aQ Broadcast Limited

"making broadcast magic"

aQ Broadcast:
Integrated Broadcast Solutions

- **Broadcast Workflow Software** & **Broadcast Engine Hardware**
- We offer a range of software and hardware for use in all areas of media production and broadcasting.
- We design, develop, manufacture and support a wide range of integrated products, including scripting, newsroom, automation & media management software and video server, production & processing hardware.
- We have huge experience of, and passion for, our industry and strive to provide intelligent workflow solutions that offer great flexibility in a variety of environments.
- Our customers include schools, colleges, universities, churches, corporates and Broadcast stations in a range of sizes and markets.
- We also offer **Bespoke Software Development**, enabling media, production and broadcast companies to achieve specific / custom functionality at a viable cost.

Company Information

- Formed as a new company in November 2013 after management buyout of Autocue's workflow division.
- Privately owned and operated – the company is dedicated to developing and supporting its own products and is not constrained, or at risk, as part of a larger corporate group.
- Based in the UK, but staff in the US and New Zealand help to provide global coverage.
- All aQ staff were previously with Autocue and have vast experience of the product range and customer base.
- Current range has foundations in Autocue's original products, but with significant evolution over the last two years.

Integrated Broadcast Solutions

Broadcast Workflow Software

- includes scripting, newsroom, automation, media management, transmission, archive, mark-up and data display solutions – benefitting from over twenty years of continuous development.

Broadcast Engine Hardware

- a unique platform providing a huge range of broadcast functionality, from basic video server recording, storage and playback to fully-integrated studio and transmission solutions.

aQ Broadcast Workflow Software

Unique, multi-user scripting tools, proven NRCS for news production at any scale, integrated automation control for broadcast devices, transmission automation and simple media management.

Broadcast Workflow Software

- **QNet** offers unique, multi-user, multi-column script production tools, including shot locks, cut lines, scene numbering, camera cards, flexible formatting and optional prompting.
- **QNews** provides Newsroom Computer System (NRCS) functionality, supporting every type of environment from large national broadcasters down to small two-user systems.
- **QNews ACC** adds Automation Control Centre functionality for live productions, allowing a range of broadcast devices to be controlled directly from events entered into the rundowns and scripts. Events are prepared by the automation software, but triggered at the required point by an operator.
- **QScript** is an innovative, award-winning script mark-up tool, allowing the traditional process of printing, annotating, copying and distributing paper scripts to be replaced with tablet PC or touchscreen interfaces. Any annotation can be seen by all users across the network as soon as it is saved.
- **QTx** provides station automation capability, based on the same database and client system as QNews and the ACC. It offers a very cost-effective solution in an environment where the output consists of both live and pre-recorded program content.
- **QMedia** offers over-arching media management functionality for ACC and QTx, including ingest, review, deletion, transfer, proxy handling, archive and restore capability.

aQ Broadcast Engine Hardware

Cost-effective, flexible and innovative solutions for any broadcast application, from basic video servers to complete all-in-one production/transmission systems, and almost every requirement in-between.

Broadcast Engine Features

simple record / continuous record / looped record / time-lapse record

on-line storage / near-line storage / network access / FTP transfer / media archive

simple playback / playlist playback / sequence playback / variable-speed playback / stills playback / alpha channel / dynamic audio

disaster recovery / time delay / profanity delay / watch-folder processing / multi-viewer display

transcode / sub-clip / trim / upload / transfer / stream / move / convert / proxy view

fade-to-black/ fade-to-silence / transitions / vision mixer / audio mixer / audio levelling / still store / picture-in-picture / key

captions / branding graphics / squeeze-back / virtual routing

Broadcast Engine Versions

- **Hybrid**
  - Storage and I/O included within the same physical server
- **Store**
  - Storage only
  - Features include open network access via SAMBA / FTP and Store Mirroring
- **Port**
  - Input / Output only
  - Features include bi-directional ports, Port Mirroring, Port Linking and alpha-channel support (linked key+fill)
- **Utility**
  - Provides supporting functions, including Proxy Streaming, Transcoding, Sub-clipping, Upload, Transfer, etc.
- Different units can be combined to provide flexible system configurations

Broadcast Engine Hardware Platforms

- **Different rack size options,** typically 1U / 2U / 3U / 4U
- **Different port counts,** typically 1 / 2 / 4 / 6
- **Different connection options,** typically SDI with embedded audio, option for HDMI, also composite video with analogue audio, also alpha channel
- **Different RAID options,** software- or hardware-based
- **Different storage capacities,** from 2 TB to hundreds of TB
- **Different network options,** including 1GigE, 10GigE, Infiniband
- **Different standards support,** including SD, HD, 4K
- However, all platforms run the **same firmware**

Broadcast Engine - model examples*

Model	Type	Storage	RAID	Ports	PSU	NIC	RU
Entry Level	Hybrid	2 TB	Software	2	Single	1GigE	1U
Mid-range	Hybrid	3 TB	Hardware	2	Redundant	1GigE	1U
Mid-range	Hybrid	3 TB	Hardware	4	Redundant	1GigE	1U
Mid-range	Hybrid	6 TB	Software	4	Redundant	1GigE	1U
Mid-range	Hybrid	6 TB	Hardware	4	Redundant	1GigE	2U
Mid-range	Hybrid	12 TB	Hardware	4	Redundant	1GigE	2U
Mid-range	Hybrid	18 TB	Hardware	4	Redundant	1GigE	2U
Standard	Store	12 TB	Hardware	N/A	Redundant	1GigE	3U
Standard	Store	24 TB	Hardware	N/A	Redundant	1GigE	3U
High Capacity & Bandwidth	Store	36 TB	Hardware	N/A	Redundant	10GigE	4U
High Capacity & Bandwidth	Store	72 TB	Hardware	N/A	Redundant	10GigE	4U
Standard	Ports	N/A	N/A	2	Redundant	1GigE	1U
Standard	Ports	N/A	N/A	4	Redundant	1GigE	1U
High Performance	Ports	N/A	N/A	4	Redundant	1GigE	1U
High Performance	Ports	N/A	N/A	4	Redundant	10GigE	1U

** note – this is just an illustration of common models: other configurations are available*

Broadcast Engine OS / Firmware

- Operating System is a custom Linux distribution, optimised for purpose
- Firmware is developed entirely in-house
- OS and firmware can be updated easily over the internet
- Units have built-in ability to connect to the aQ support network for monitoring and configuration purposes
- All firmware components are installed on each unit, making it easy to enable / disable features and to combine different functions on a single server
- Most features are controlled by a software licence which can be updated quickly and easily over the internet

Broadcast Engine GUI

- A completely unique approach to the graphical user interface (GUI)
- The GUI is completely configurable by the user
- Different layouts can be saved for different users or different modes
- The same GUI can run locally on the server or remotely on a PC
- With appropriate network configuration, GUI can even be run off-site
- All GUI features are available at all times, even audio & video previews
- Remote GUIs are licenced on a concurrent basis, allowing flexible use
- FMC – Flexible Media Controller is a Windows application for W7/8.1/10

Broadcast Engine Functions: aVS - ‘classic’video server

- Typical video server functionality for Ingest, Storage and Playback
- **Playback** modes include
  - Single clip (one clip at a time)
  - Playlist (selected clips played in any order one at a time)
  - Sequence (selected clips played in a back-to-back sequence, including transitions)
  - Delay (delayed playback ranging from a few seconds to many hours)
- **Record** modes include
  - Single clip (simple recording)
  - Chunked (continuous recording broken up into individual clips automatically with no frame loss)
  - Looped (most recent content overwrites oldest material until the clip is saved or discarded)
  - Time lapse (configurable recording of individual frames into a single clip)
- **Storage** provides access to material across the network, with clips available without processing

Broadcast Engine Functions: aPS – Production Suite

- A unique integrated production system, providing a single, cost-effective solution for a variety of applications
- Combines a range of functionality to support live studio production from a single system in different environments
- Includes a variety of features as an all-in-one system, including
  - Vision mixing (supports multiple mixers / multiple ME banks)
  - Audio mixer (supports multiple mixers)
  - Internal clip playback and recording
  - Still-store
  - Caption Generator (e.g. lower-thirds) and Branding insertion (e.g. logo, clock, ticker, etc.)
  - Picture-in-picture and chromakey processors
  - Multi-viewer capability, both as video output and network stream
  - Output streaming (direct to another aQ device or to a third-party service such as YouTube / UStream)
  - Internal routing – e.g. to support AUX outputs for in-vision / on-set monitors
- Uses aQ's standard GUI, allowing a complete control room / gallery to be built from standard PCs

Broadcast Engine Functions: aMS – Media Server general features

- The Broadcast Engine supports an ever-increasing range of additional functionality, including
  - Archive/Restore (on a variety of archive platforms, including spinning disk & data tape, using standard hardware)
  - Transcode (user triggered from the asset list or automatically via watch-folder handling)
  - Sub-clip / Trim (including audio fade in and out, plus audio levelling)
  - Upload (e.g. to YouTube, including transcode from a marked portion of a specified clip)
  - RTMP/RTSP streaming
  - Direct aQ-aQ streaming (i.e. directly from one Broadcast Engine to another, over a standard internet link). Both 'NetStream' & 'FileStream' functions are available.
  - Content movement (controlled from any GUI and handled direct from unit to unit)
  - Program Delay (e.g. across timezones) and Profanity Delay (including audio and video blanking)
  - Watch folder handling (including automatic conversion, transfer and upload operations)
  - Proxy streaming (allowing frame-accurate review of original content across the network without file generation)
  - Output protection (input monitoring / automatic switching)

Supported Formats Summary

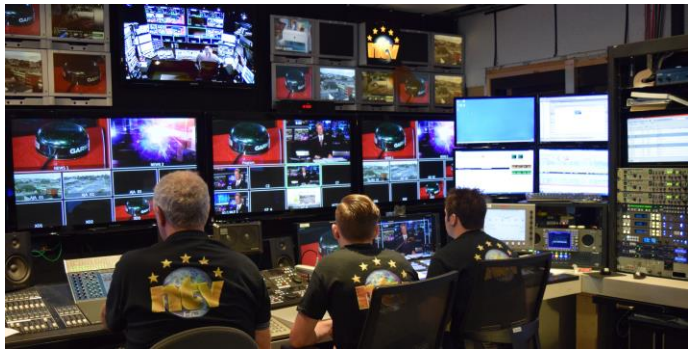
- Almost any common file format can be played back, in almost any resolution and frame rate, including AVI, DV-DIF, FLAC, FLV, MP3, MXF, Quicktime & MP4, plus still images (JPEG, BMP & PNG)
- Files from a Nexio server (LXF) can be played back directly without prior conversion
- Some formats are supported for only for end-to-end-playback-only, including AIFF, ASF, GXF, MPEG stream
- Almost any common video format can be played back, including DV-Video, MPEG-1, MPEG-2, MPEG-4 pt.2, DNxHD, h.264/AVC/MPEG-4 pt.10, Motion JPEG, ProRes, Dirac, HEVC/h.265, JPEG-2000 & uncompressed RGB/YUV. Other recognised formats include h.261, h.263, Apple Intermediate Codec, Flash Video, and many others. Playback support for audio formats includes PCM, MPEG-1 audio (layer 1,2,3), AAC, FLAC, AC-3 & Apple Lossless
- Recording is possible into a range of file formats: Quicktime (default), AVI, DV-DIF, MP4, MXF D-10, MXF OP-1a & MXF Op-Atom
- Video encodings supported for recording include Apple ProRes, DNxHD, DV Video, DVSD/DVCPro25/DVCPro50, Motion JPEG, MPEG-2 & MPEG-4 part 2, with options for h.264/AVC and DVCPro-HD
- Audio encodings supported for recording include Uncompressed (PCM), AAC, MPEG Layer 2 & FLAC
- The range of supported formats is expanding continuously

Broadcast Engine applications / customers

- aQ units are already in use in a wide range of environments around the world:
  - **Traditional Broadcasters** (BBC Media Action, Tunisia – BFM-TV, France – Australian Broadcasting Corporation, London & Washington – Evine Live, MN)
  - **Local/Regional TV** (UK Local TV operators in Norwich, Brighton, Portsmouth, Birmingham, Manchester, Preston, Oxford, Nottingham, Liverpool & Cambridge – Sadnha TV, India – Landmark TV, India – Charran TV, India – Nutmeg Public Access TV, CT – Azteca Noreste, Mexico – Ware Access TV, MA – Danvers Community Access TV, MA – Tanana Valley Broadcasting, AK – Al Sharqiya TV, Jordan – Namibian Broadcasting Corporation, Namibia – RTHK, Hong Kong)
  - **Academic** (Georgetown University, Washington DC – Millersville University, Pennsylvania – University of Bedfordshire, UK – Nottingham Trent University, UK – University of the Creative Arts, UK – Staffordshire University, UK – University of South Wales, UK – Thomas More University, Belgium)
  - **Religious** (Glad Tidings Assembly of God, PA – Morning Star Fellowship, PA)
  - **Corporate** (3M, Wells Fargo, Bank of America, Conde Nast Publishing, Rich Products Corporation, PriceWaterhouseCoopers, Royal Bank of Scotland)

Case Study: NTV News, Newfoundland

- Playback into news programmes, including alpha channel support for key/fill content and mirrored playout ports
- Integrated control from QNews ACC plus manual control from FMC
- Remote ingest/review functionality via any networked PC
- One large Store (18 TB, hardware RAID-6, 10GigE NIC) plus two four-port I/O nodes. Expansion for additional I/O will be straightforward with extra port nodes.
- In full operation for over two months – replaced aging Harris system
- Recent comment from Chief Engineer: "**Thank-you to you and your team for the extra effort to assist us. Once again, you have reassured us in our decision to expand our relationship with aQ.**"



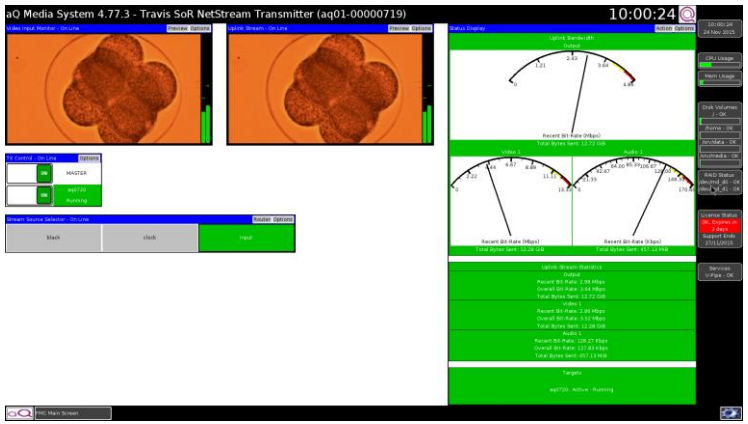
Images show server hardware and NTV's studio gallery

Case Study: NTV Transmission

- Installed in January 2016: will replace an aging Harris system and currently running in parallel during operator training
- Full transmission playout for all programmes and commercials, including mirrored playout from two completely independent Tx-Chains
- Utilises the 'video-pipeline' configuration, which enables flexible configurations with multiple players, slates, live sources and internal routing
- Integrated scheduling from QTx, plus manual control, plus integration with traffic scheduling system
- Two large mirrored Stores (all content automatically copied between them), plus two two-port I/O nodes and four-port hybrid for ingest, review and emergency playback
- NTV's Studio Chief Engineer: "**We are very pleased with the new content management and play-out solutions in both our Newsroom and Master Control. With over 26 years of selecting and commissioning new hardware, I can state with confidence that aQ Broadcast go above and beyond with their professionalism, leaving their competition far behind. Their level of support is next to none.**"

Case Study: NetStream worship application

- Due to be installed in March – currently being trialled
- Requirement to stream a sermon from the main campus to a satellite campus, but existing streaming solution is unreliable and inflexible
- Two 1U units will be used
  - Main campus: NetStream transmitter for the main campus, which will accept an SDI / HDMI input
  - Satellite campus: a Hybrid NetStream Receiver / aVS with local storage and an SDI / HDMI output
- The Transmitter will send the live sermon to the Receiver via a standard internet link. The Hybrid unit at the Satellite will receive and record the incoming stream, allowing it to be played out at any time, including whilst still in progress. An internal router will allow the output to be switched between incoming stream, internal player, static logo and test signal.



Images show server hardware and transmitter screenshot

Case Study: 3M

- Centralised video solution for 3M's HQ to replace multiple, standalone portable media players which required constant movement of files.
- New central Store (32 TB) with two four-port I/O nodes.
- Key benefit is use of Flexible Media Controller (FMC) GUI, which allows control of any port from any networked PC. 3M were surprised by its capability: **"The FMC delivered functionality far above what we had initially specified. We never really expected to have this level of portable integration, and it has made us all far more productive."**

3M Media Solutions Technical Coordinator Marilyn Cook controls the aQ Broadcast system from 3M's head-end facility.

Case Study: BCTV, Birmingham, UK

- One of the new UK Local TV (city-based) broadcasters
- Needed to be able to run regular news bulletins via an existing TriCaster and equip a brand new studio for a range of live and pre-recorded productions
- Central Store provides storage for all station media. Four-port I/O node supports ingest, review and news playout. Production Suite (aPS) provides all functionality for the new studio, including mixing, graphics, still store, playback and recording.
- QNews provides core NRCS functionality for all production
- Automation Control Centre (ACC) provides control over TriCaster from new running order, including tally integration (selecting the source on the TriCaster vision mixer program bus automatically triggers playback, and the end of the clip triggers a transition back to the preview source). The same integration is also available as a wrap-around solution for the ATEM.
- ACC and FMC provide control over the aPS for studio production – the gallery consists just of three standard PCs.

Case Study: That's TV network, UK

- Another of the UK LTV operations, but will be the largest network of stations with presence in nine cities.
- Unlike other LTV sites, That's handle all transmission output themselves rather than delegating to a shared Network Operations Centre. Each site has to generate its own 24/7 output.
- Four stations are currently live, the remaining five will launch in 2016. We have provided four broadly similar systems, each built and configured off-site in a wheeled 24U rack and rolled into place.
- Each system consists of a Store, an aPS and a Transmission (Tx) server, plus QSeries Windows servers. The aPS provides all functionality for studio production, with its output fed into the Tx server. The QTx automation switches between live studio output and clip playback based on its schedule.
- Additional functionality includes upload to YouTube, NetStream connections between the sites (enabling networked shows to take place) and in the future the ability to stream the live output – all provided within the standard firmware without additional software or hardware being required.
- Dan Cass, CEO, said: **"We are very pleased that we chose the fully-integrated aQ Broadcast system for That's Manchester. The system is intelligent, robust and intuitive. We've been really pleased with the support from the team and their openness to adding specific features to meet our own particular requests."**

Case Study: Evine Life, three US sites

- US shopping channel, previously ShopHQ, understood to be part of NBC
- Originally purchased a Store plus two four-port I/O nodes for use in general playback.
- Subsequently set up a small satellite operation at a new location and purchased a small two-port Hybrid aVS (storage and I/O within same unit)
- Most recently had a requirement to provide two outputs delayed by an hour. They have now purchased two of our new third-generation units to provide simple delayed playback operation.

Example of a 2U Hybrid aVS – four I/O ports, with approx. 6 TB hardware RAID storage

Case Study: Sadnha TV, India (via JVC)

- Resold by JVC Middle East
- Self-contained system to provide complete newsroom, news automation and transmission automation functionality
- Built and configured in the UK prior to shipping
- Provided as five 1U servers:
  - Pair of clustered (redundant) QSeries Database Servers
  - Single QSeries Utility Server, including text archive handling
  - Pair of two-port aVS units, providing both mirrored and independent ingest, storage and playout

Canadian Customers – QSeries & aVS

- Rogers/Citytv, Toronto
- Rogers/Citytv, Montreal
- Rogers Sportsnet/Sportsnet360, National
- CKWS, Kingston
- CHEX, Peterborough
- CJON/NTV, St. John's
- CFVS, Val d'Or
- CHOT, Gatineau,
- CKEM, Rouyn-Noranda
- Algonquin College, Ottawa
- Centennial College, Toronto
- Fanshawe College, London
- Loyalist College, Belleville
- Nova Scotia Community College, Dartmouth
- Ryerson University, Toronto
- RTV, Toronto/Mississauga/Barrie
- The Weather Network, Oakville

aQ Broadcast Limited

"making broadcast magic"

www.aq-broadcast.com

sales@aq-broadcast.com

@aqbroadcast

+44 (0) 118 324 0404

Additional Detailed Information

FORMAT INFORMATION

Format Information: Processing

- Supports standard video modes up to 1080i/p 25/29.97/30. SDI by default, other connection options available. 3G-SDI modes (1080p @ 50/59.94/60 fps) available as options.
- Extensive support for video resizing, frame rate conversion, colour space conversion. Full 10-bit 4:2:2 on standard SDI connections. Advanced up/down/cross conversion for standard HD and SD formats including field/frame temporal delta processing.
- All internal processing in 4:4:4 RGB/YUV
- Full support for alpha processing on appropriate hardware including 4:4:4:4 YUV/RGB
- Supports up to 8 (16 on 3G-SDI) embedded audio channels in SDI. All internal audio processing is in 32 bits-per-sample integer, or 32/64 bits-per-sample floating point.
- Extensive support for sample rate conversion, format conversion, channel multiplex/de-multiplex.
- Extensive support for ancillary data (VANC/VBI) and closed captions (CEA-608, CEA-708, SMPTE S436m)

Format Information: Playback Container

- Full-function video and audio container formats:
  - AVI (Audio Video Interleave)
  - DV-DIF (DV video stream)
  - FLAC (Free Lossless Audio Codec native stream)
  - FLV (Flash Video)
  - LXF (Nexio Native Format)
  - MP3 (MPEG layer-3 audio)
  - MXF (Media Exchange Format) – Accepts valid OP-1a and Op-Atom files.
  - Quicktime
  - ISO Media Format (mp4)
  - Frame Sequence (.seq)
  - Wave (.wav)
  - Y4M uncompressed video
  - XML Clip Description (.clip)
- Still Image formats: JPEG/JFIF, Bitmap, PNG, SGI (Silicon Graphics Image)
- End-to-end-playback-only video and audio container formats: AIFF, ASF, GXF, MPEG stream (PS, TS, ES), MKV (Matroska)

Format Information: Playback Encodings

- Video Encodings
  - Supported formats: DV-Video, MPEG-1, MPEG-2, MPEG-4 pt.2, DNxHD, h.264/AVC/MPEG-4 pt.10, Motion JPEG, ProRes, Dirac, HEVC/h.265, JPEG-2000, Uncompressed RGB/YUV.
  - Many other formats are handled, including h.261, h.263, Apple Intermediate Codec, various On2 codecs, Flash Video, and many others.
- Audio Encodings
  - Virtually any PCM (uncompressed) format is supported and extensive conversion capability is built in.
  - Supported encoding formats: MPEG-1 audio (layer 1,2,3), AAC, FLAC.
  - Many other audio formats are handled, including AC-3 and Apple Lossless.

Format Information: Recording Container

- Recording is possible in the following container formats:
  - Quicktime (default)
  - AVI
  - DV-DIF
  - ISO Media Format (MP4)
  - MXF D-10
  - MXF OP-1a
  - MXF Op-Atom.
- Not all container formats are capable of storing all video/audio encodings
- Some functions, e.g. subtitles/captions, are only supported for recording in specific containers

Format Information: Video Encoders

- Note: the number of available simultaneous recordings depends on encoding format and hardware capability.
- Apple ProRes. SD or HD, 4:2:2, Standard / HQ / LT / Proxy profiles.
- DNxHD. HD only, 4:2:2, 8 or 10 bit, up to 440 Mbits/sec.
- DV Video. SD as standard, DVSD/DVCPro25/DVCPro50.
- Motion JPEG. SD or HD, supports both quality and bit-rate control.
- MPEG-2. Intra (I-frame only) as standard, long-GOP optional. 4:2:0 and 4:2:2. Presets for several configurations including IMX (for SD). Can also be freely configured for special requirements.
- MPEG-4 part 2. Intra (I-frame only) as standard, long-GOP optional.
- Additional encodings are available as options, including h.264/AVC and DVCPRO-HD

Format Information: Audio Encoders

- Uncompressed (PCM) audio is recommended in most cases. 24-bit integer storage is typical, but many options are available up to 64-bit floating point. Audio is normally stored at 48 KHz (native SDI sample rate) but sample rate conversion is built in.
- The following encoders are also available:
  - AAC (Advanced Audio Codec). Single and multi-channel support, any AAC-legal bit rate.
  - MPEG Layer 2. Mono and Stereo only. Bit rates up to 320 Kbits/sec supported.
  - FLAC (Free Lossless Audio Codec). Supports multi-channel audio.

Additional Detailed Information

"4K" SUPPORT

“4K” Summary

- UHD – Ultra HD – will generally, at present, mean 3840 x 2160 pixels, technically referred to “4K UHD” according to both ITU and EBU.
- The equivalent for cinema-style operation is technically “4K DCI” and is 4096 x 2160 pixels.
- Typically there are two categories of 4K-UHD:
  - 25/29.97/30 fps - 6G-SDI
  - 50/59.94/60 fps - 12G-SDI.

4K-UHD Broadcast Engine hardware

- Three things are required for 4K-UHD support:
  - Underlying 4K-UHD support throughout the core firmware / infrastructure
  - Sufficient CPU power and memory bandwidth to process 4K-UHD material, in particular for video decoding and encoding, but also other functionality such as colourspace conversions and rescaling
  - Hardware interfaces (typically SDI) for 4K I/O
- The core infrastructure is already capable of processing 4K-UHD material - fundamentally, it is resolution neutral, and will in fact process any frame size. Video encoders and decoders that work at 4K-UHD resolutions also exist already.
- The resource utilisation is intensive: 4K-UHD takes four times the resources of full HD at the same frame rate and stepping up from normal HD frame rates to the higher frame rates offered with 4K-UHD, will require 8x the resources. Our standard current platform should be capable of playing out two normal-rate 4K-UHD streams, or recording one stream, depending on codec . However, more powerful platforms are available as an alternative to support more parallel streams.
- There are several mechanisms for transporting a 4K-UHD stream:
  - Single Link – 4K-UHD up to 30fps on 6G-SDI, up to 60fps on 12G-SDI (this is a proprietary, non-standard, connection mechanism)
  - Quad Link in quadrants: up to 30fps on 4x HD-SDI, up to 60fps on 4x 3G-SDI
  - Quad Link using SMPTE S425-5 (interleaved splitting of the image instead of quadrants): again, up to 30fps on 4x HD-SDI, and up to 60 fps on 4x 3G-SDI
  - Dual Link - 30fps over two 3G-SDI links, by effectively using each 3G-SDI as two HD-SDI links (i.e. quad-link over two cables)
- We can provide hardware I/O options for each type of connection, depending upon requirements for any particular project.

Additional Detailed Information

INTEGRATION WITH AVID MEDIACOMPOSER

AVID integration – Media Composer

- Integration with AVID MediaComposer is difficult and unreliable – their support for third-party file formats changes unexpectedly from version to version, and the formats that they produce do not necessarily conform to standards.
- The most reliable operation has been achieved with DNxHD and we would always recommend that is used.
- It is not currently possible to import the files that MC stores in the MXF/1: despite using the .mxf extension, the files are not valid MXF and are an Avid-specific format. Similarly, it is not currently possible to generate files that can be copied into the MXF/1 tree and used directly by MC.
- MC can render out edits to Quicktime and to MXF OP-1a files. Providing the selected output configuration falls within defined format specifications, these files can be played back successfully. There is already specific handling in our MXF reader for Avid-generated files because they don't conform to the SMPTE specification in various ways.
- Conversely, MC can AMA link to DNxHD in MXF OpAtom files that we generate, and AMA linking to DNxHD in MXF Op-1a files should also work correctly. MC5 could AMA link to QuickTime intra-coded files, but that stopped working in MC6. It is not clear whether that issue has been resolved by Avid yet.
- It is very likely that further support for other file formats / configurations could be added with additional development, based on specific customer requirements.

Additional Detailed Information

NAS / SAN COMPARISON

NAS / SAN Summary

- Individual aQ Storage Nodes equate to a NAS, rather than a SAN.
- However, multiple Stores can be linked together to form a SAN-like system, e.g. as pairs of Stores with automatic mirroring, or by using multiple Stores as ‘storage islands’ for different applications / projects.
- It is also possible to interoperate with a third-party SAN systems in two ways:
  - The Storage Gateway server can provide the ability to transfer assets between the SAN system and standard AMS storage nodes.
  - The Storage Gateway server can be utilised by Port Nodes to play back from, and record to, files on the SAN.

NAS / SAN Background

- NAS : Network Attached Storage.
  - The NAS unit will have disks attached to it. Clients access the NAS at the file level. Multiple clients can share access to the files. All the traffic ultimately goes through the NAS unit. Access to the NAS is typically over the same shared IP network as all other traffic and generally will use software built into the client OS (e.g. SMB for Windows). Multiple NAS units each appear as individual "drives" in Windows.
- SAN: Storage Area Network.
  - SAN systems normally consist of multiple disk arrays and "Directors" that, together with the clients, are connected to a separate, dedicated "storage network" which is commonly FibreChannel, but can also be Ethernet. Clients will normally require special software installed, which is provided by the SAN vendor.
- In most cases where video-file storage is required, NAS-type systems are likely to be adequate. A SAN might be needed only if the required throughput is extremely high.

NAS Storage Capacity

- In terms of storage capacity, NAS systems can scale in two ways:
  - NAS units such as aQ Storage Nodes can scale up to large numbers of drives and arrays – Petabyte-level storage can be built.
  - Multiple NAS units can be attached to the same network. They do act mostly as "islands" but it can be useful to allocate the NAS units to workgroups / departments.
- aQ Storage Nodes can work together seamlessly in several ways:
  - I/O nodes can record to, and play back from, any storage node that they can access, completely seamlessly. That includes mixing clips from different storage nodes in the same edit, or sequence, or playlist.
  - QSIA management can make the physical location of the clips virtually irrelevant.
- Resilience of disk subsystems in NAS units can be built to be at least as reliable as SAN systems, including both RAID resilience within arrays and secondary replication across arrays that are attached to the same NAS.
- In the case of AMS storage nodes, duplicate AMS nodes can be automatically maintained as replicas – i.e. two identical AMS nodes can be automatically maintained such that the two units retain identical content.

aQ Storage Nodes – NAS functionality

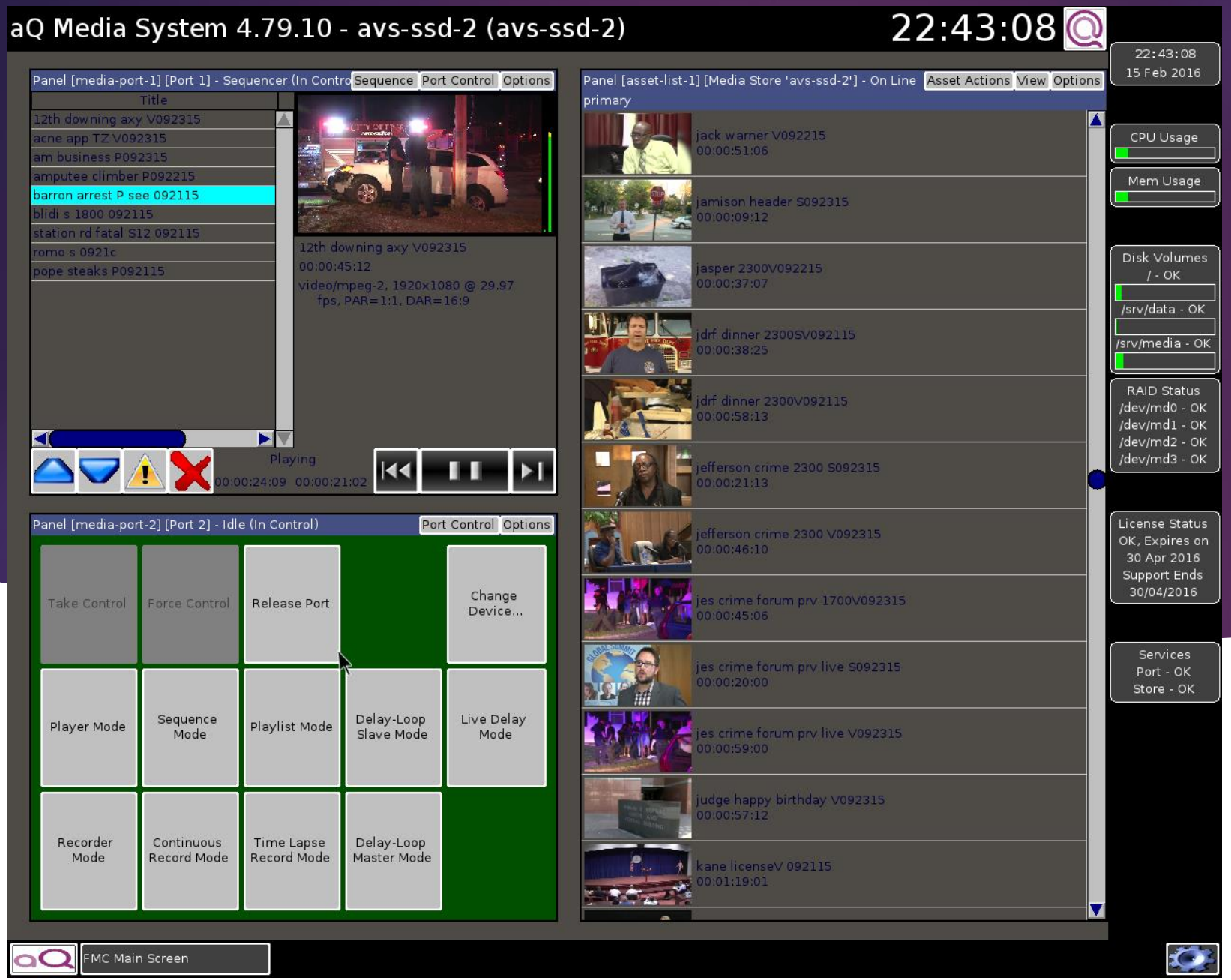
- aQ Storage Nodes are media storage systems that also provide NAS functionality on top of the directly-attached disk arrays.
- aQ Port Nodes (I/O capture and playback) require that there is a Storage Node in order to provide the necessary special handling that allows capture and playback to be inherently resilient.
- Port Nodes cannot directly interoperate with a third party SAN or NAS because they cannot provide the necessary bandwidth and latency guarantees.
- The aQ Storage Gateway provides a mechanism for the various aQ sub-systems, including Port Nodes, to interact with a third-party SAN.
- The Storage Gateway runs on a system that is a SAN client and other aQ Nodes (Port, Transfer, etc.) all communicate through it. The Storage Gateway provides the necessary buffering and management to allow Port Nodes to play back from / record to the SAN.
- It would be valid to mix the Storage Gateway / SAN combination with other aQ Storage Nodes. For example, a Store – possibly with replication – could be used as the primary storage for live video packages in transmission and news systems, while also running a SAN that is used for package editing and preparation. A Storage Gateway / SAN configuration allows for clips to be properly tracked and transferred between systems, and the ability of the Port Nodes to play directly from the SAN (via the Storage Gateway) allows last-minute edits (for example) to be played out directly to air.

Additional Detailed Information

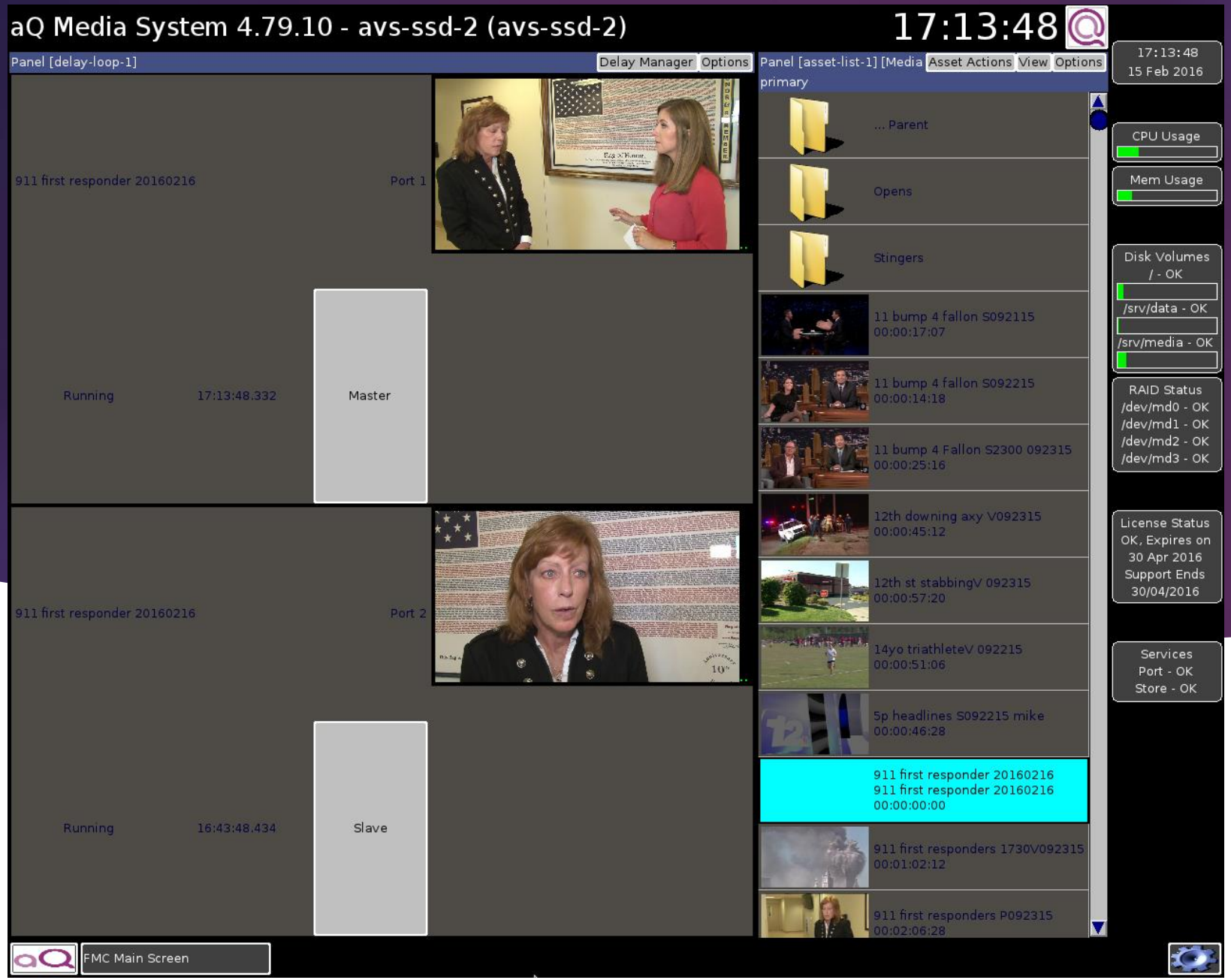
EXAMPLE SCREENSHOTS:
FMC (FLEXIBLE MEDIA CONTROLLER) – RUNNING UNDER WINDOWS

Simple Playback – two individual clips on two separate ports

Playlist Playback – a series of clips (which can be played back one at a time in any order) loaded into one port



Sequence Playback – a series of clips (which can be played back-to-back, with transitions) loaded into one port



Delayed Playback – a clip being recorded into one port (using an optional loop) can be played back after a defined delay on another port

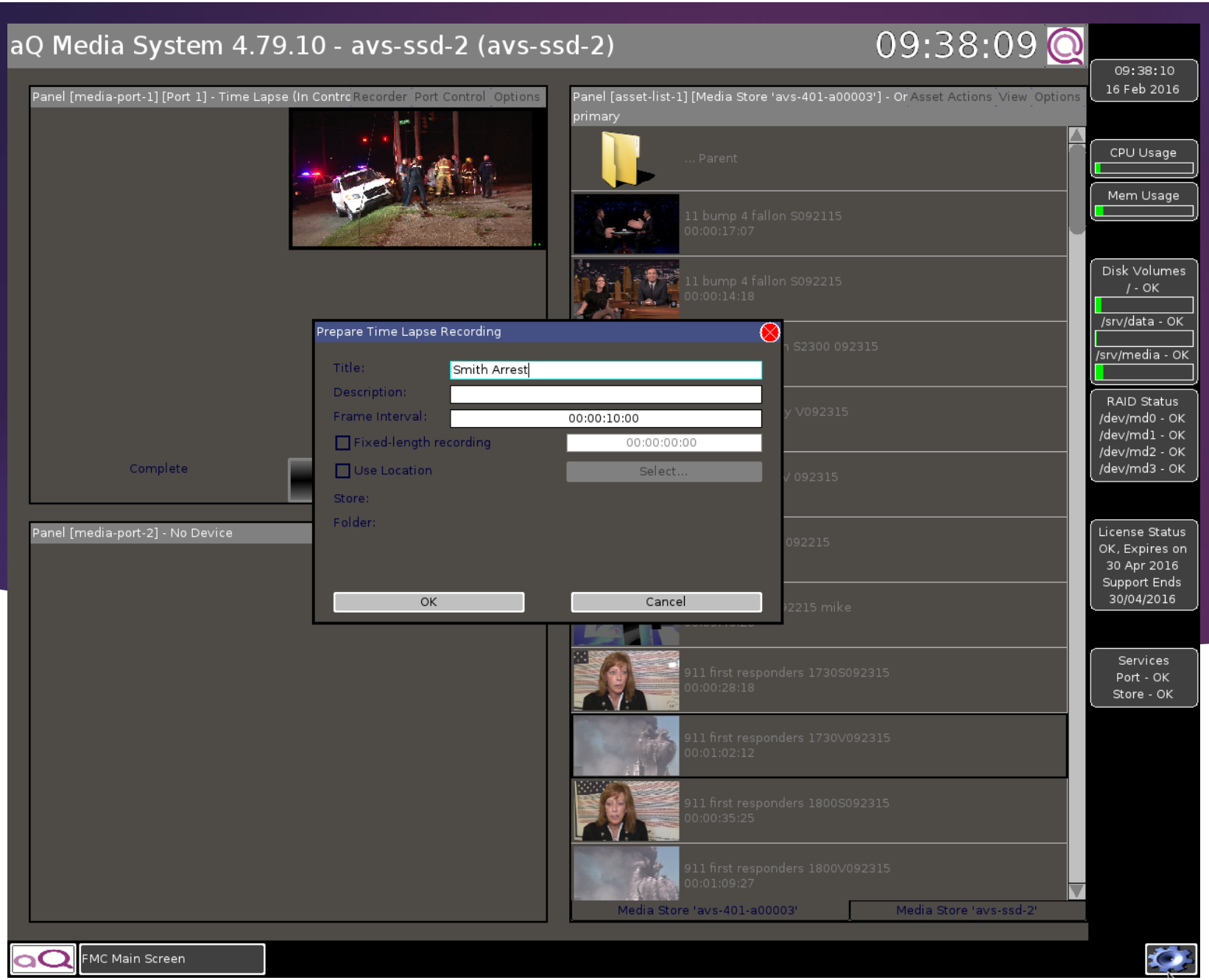
Variable Speed Playback allows clips to be played using frame repeats or frame skips

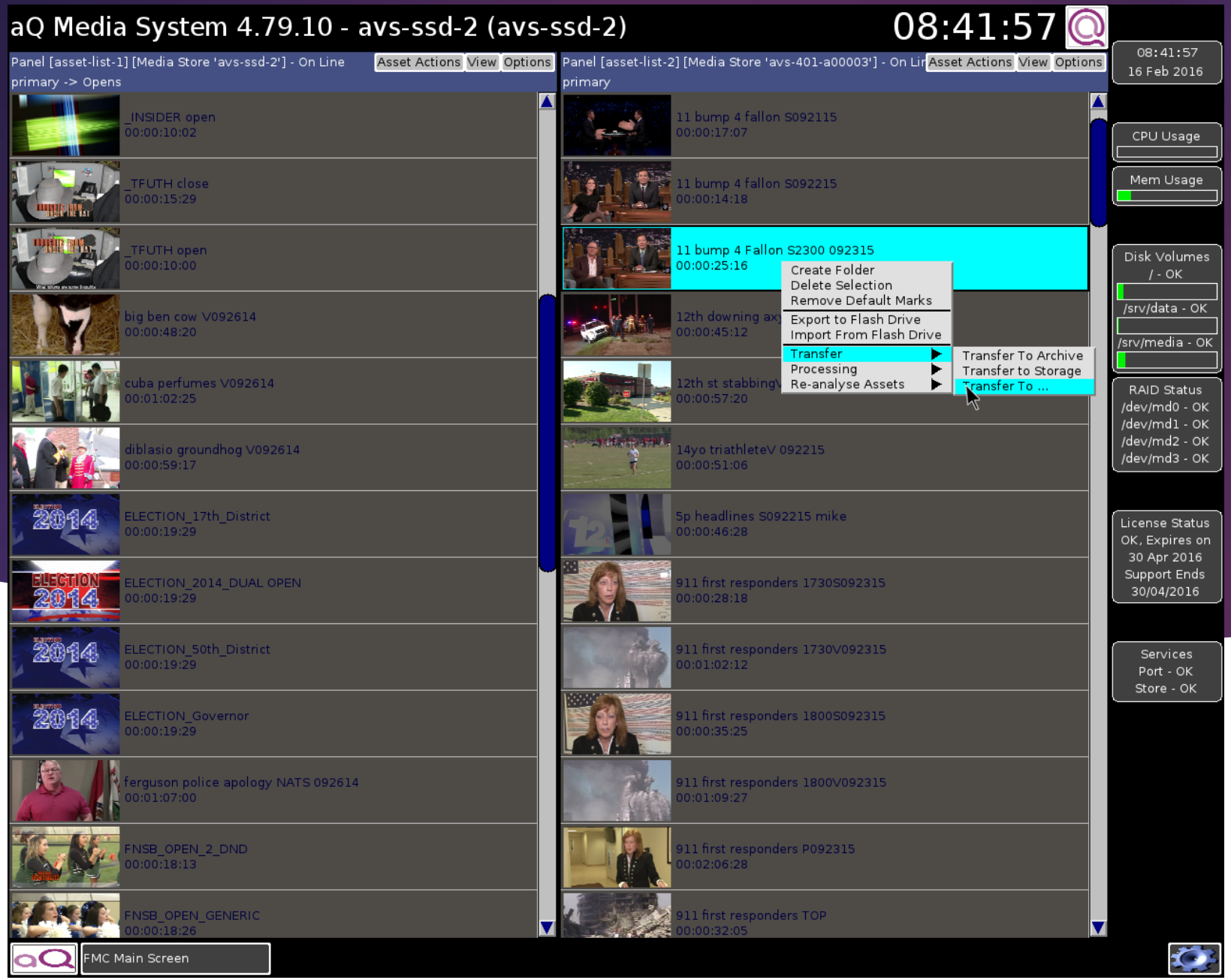
Simple recording on one port

Continuous recording on one port (creates a series of clips without any frame loss between each one)

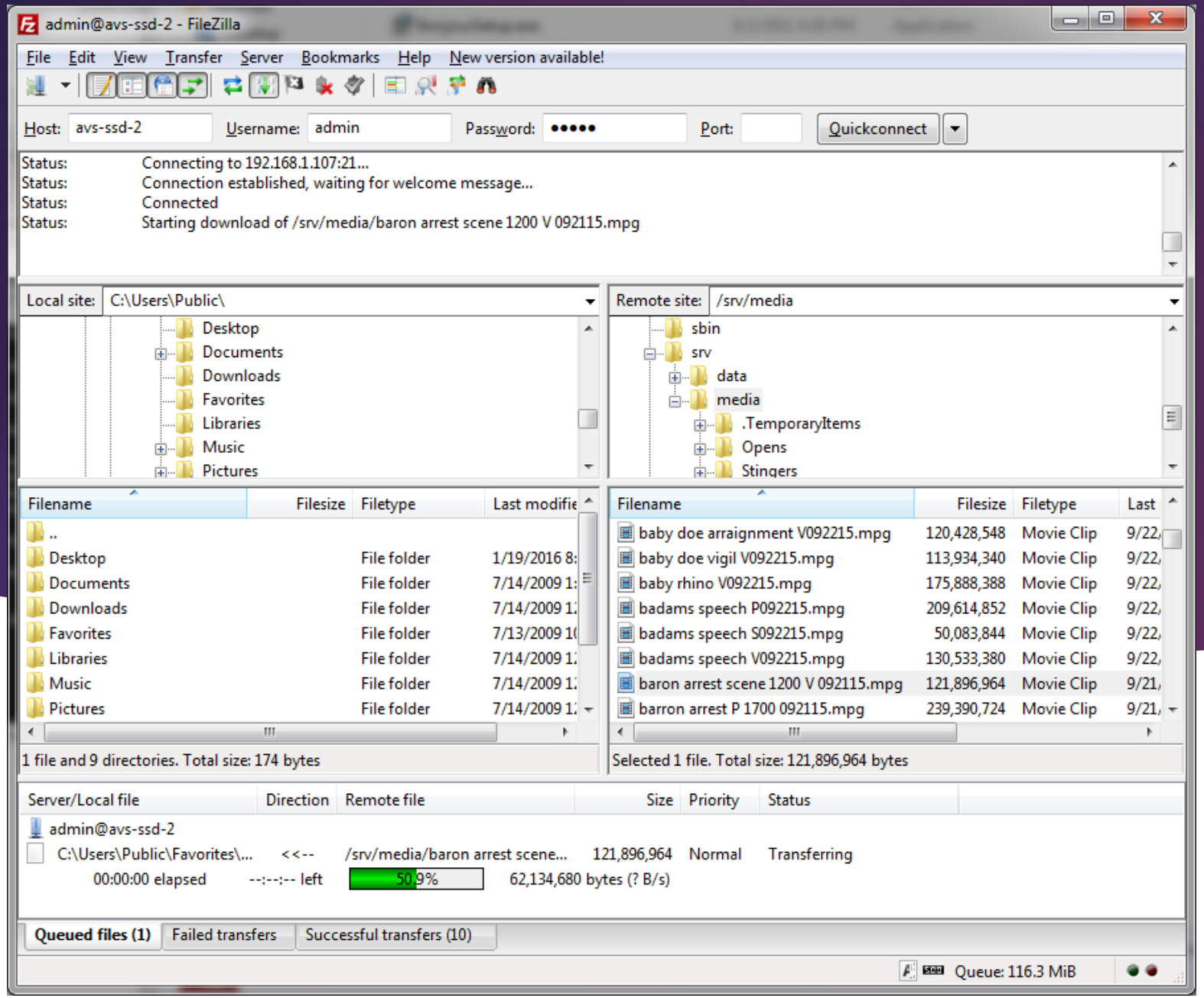
Looped recording (allows content to be recorded into a loop, e.g. whilst waiting for a press conference to start, until committed)

Timelapse Recording

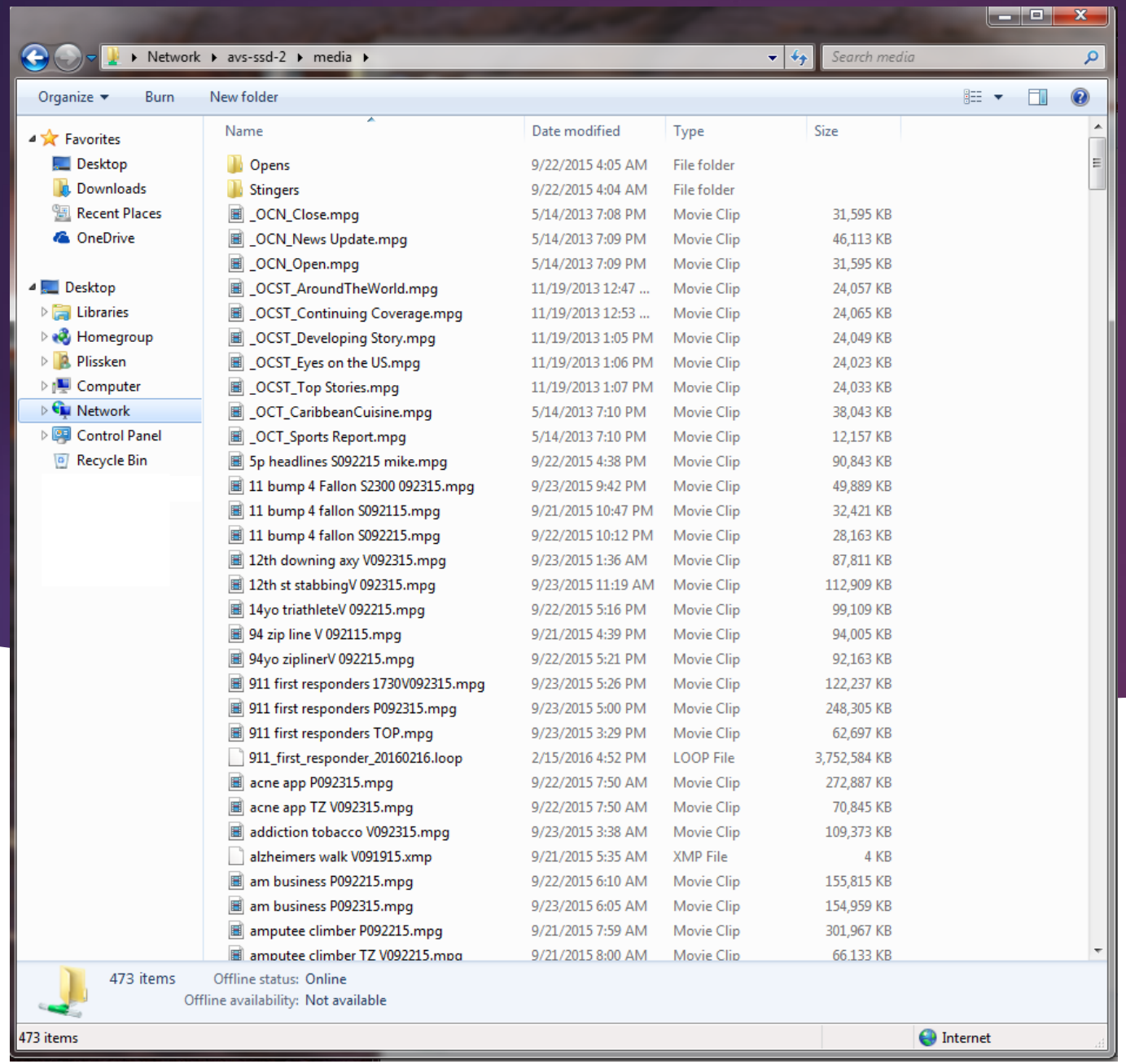




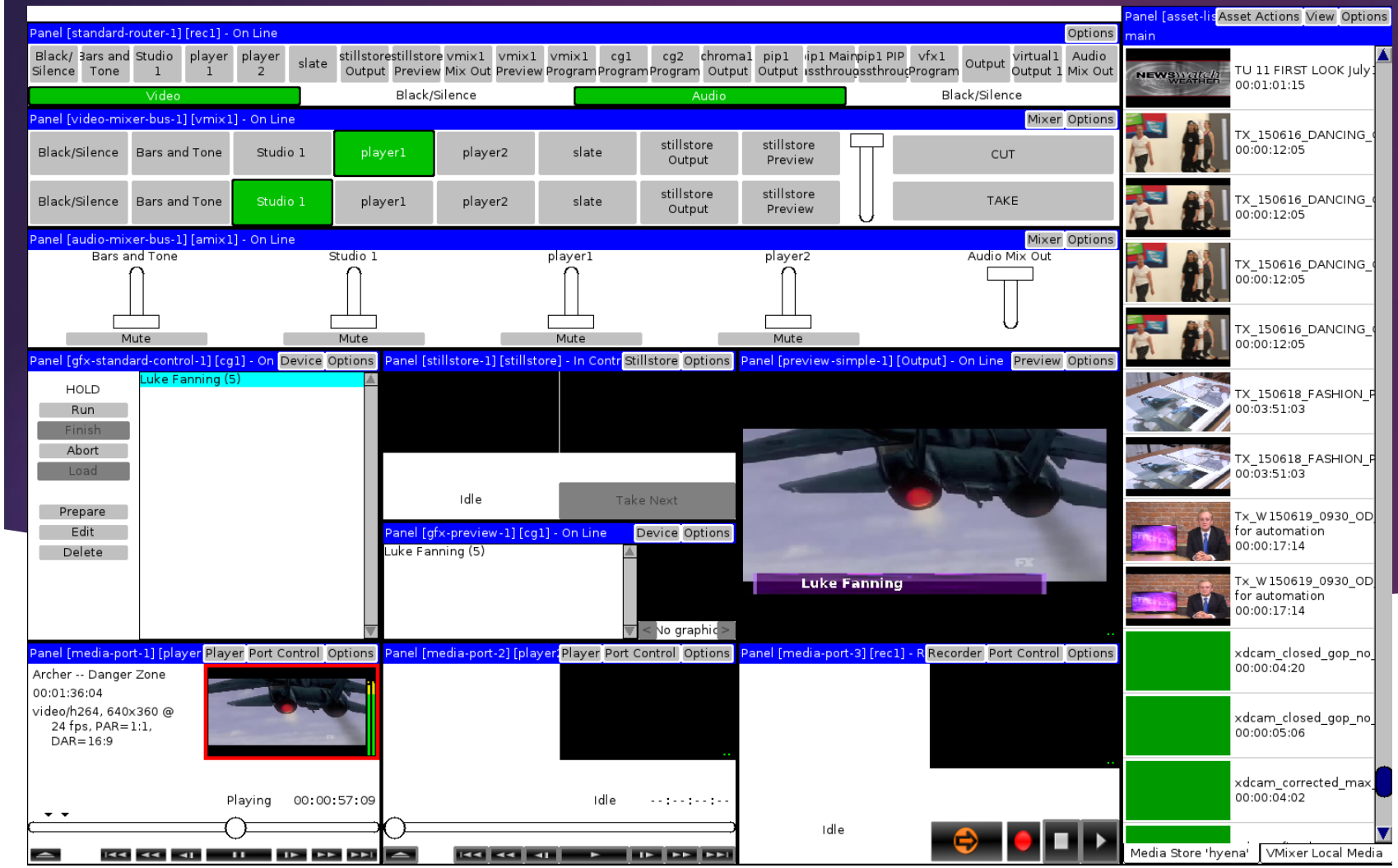
Built-in “Transfer To…” handling copies or moves clips between aVS Storage Nodes



Optional FTP access to content on a aVS Storage Node



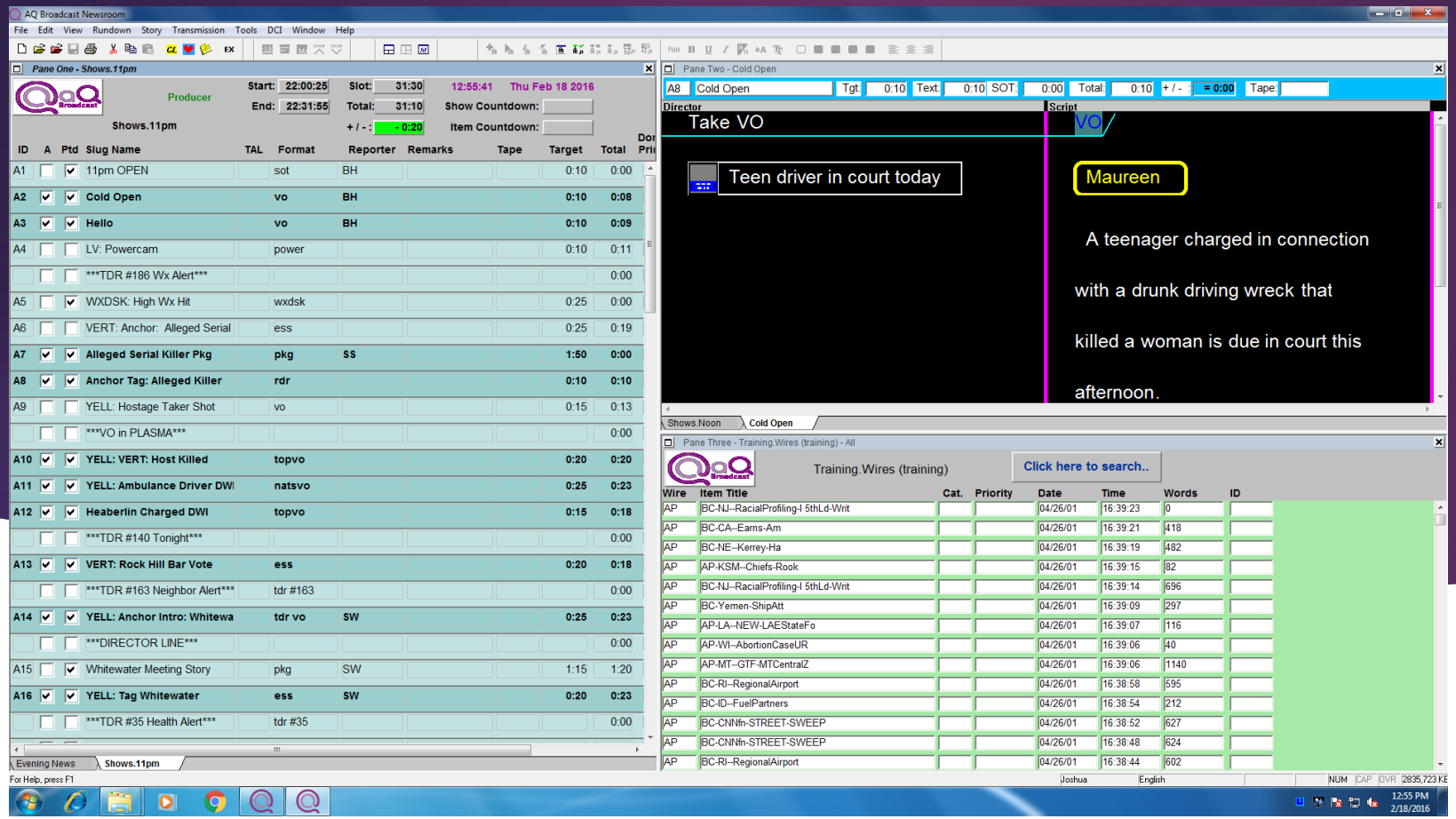
Built-in SAMBA/SMB access to content on a aVS Storage Node, available via Windows and Mac workstations



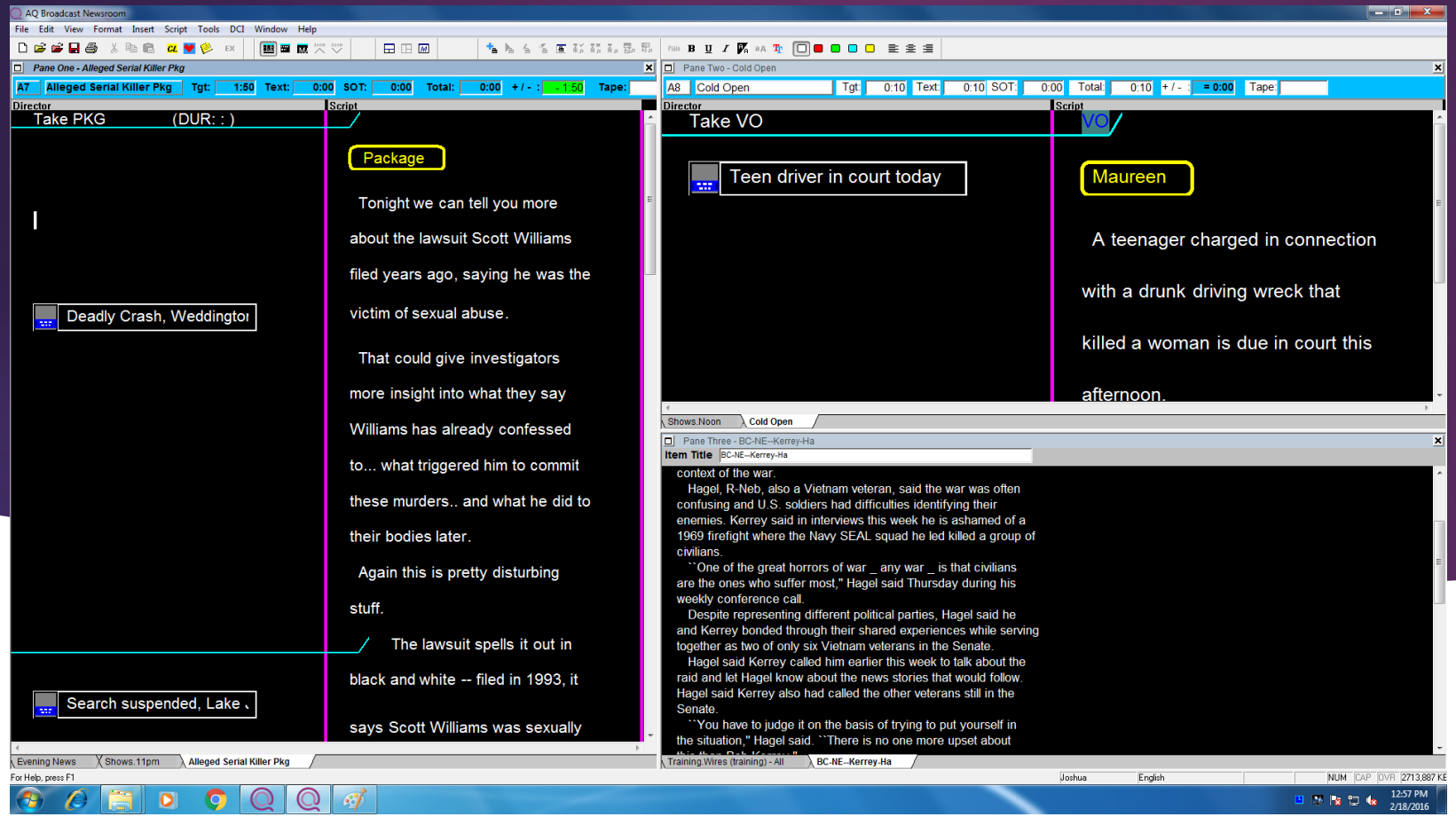
aPS Production Suite example – vision & audio mixers, virtual players & recorder, CG graphics insertion

Additional Detailed Information

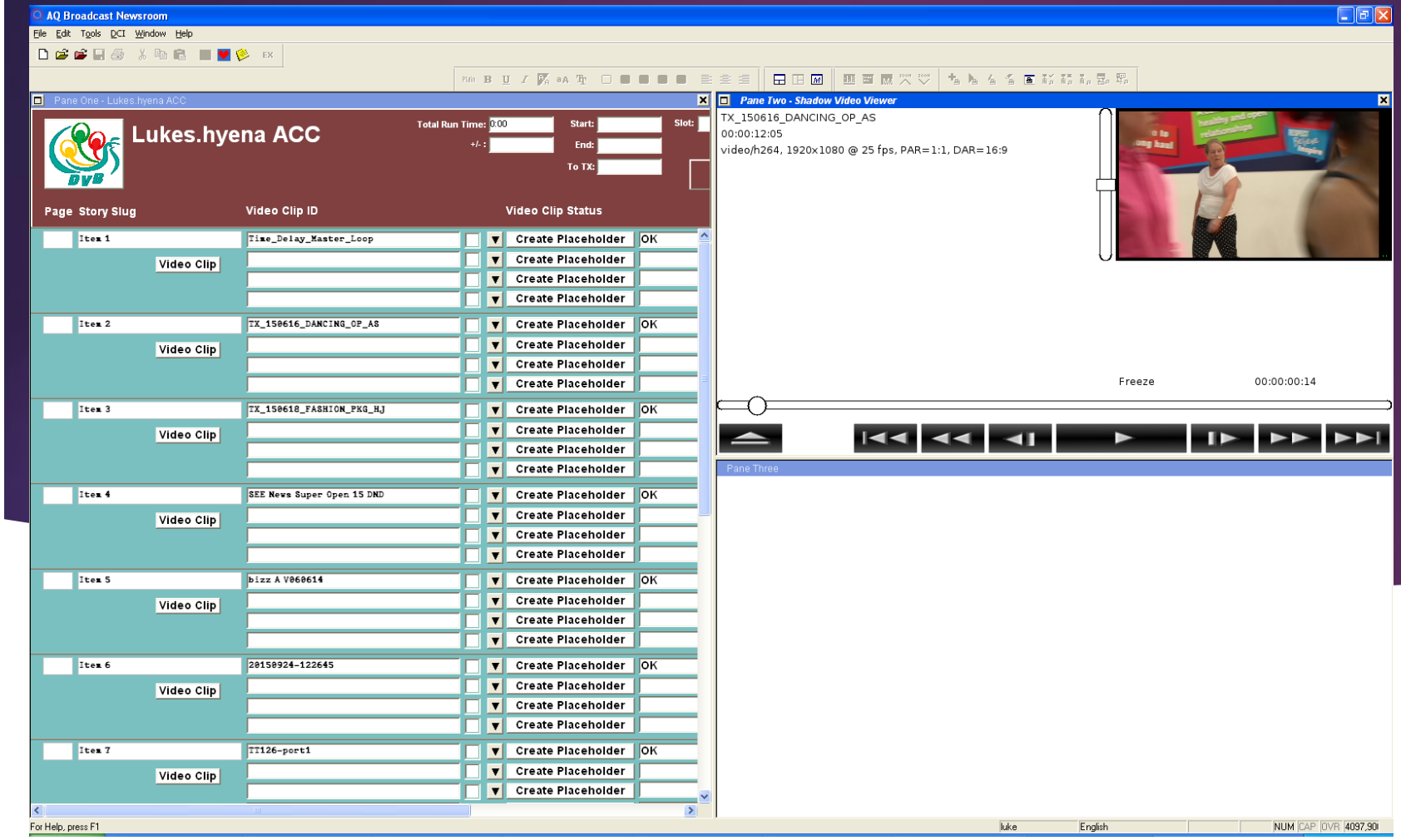
EXAMPLE SCREENSHOTS: QSERIES



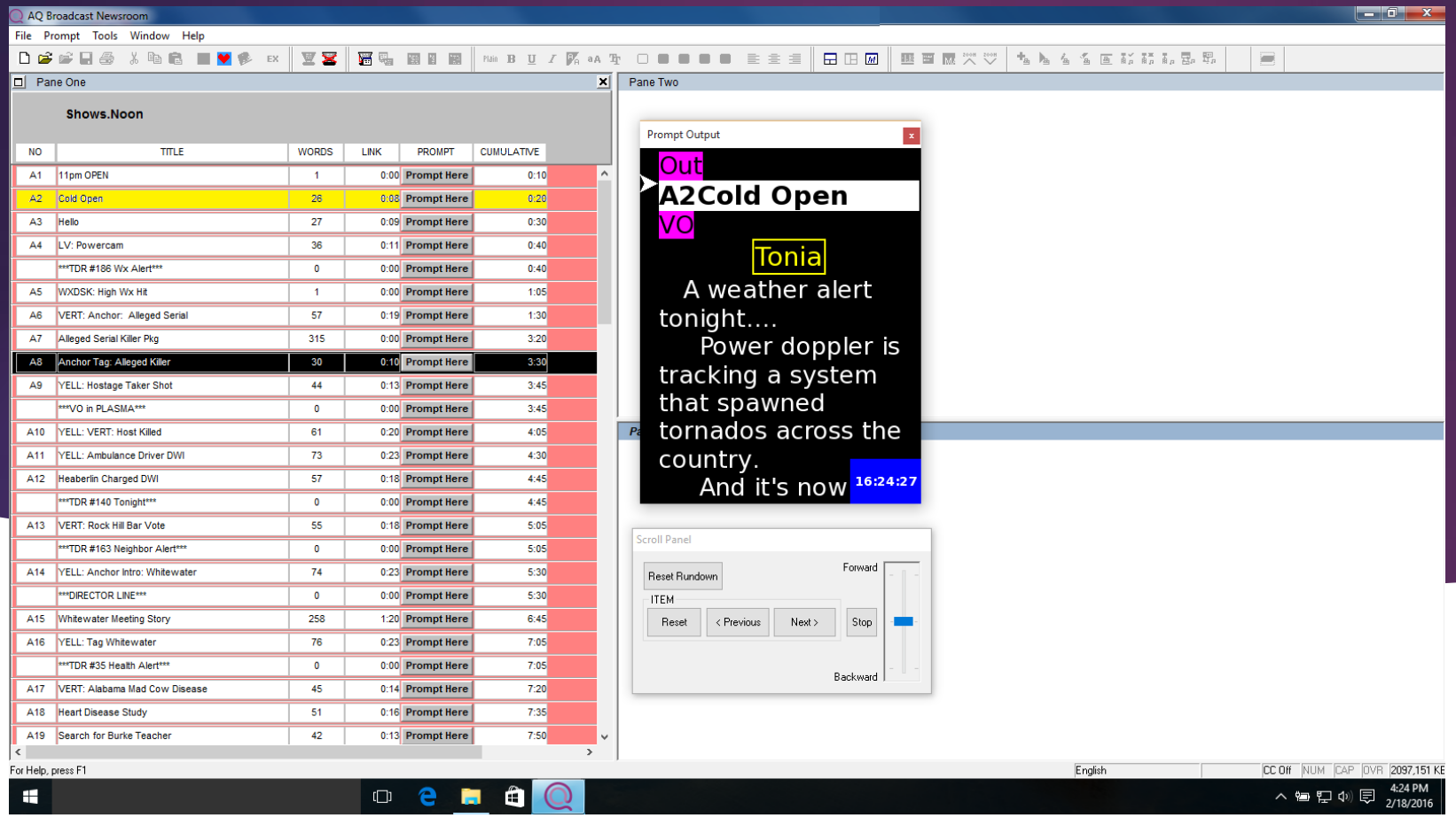
QNews – multiple windows showing news rundown, script editor and wire stories



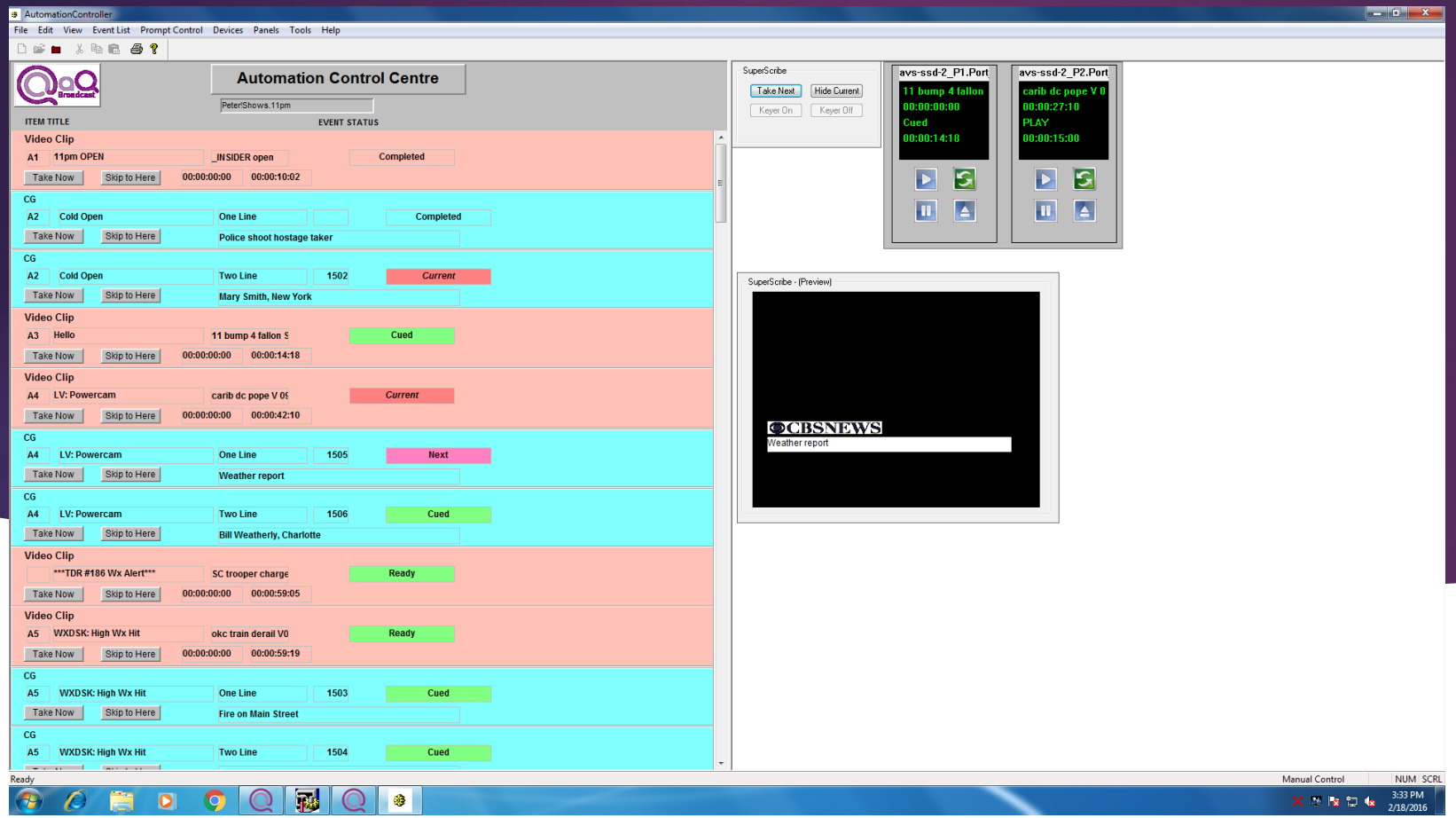
QNews – view of multiple, multi-column scripts



QNews – proxy viewer via aVS: frame-accurate proxy version of original content can be streamed on-demand over the network

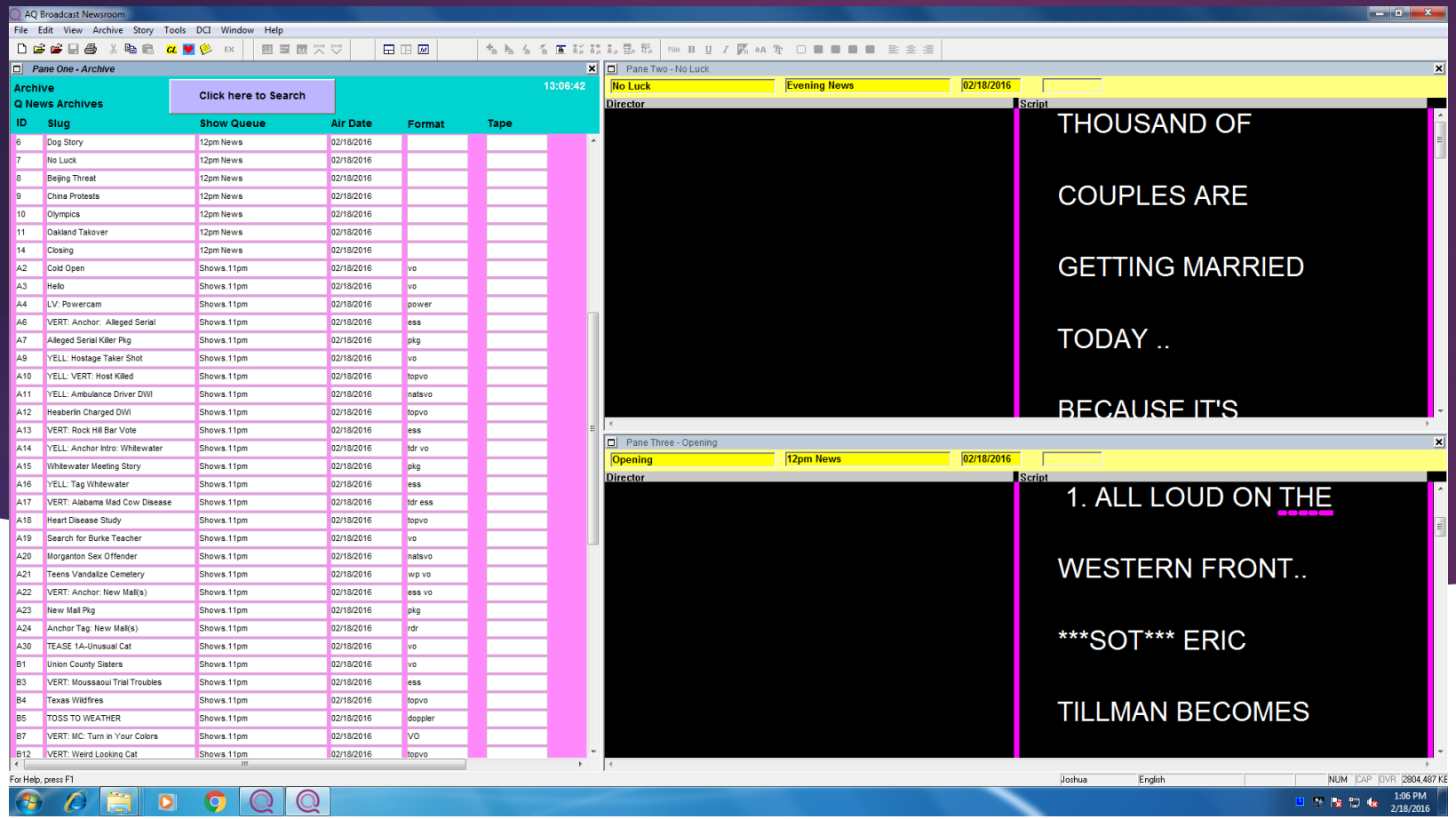


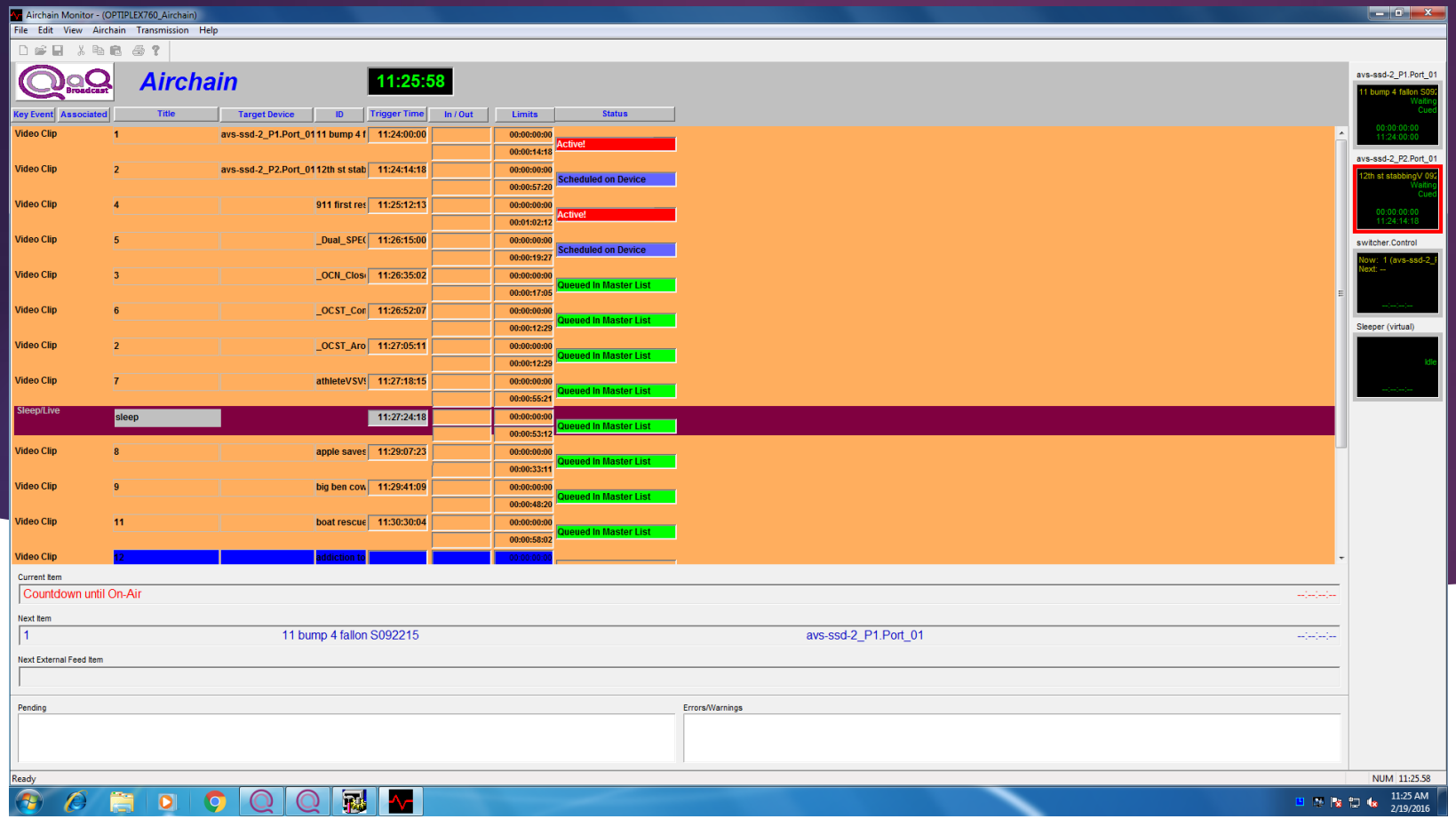
QNews – news running order plus prompt preview



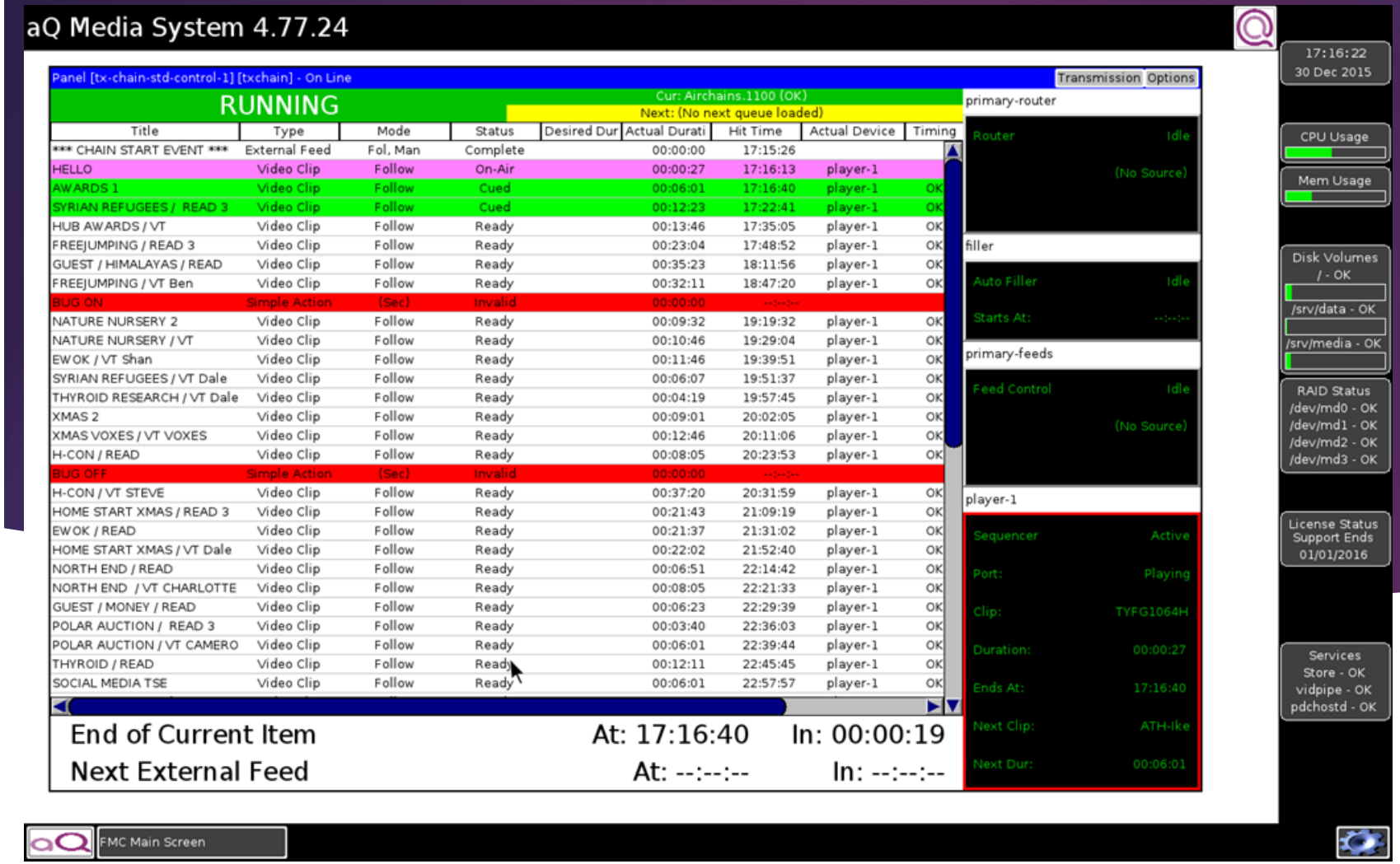
QNews Automation Control Centre (ACC) – playout automation for live shows, including video server and CG control

QSeries Script Archive



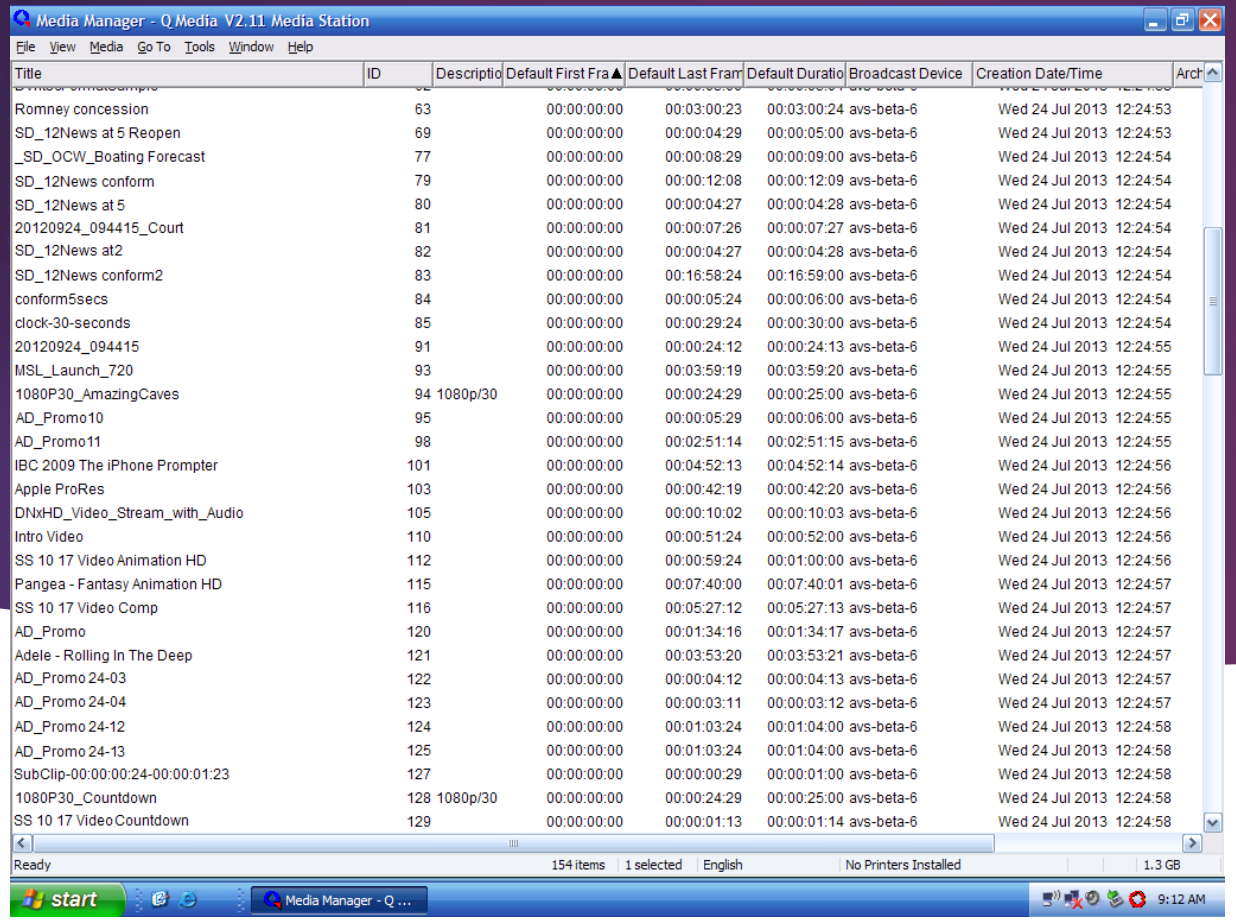


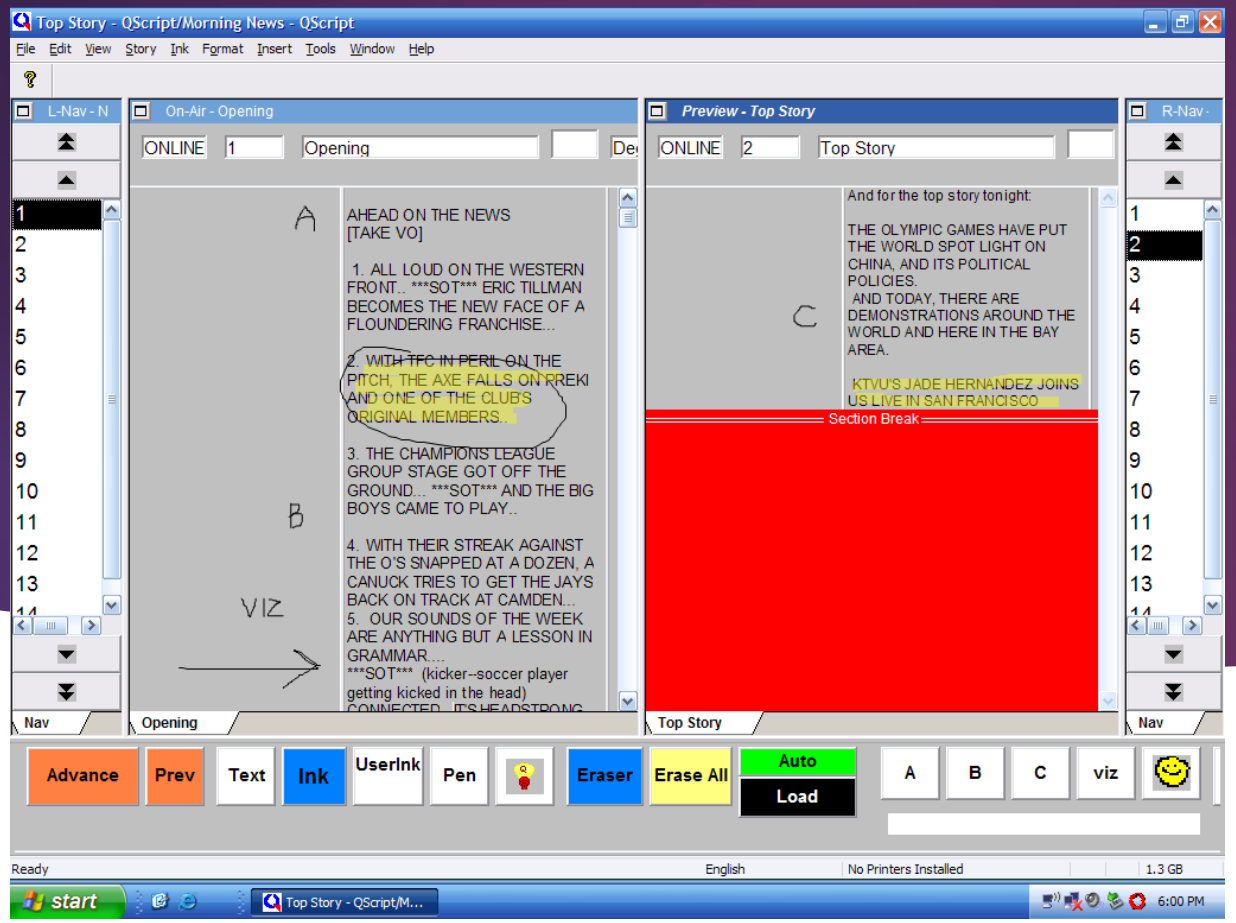
AirChain Monitor – transmission control using QTx



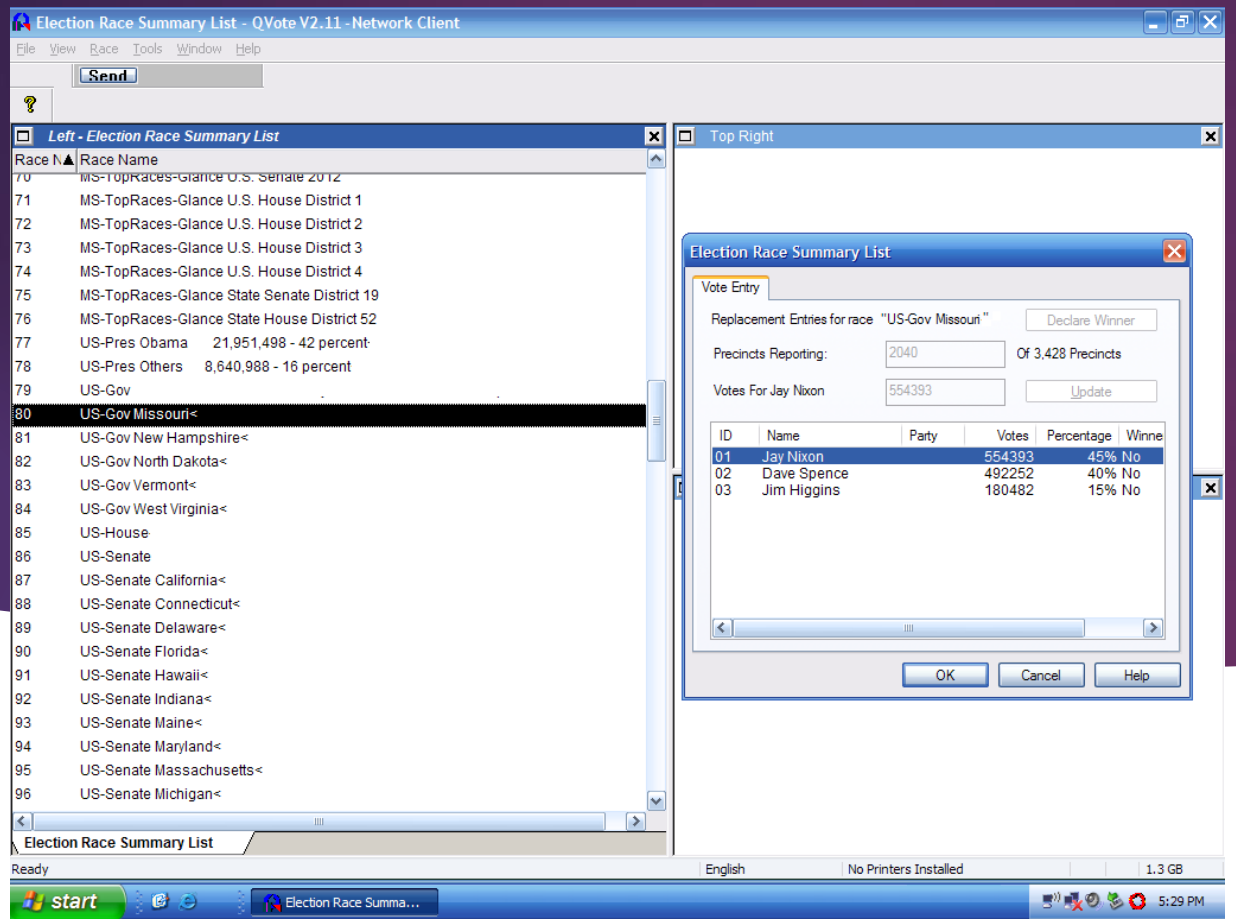
QTx – transmission automation indirectly via Tx-Chain

QMedia – media information for video server clips





QScript – award-winning mark-up & annotation tool



QVote – result collation and display tool for elections

Additional Detailed Information

PHOTOS

aPS gallery setup, based on three dual-screen PCs running QNews, ACC, FMC and QTx AirChain Monitor

FMC running in the gallery at Mustard TV, Norwich (UK)

aQ equipment rack installed at Big Centre TV, Birmingham (UK)

QNews and ACC in use in the news gallery at Big Centre TV

Production studio at Big Centre TV

aQ Broadcast Limited

"making broadcast magic"

www.aq-broadcast.com

sales@aq-broadcast.com

@aqbroadcast

+44 (0) 118 324 0404