVS Store node & Storage Gateway  
(small internal storage, no I/O ports +  
transfer from MAM)



An aVS Store node provides dedicated storage. Size and capacity is flexible, but will typically be 2 – 4U, and from 5 TB to many hundreds of TB. All units have redundant PSUs and storage is always provided based on hardware RAID configurations.

The Storage is accessible over the network as a standard SAMBA/SMB share and optionally via FTP. Standard units provide multiple 1GigE network connections, but an option for dual 10GigE connections is available.

In this case, the Store node will also act as the point of interchange between the third-party MAM system.

Studio #1  
(remote control, e.g. via VDCP, AMP  
or MOS)



Studio #2  
(remote control, e.g. via VDCP, AMP  
or MOS)



Studio #3  
(remote control, e.g. via VDCP, AMP  
or MOS)



Private media  
content / control  
network

aVS Port node #1  
(bi-directional ports, no internal  
storage)



aVS Port node #2  
(bi-directional ports, no internal  
storage)



aVS Port node #3  
(bi-directional ports, no internal  
storage)



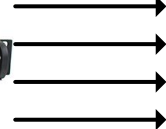
aVS Port node #4  
(bi-directional ports, no internal  
storage)



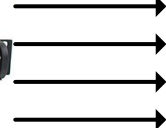
aVS Port node #5  
(bi-directional ports, no internal  
storage)



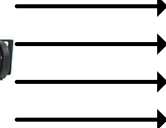
Video Outs



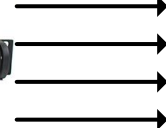
Video Outs



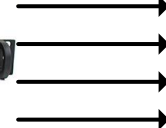
Video Outs



Video Outs



Video Outs



An aVS Port node provides dedicated I/O, typically two or four ports in a 1U chassis with redundant PSU. Input/output connections are normally SDI with embedded audio, but an option for the 2U chassis includes analogue video and audio connections. All ports are bi-directional – their individual operation can be switched immediately between recording and playback. Alpha channel support is available as an option, with two ports configurable as linked key+fill or as independent connections.

aVS Port nodes are connected to an aVS Store node via a private network link. Port and Store nodes can be connected in any combination – multiple Ports -> one Store, one Port -> multiple Stores or multiple Ports -> multiple Stores. Any port can record content to, or playback content from, any Store.

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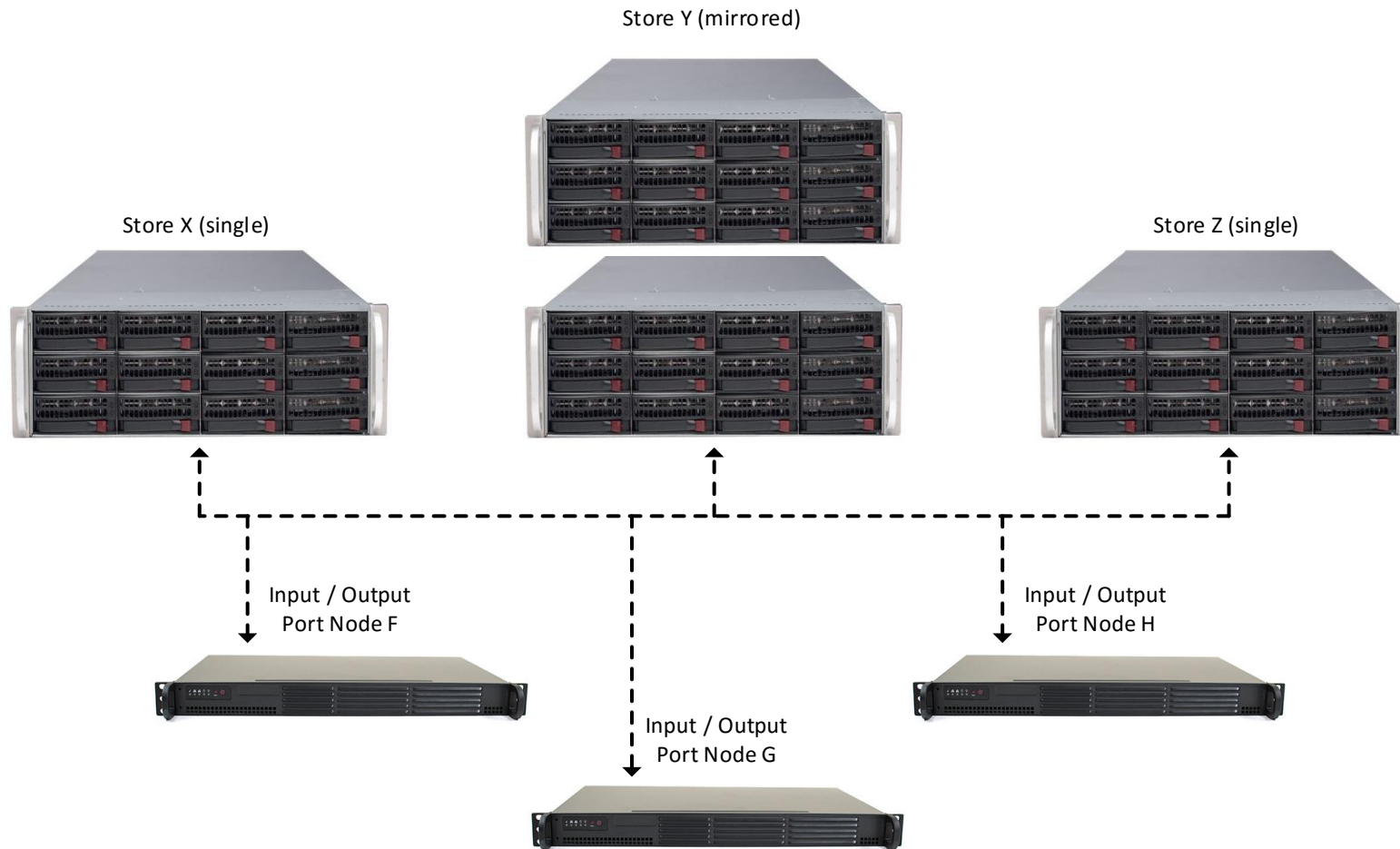
aQ Broadcast system options –  
large studio playback example

NH

14 Jun '16

v1





Stores are accessible on the network via standard SMB / SAMBA file sharing and via FTP. Stores can be configured as standalone or mirrored. Each Store is aware of other Stores on the network and automatically supports the direct movement of content between units – transferred point-to-point rather than via an intermediary workstation. Stores are typically available in capacities from 5 TB up to many hundreds of TB, in rack sizes from 2U upwards.

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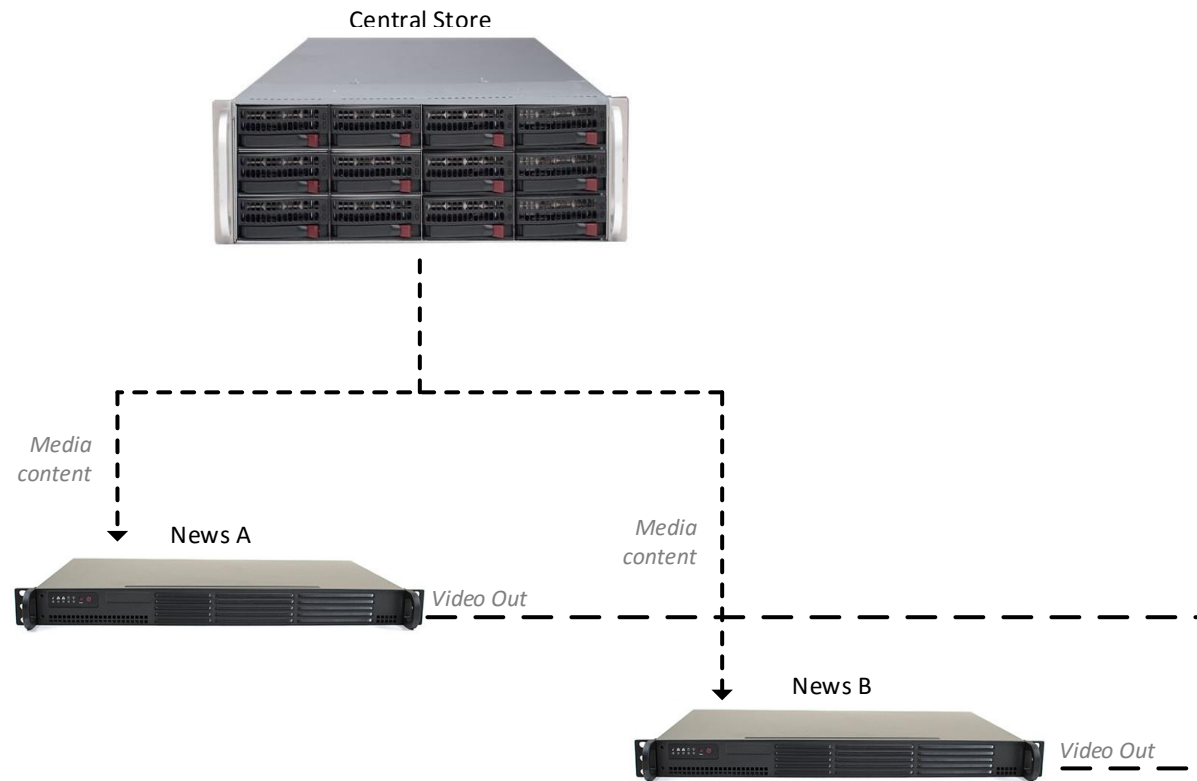
Any Port Node can record content into any Store, and play back content from any Store. Port Nodes are typically available as 1U units with two or four bi-directional ports (SDI with embedded audio, plus genlock input). An option for key + fill output is available if required.

aQ Broadcast system examples – large network configuration

NH

28 Jan 2016

v1



*A single clip can be played out in parallel across both playout servers – all actions (e.g. load, cue, play, re-cue, etc.) will be automatically mirrored on both servers.*

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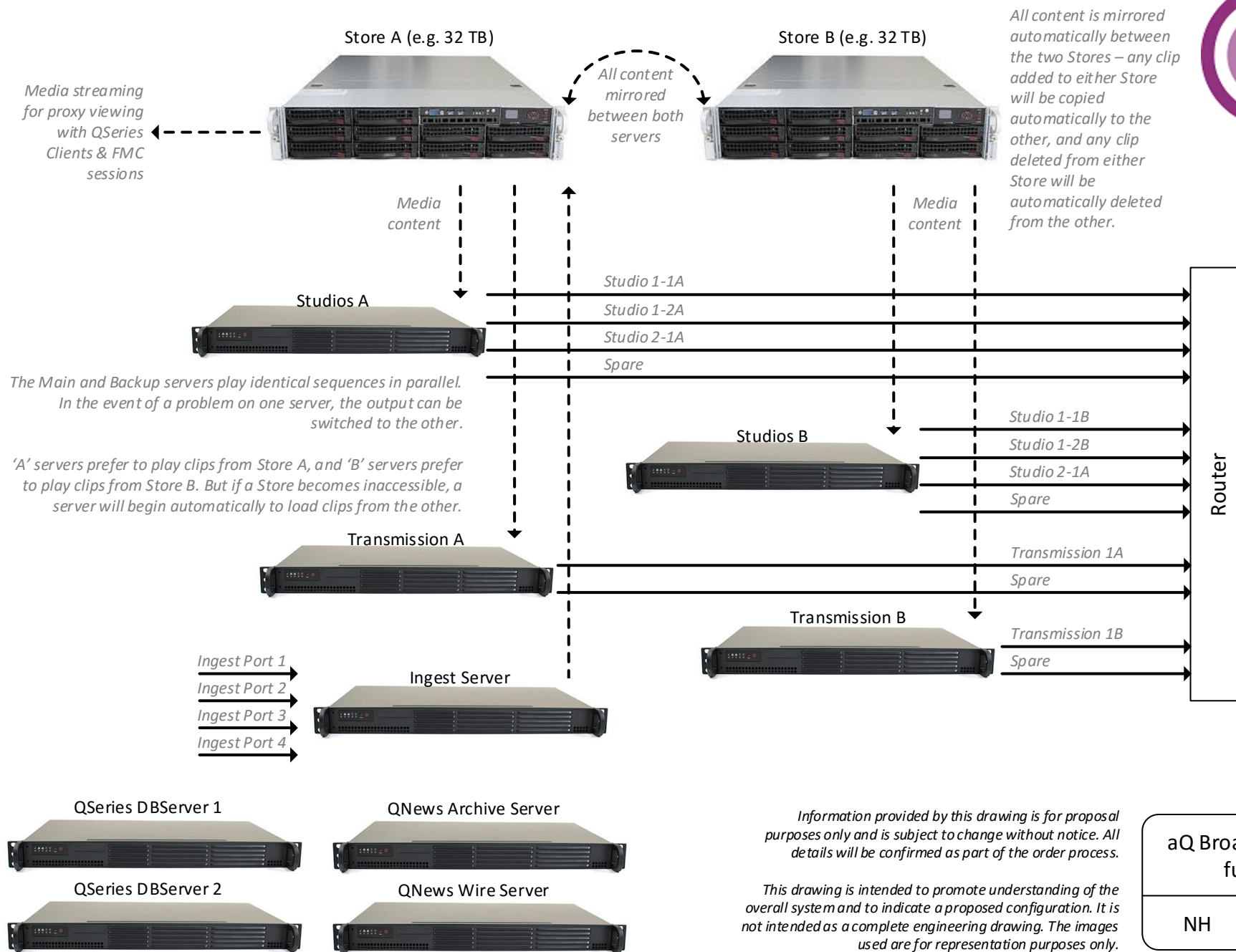
aQ Broadcast system examples –  
redundant news ployt

NH

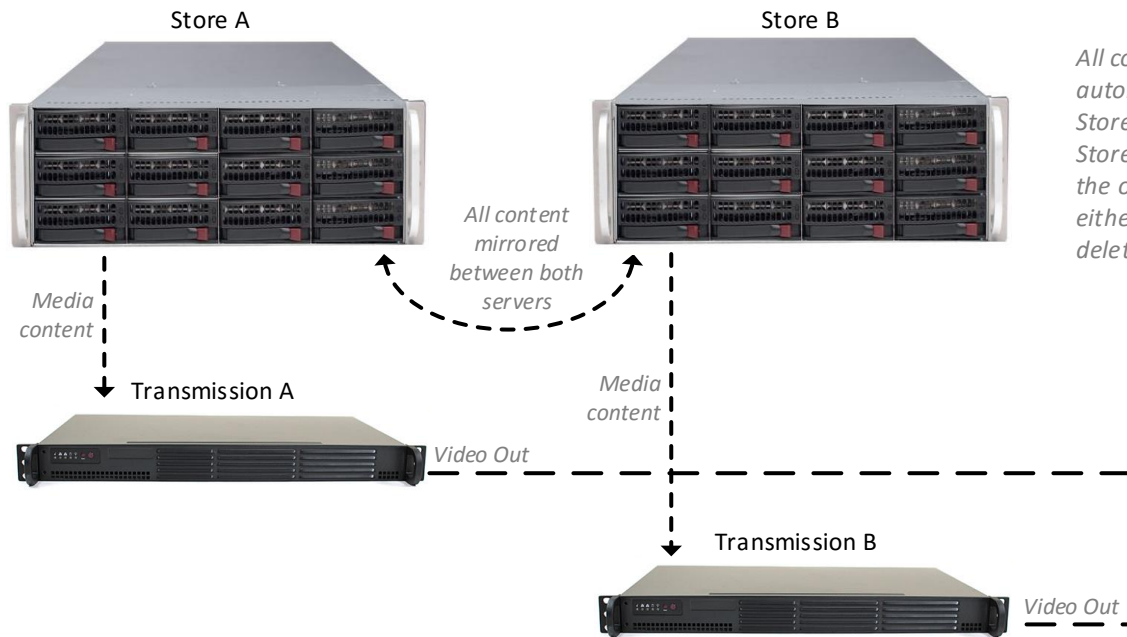
28 Jan 2016

v1





aQ Broadcast system examples – full channel example		
NH	17 Jul 2016	v1



*All content is mirrored automatically between the two Stores – any clip added to either Store will be copied automatically to the other, and any clip deleted from either Store will be automatically deleted from the other.*

*Transmission Server A prefers to play clips from Store A, and Transmission Server B prefers to play clips from Store B. But if a Store becomes inaccessible, a Transmission Server will begin to load clips from the other.*

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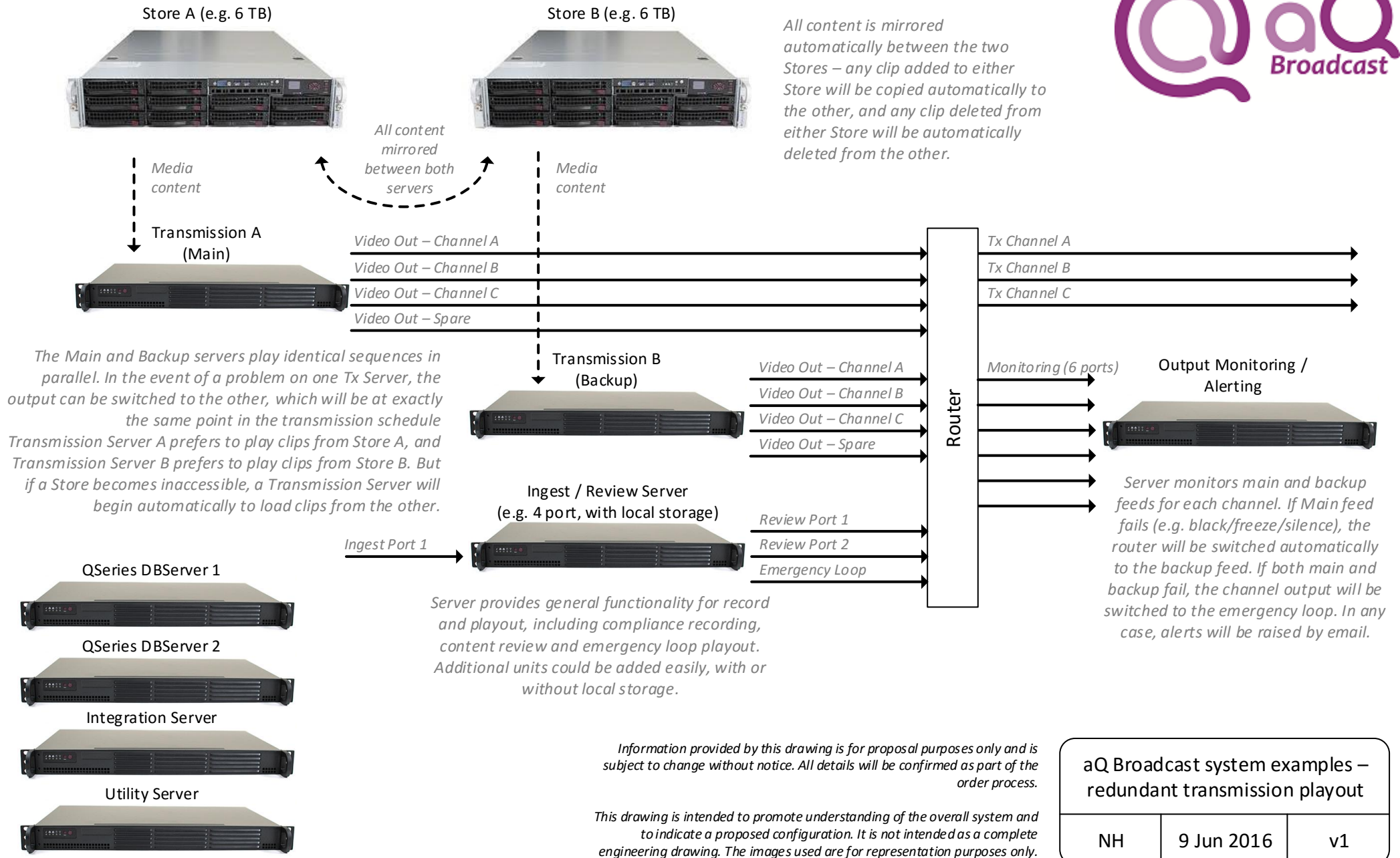
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aQ Broadcast system examples –  
redundant transmission playout

NH

28 Jan 2016

v1

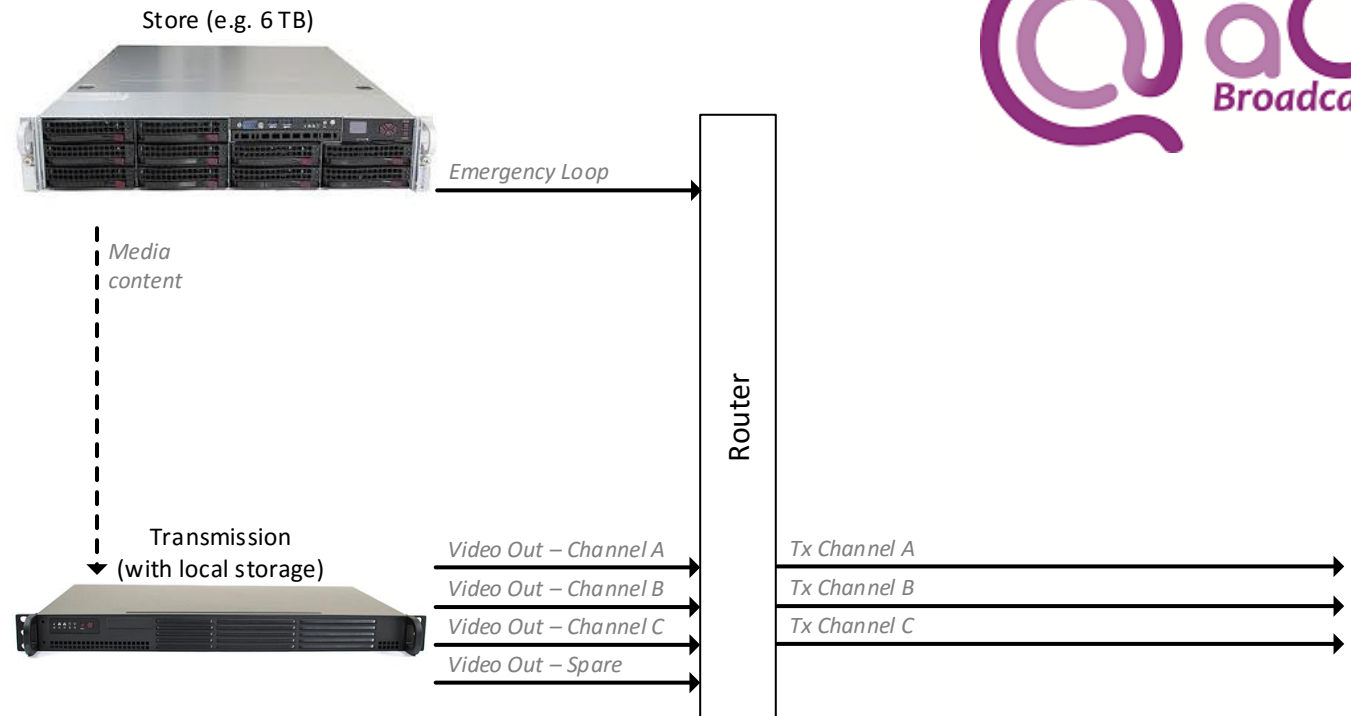


aQ Broadcast system examples – redundant transmission playout

NH

9 Jun 2016

v1



QSeries DBServer



Utility Server



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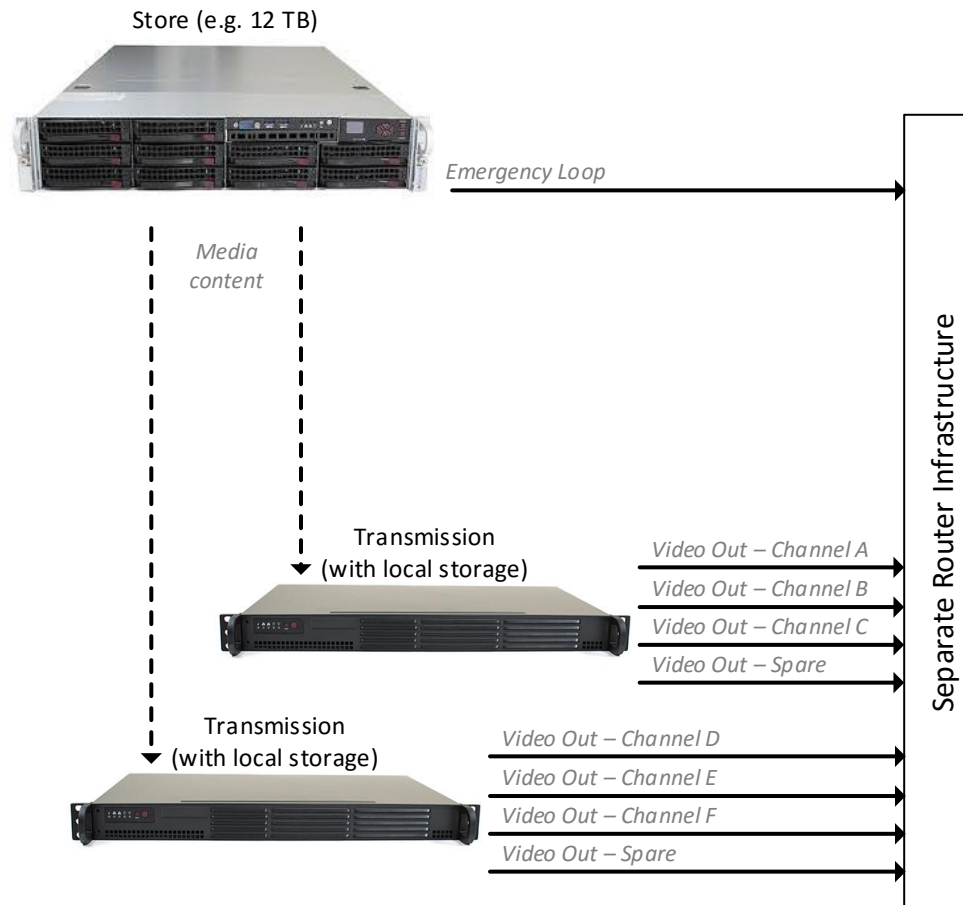
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aQ Broadcast system examples –  
entry-level transmission playout

NH

10 Jun 2016

v1



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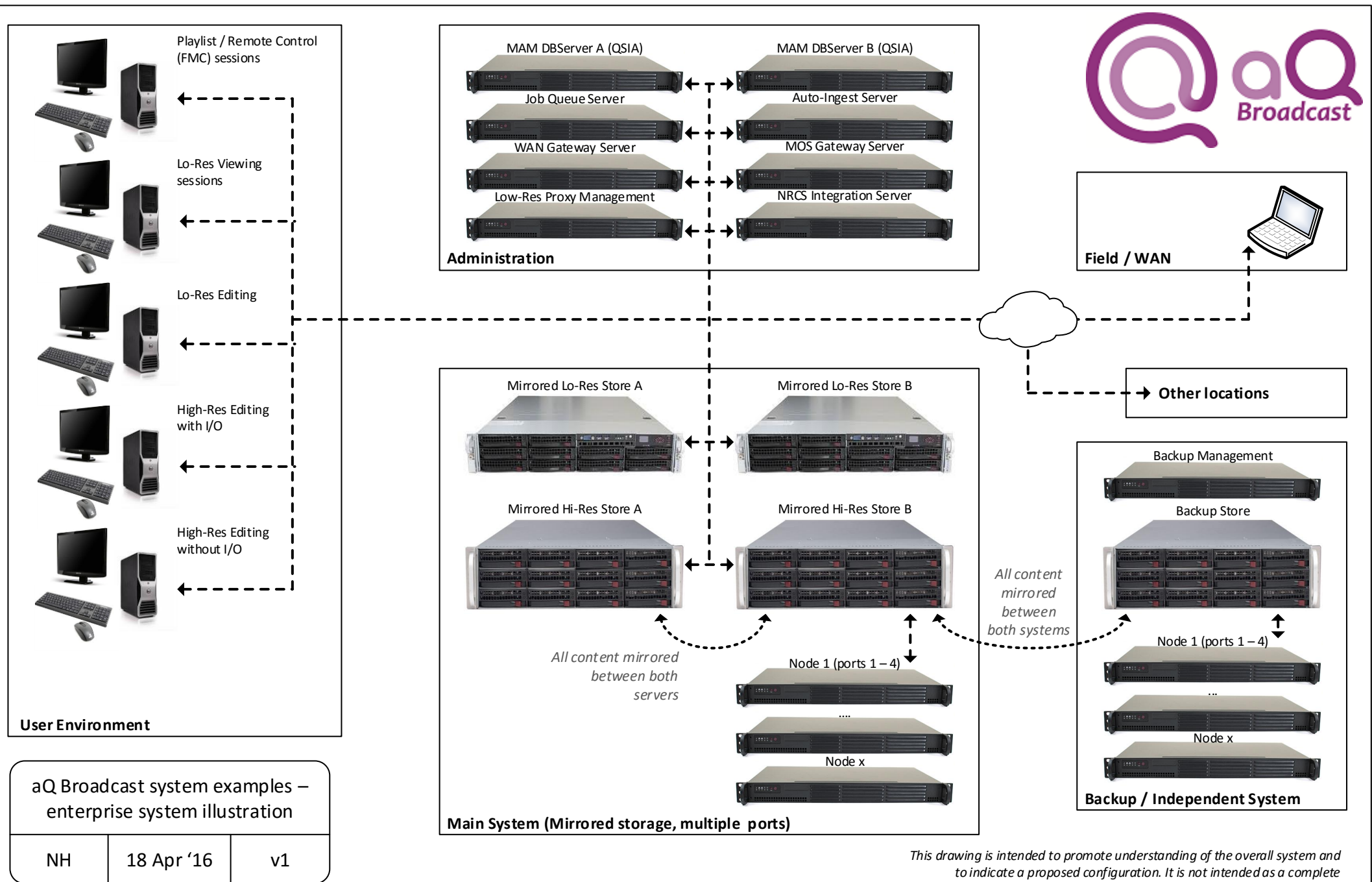
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aQ Broadcast system examples –  
entry-level transmission playout

NH

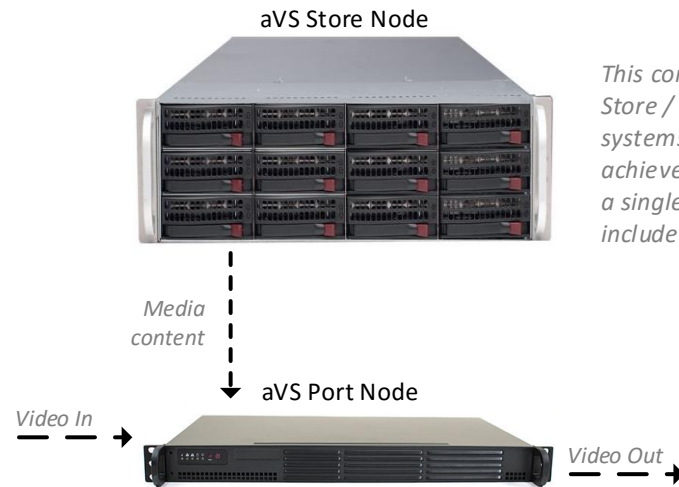
12 Jul 2016

v1

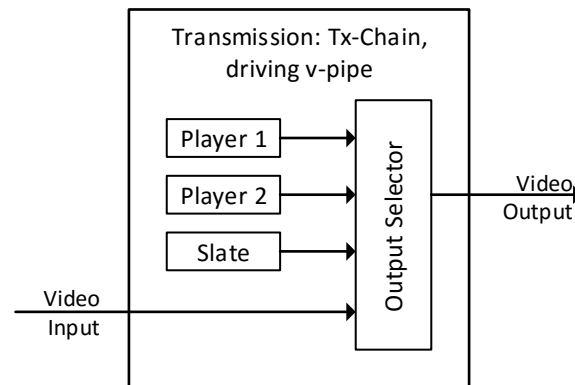


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*This configuration shows a standard Store / Port combination. For small systems, it is also possible to achieve the same functionality with a single Hybrid (Storage and I/O included within the same chassis).*



*The standard Port node can be configured to run the 'video-pipeline' components, which includes virtual internal players, still stores and routers. This allows the single video output to be switched between a live input, a manual player, an image (e.g. station logo) and a player under control of the transmission sequence handling.*

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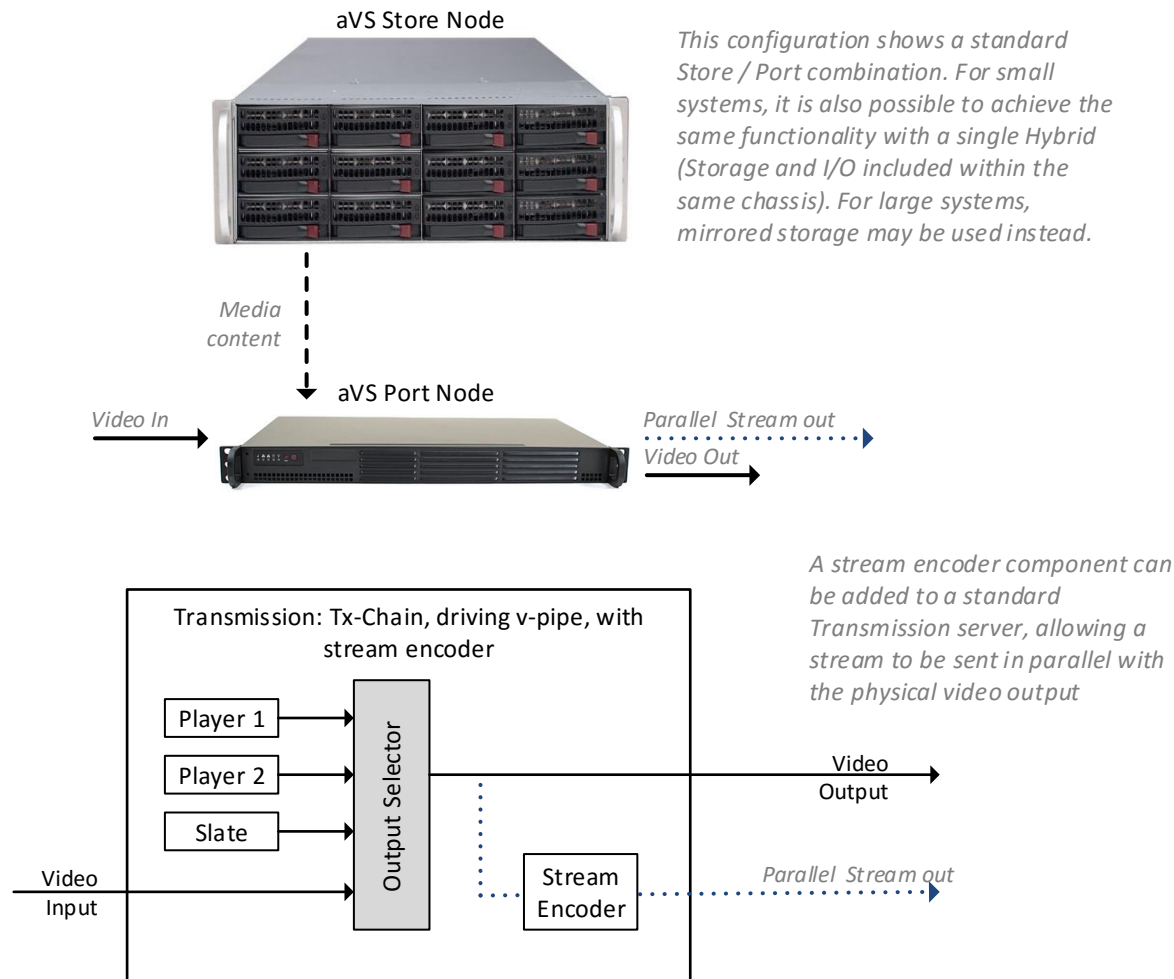
aQ Broadcast system examples – transmission playout (virtual player)

NH

3 Feb '16

v1





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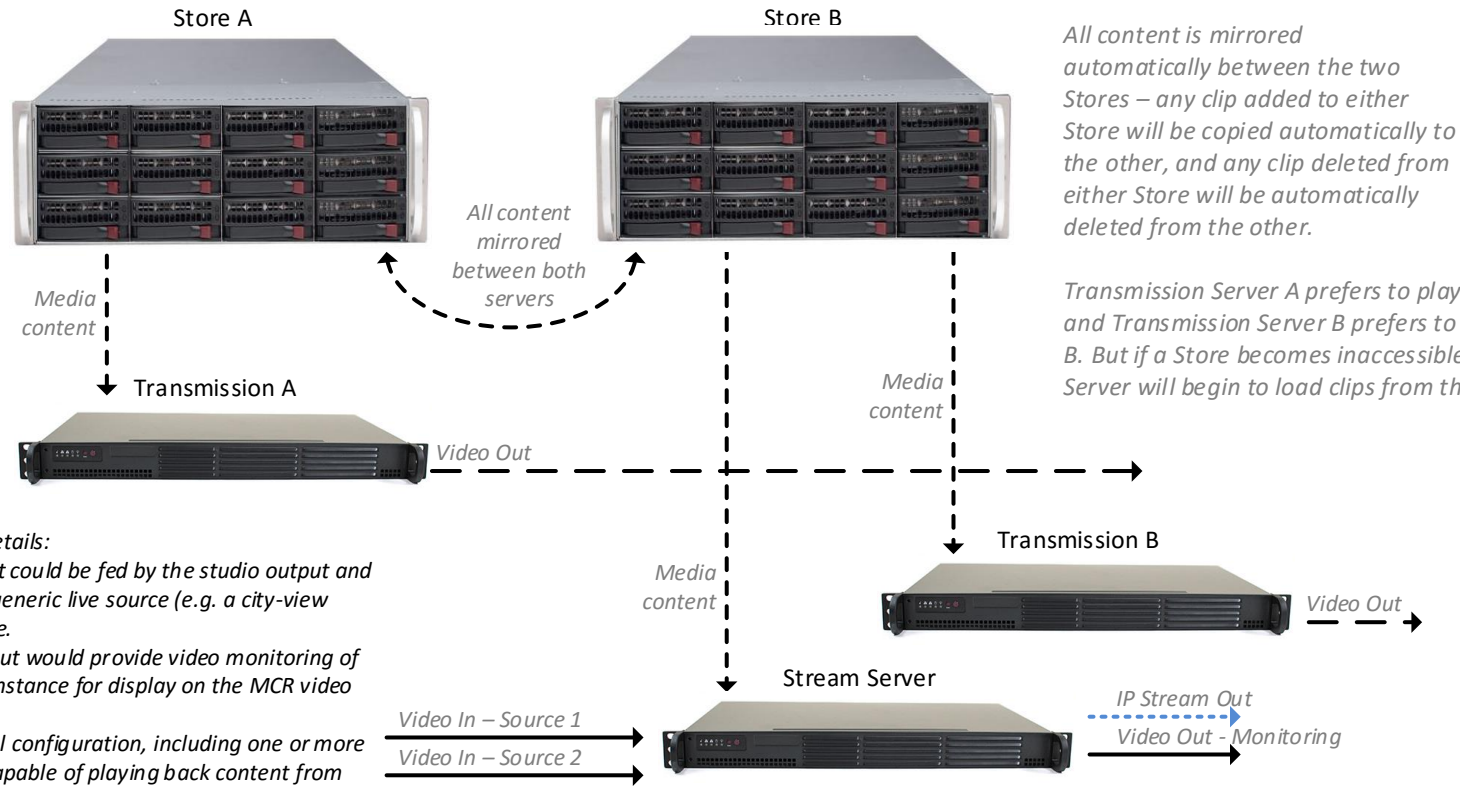
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aQ Broadcast system examples – transmission (with streaming)

NH

22 Mar '16

v1

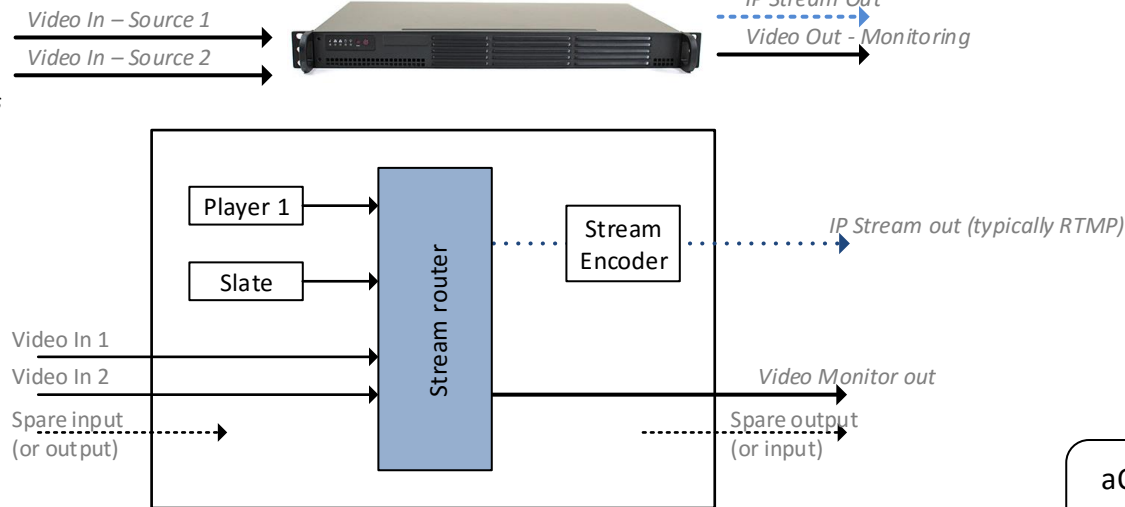


All content is mirrored automatically between the two Stores – any clip added to either Store will be copied automatically to the other, and any clip deleted from either Store will be automatically deleted from the other.

Transmission Server A prefers to play clips from Store A, and Transmission Server B prefers to play clips from Store B. But if a Store becomes inaccessible, a Transmission Server will begin to load clips from the other.

#### Stream Server details:

- \* one video input could be fed by the studio output and another from a generic live source (e.g. a city-view cam) for instance.
- \* one video output would provide video monitoring of the stream, for instance for display on the MCR video wall
- \* flexible internal configuration, including one or more virtual players capable of playing back content from the mirrored storage and one or more still/logo images
- \* the various internal and video sources would be switchable via the internal router, which would control both the output being streamed and the monitoring output.
- \* the routing and internal clip playback would be controlled using the same Tx-Chain handling as the existing A and B servers, with the schedule originating either from QSeries or from a simpler Tx-Lite sequence list.
- \* because this unit would have the same basic capability as the main Transmission servers, it could be immediately used as a spare in the event that either failed. It would essentially be a 'Transmission-C' server which could be set to play any schedule when required.



Transmission: Tx-Chain, driving v-pipe, with stream encoder (other configurations are possible)

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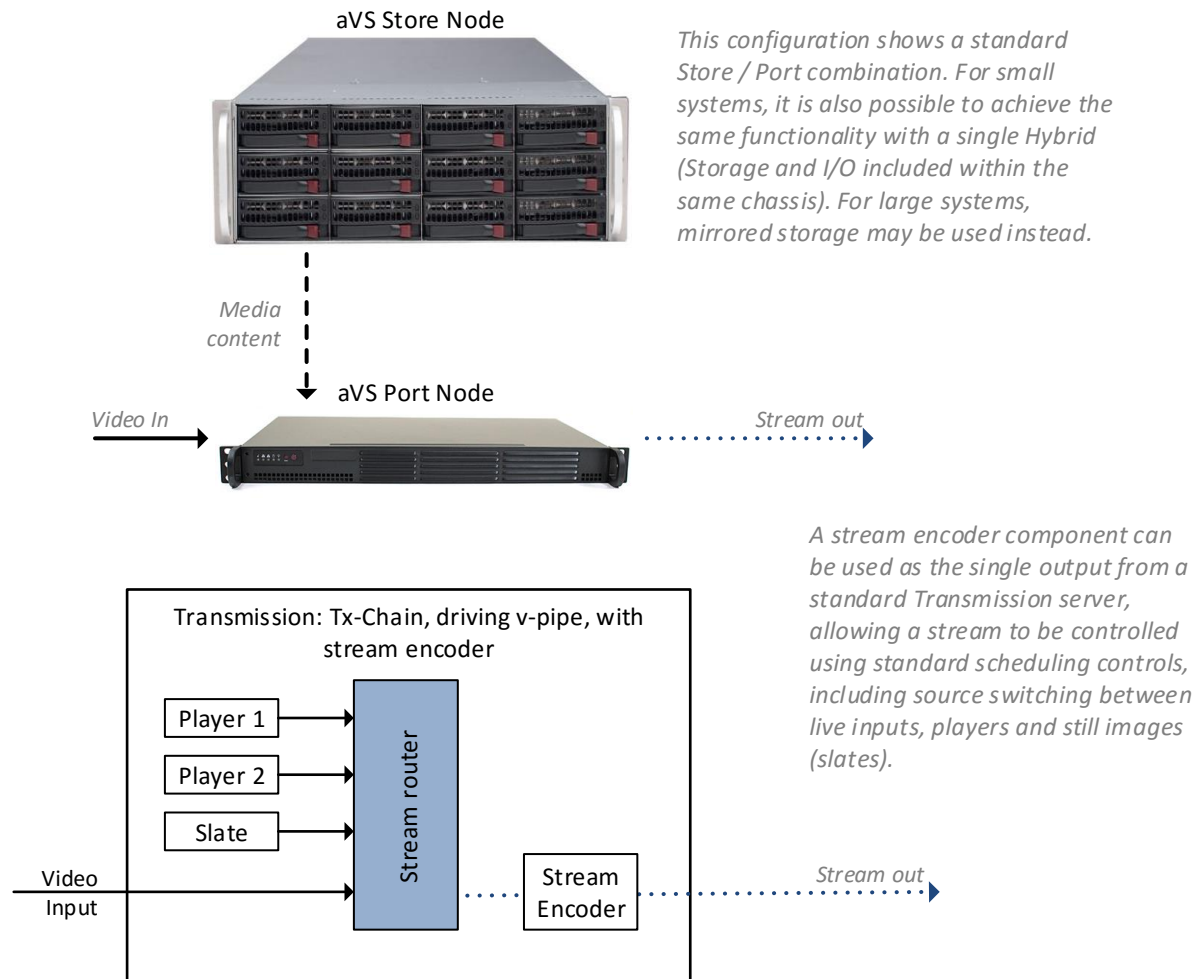
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#### aQ Broadcast system examples – redundant transmission & stream

NH

17 Jun '16

v1



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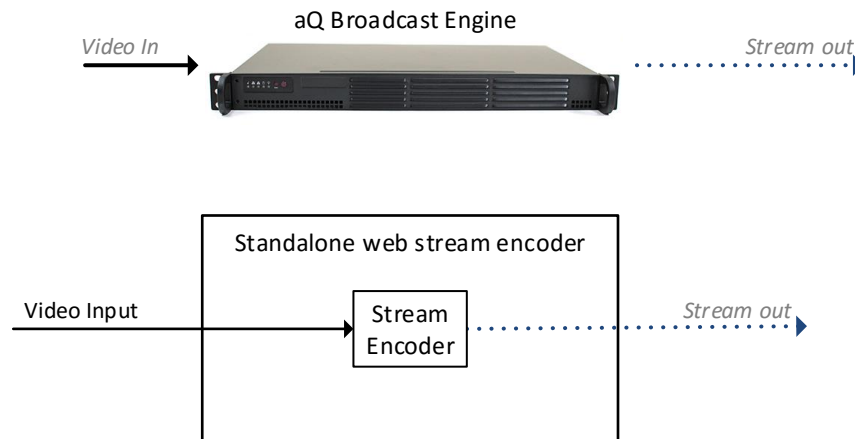
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**aQ Broadcast system examples – transmission (stream only)**

NH

22 Mar '16

v1



*An aQ Broadcast Engine can be used as a standalone web stream encoder, taking a video input and converting it to a web stream in RTMP or RTSP format.*

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aQ Broadcast system examples – standalone Web Stream encoder

NH

22 Mar '16

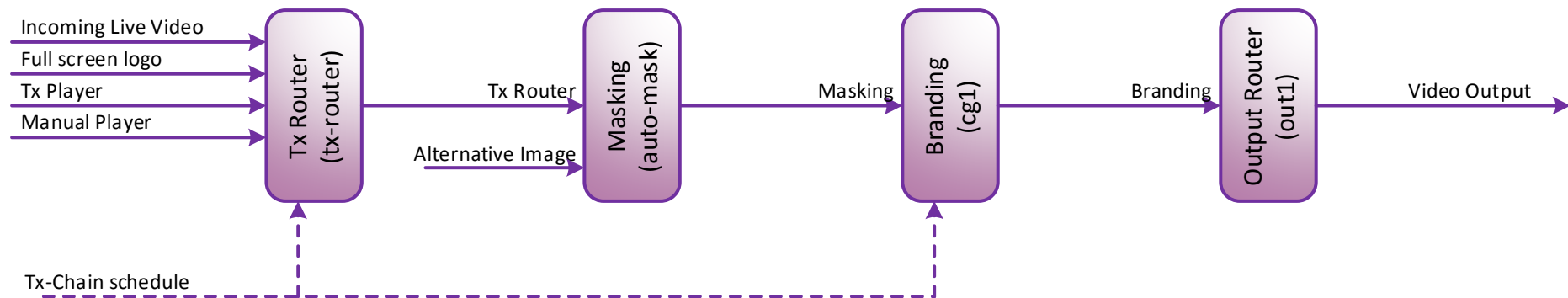
v1

*When running under control of an automation sequence, tx-router is switched by tx-chain in order to select the correct input based on the active schedule.*

*This 'mask' processor overlays the 'slate' graphic automatically when the incoming video matches the stored reference frame within the defined active detection area.*

*This 'cg' processor can add branding elements such as logo, clock, ticker, etc. Elements can be shown/hidden manually or under control of the active schedule*

*The output router controls the ultimate output from the server. Any of the inputs and internal sources can be switched directly to the output, bypassing any other internal routing and processing.*



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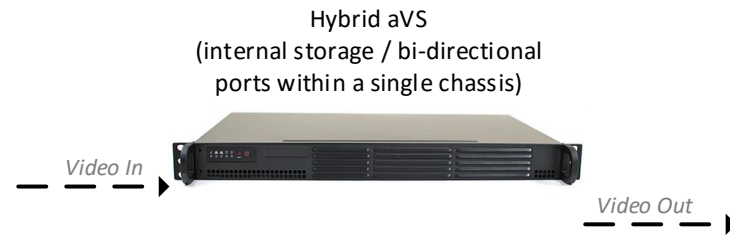
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**aQ Broadcast system examples –  
Video Pipeline illustration**

NH

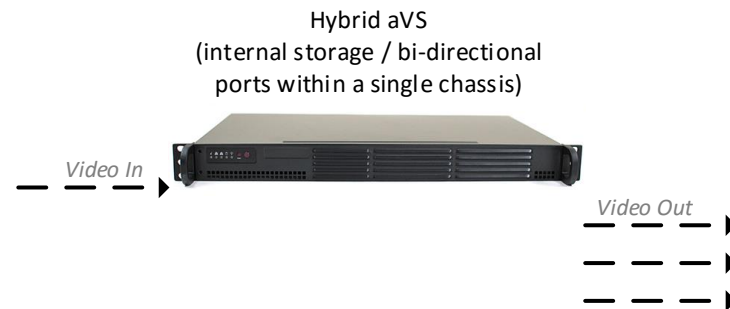
18 Apr '16

v1



*Simple delay application – e.g. profanity delay for live shows.*

*The incoming live video is buffered for a set period (e.g. 5 seconds) and then emitted from the video output. In the event of a problem, the audio may be muted on the output or replaced with a generic looped track, or both the video and audio can be replaced.*



*Multiple delay application – e.g. station output delayed for different time-zones*

*The incoming live video is buffered for a set period and then emitted from each video output after a set period. For instance, one output could provide a delay of one hour, a second output could provide a two-hour delay and another output could provide a three-hour delay.*

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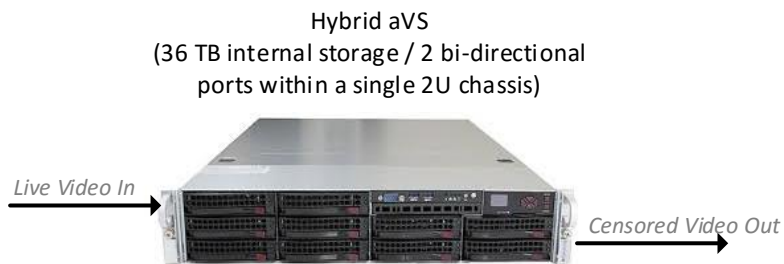
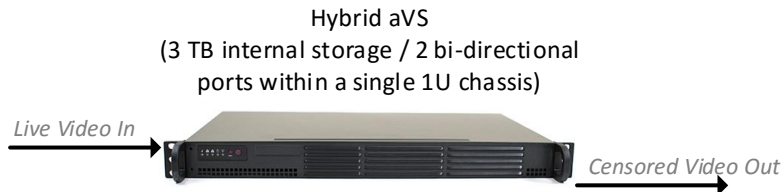
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aQ Broadcast system examples –  
standalone aVS Delay units

NH

3 Feb '16

v1



*The censorship workflow operates as follows:*

- 1) There will be a live video input, which will be recorded as the 'raw' version of the session.
- 2) There will be a censored video output, which will normally operate about 30 minutes behind real time (but could be less, see below). This will show all uncensored material from the raw recording. Censored material will not be shown on this output.
- 3) An operator will monitor the live input for 'non-parliamentary conduct'. If something happens that needs to be censored, the operator will use the raw recording to mark a portion which is not to be shown (or included anywhere else).
- 4) There will be a 'censored' recording, which will contain all raw footage that has not been censored. Where content is censored, the raw footage will play continuously around it - i.e. there will not be a 'hole' left, rather the last raw frame before the censored portion will run directly into the first raw frame after the censored portion.
- 5) Similarly, the censored output will show all raw footage that has not been censored. Again, where content is censored, the raw footage will play continuously around it - i.e. there will not be a 'hole' left, rather the last raw frame before the censored portion will run directly into the first raw frame after the censored portion. This may mean that the effective delay on the censored output reduces - an initial 30 minute delay will be reduced to 20 minutes if 10 minutes of content is censored. If the amount of censored content removed exceeds the delay (e.g. 35 minutes has been censored and the delay is only 30 minutes) then the output can show an alternative output - e.g. video and audio from a clip which is looping in the background, similar to profanity delay handling.
- 6) To summarise, the censored output is effectively playing back the censored recording, and the censored recording is being generated on-the-fly from the raw recording, with marked portions being removed.

*The smaller unit will allow recordings for a few days to be stored locally. The larger unit will allow recordings to be stored for around 90 days (both raw and censored versions).*

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aQ Broadcast system examples –  
aVS for censorship application

NH

11 May '16

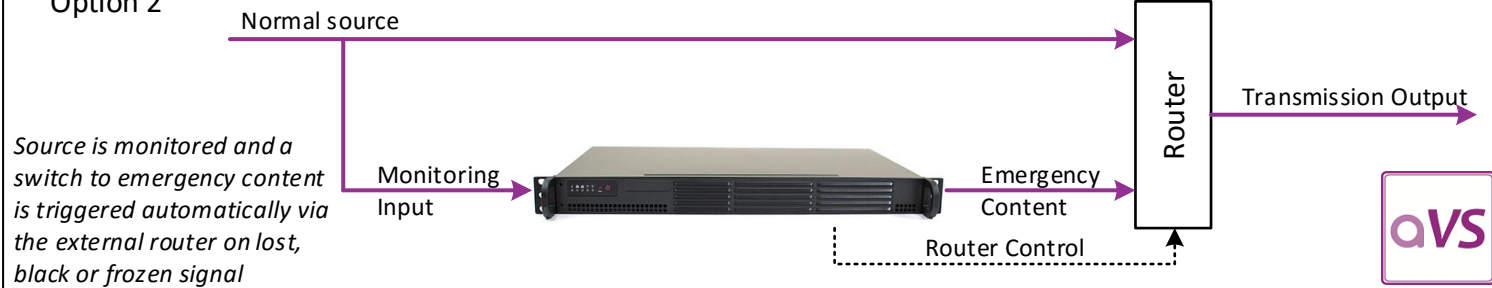
v1



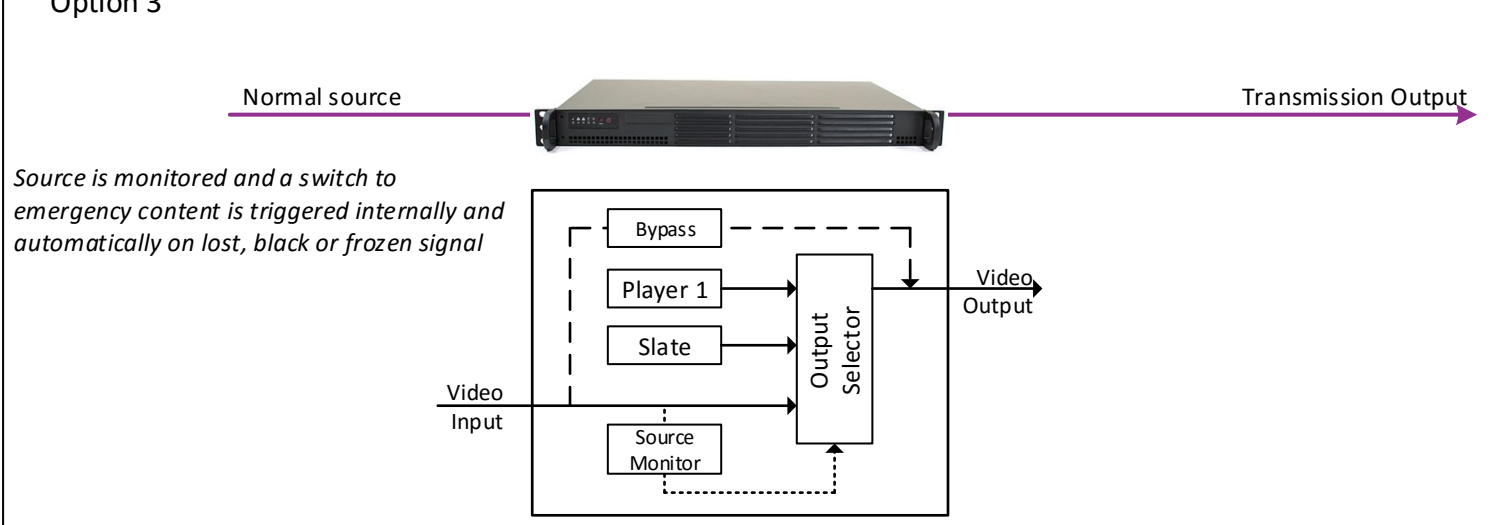
### Option 1



### Option 2



### Option 3



*Information provided by this drawing is for proposal purposes only and is subject to change without notice. All details will be confirmed as part of the order process.*

*This drawing is intended to promote understanding of the overall system and to indicate a proposed configuration. It is not intended as a complete engineering drawing. The images used are for representation purposes only.*

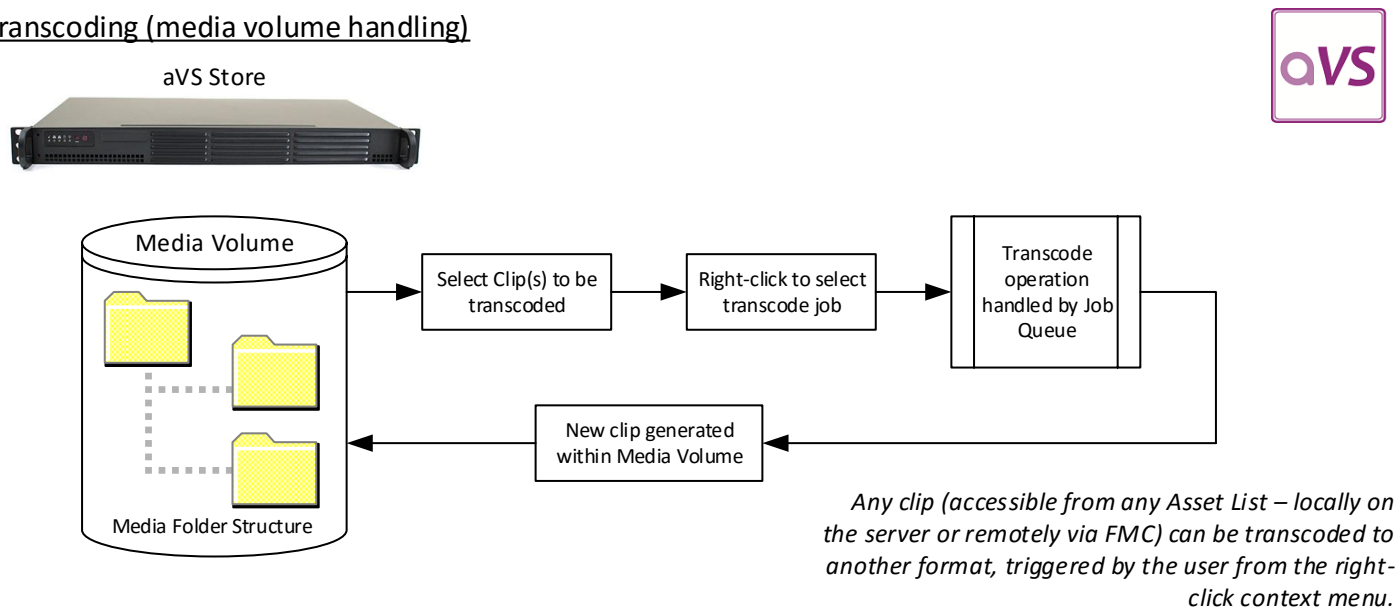
#### aQ Broadcast system examples – Disaster Recovery options

NH

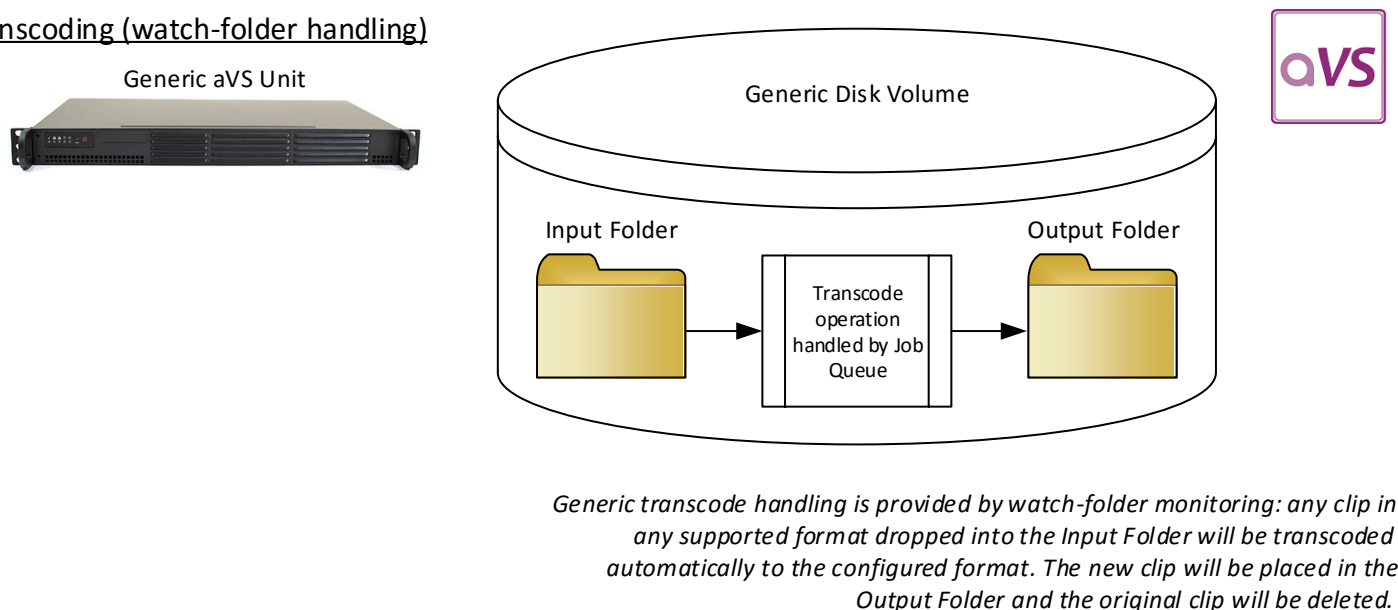
3 Apr '16

v2

## Asset Transcoding (media volume handling)



## File Transcoding (watch-folder handling)



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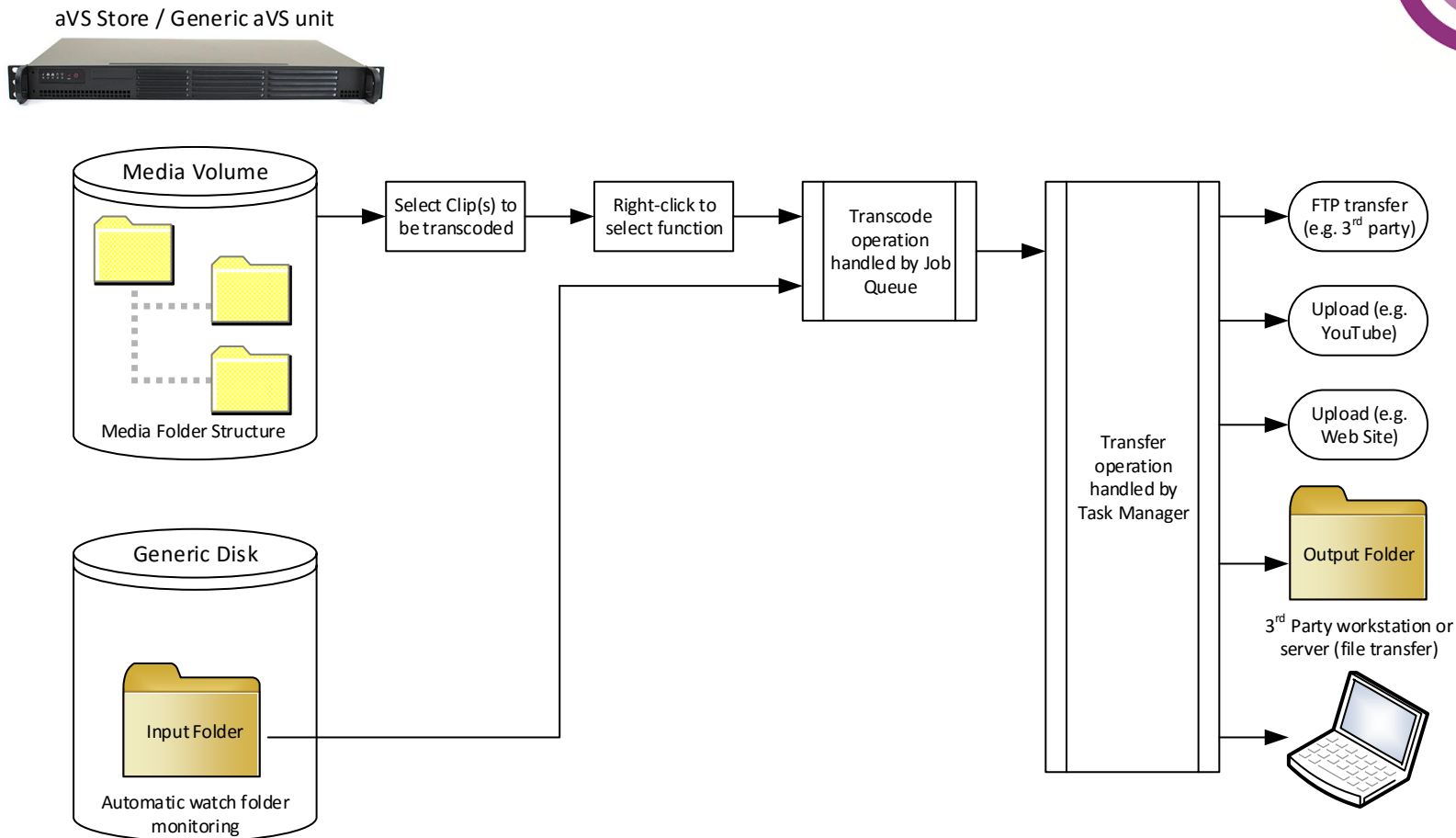
**aQ Broadcast system examples –  
File & Asset Transcoding**

NH

3 Apr '16

v1

'Send-To' Handling (Transfer with optional transcode)



'Send-To' handling provides transfer to a variety of sources using a specified format. Existing media can be selected from the Media Volume (via any Asset list) or generic clips can be dropped into a watch-folder to be processed automatically. The items are transcoded to the required format (if necessary) and are then transferred to the specified destination, using the selected mechanism.

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aQ Broadcast system examples – 'Send-To' Functions		
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