



## **SQX TECHNOLOGY WHITE PAPER**

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### **+ COMPRESSED VIDEO AND AUDIO OVER IP**

Video over Internet Protocol (IP) is a generic term for transmitting digital video, audio and metadata streams over a standard computer network. Data is transmitted over Cat 5 or Cat 6 copper cabling using standard computer network hardware such as switches and routers. To achieve this, the audio and video (AV) being captured must be compressed, either by an encoder located in the source itself, or by an external encoding device physically located near the source. For digital network cameras and encoder sources, two compression algorithms are commonly supported within the Command, Control and Security industries:

- Motion JPEG (M-JPEG)

First used in the mid-1990s, each frame of the video is compressed separately as an individual JPEG image and then transmitted over the network. Commonly used by IPTV vendors, M-JPEG offers low latency compression. All Datapath SQX decode technologies support M JPEG compression.

- MPEG-4 Part 10 Advanced Video Codec (H.264)

As well as being used to compress the video stored on Blu-ray disks, H.264 is the ubiquitous standard in video compression and streaming. Frames are compressed with reference to other neighbouring frames, video streams where there are few changes between frames are compressed more efficiently than with M-JPEG and require less bandwidth. Used by CCTV equipment manufacturers, streaming media companies and broadcast markets, H.264 provides a globally accepted standard for video compression. All Datapath SQX encode and decode technologies support H.264 compression and allow customers to interact with video from a wide range of sources.

H.264 encompasses a number of standardised profiles. Datapath SQX technology supports the following:

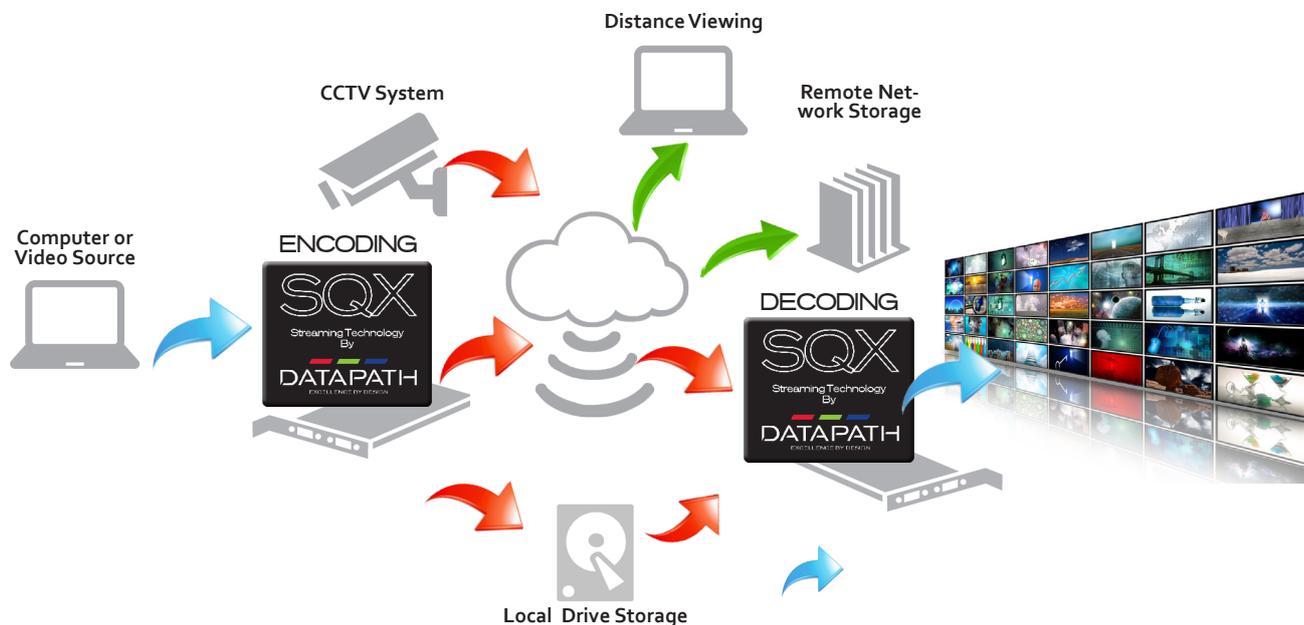
- o Baseline Profile: Commonly used in video conferencing systems
- o Main Profile: As used in Digital TV broadcasting
- o High Profile : Critical for High Definition applications and storing to disk

In addition to these commonly used compression algorithms, Datapath SQX decode technologies support MPEG 2 Part 2 and WMV VC1.

## + WHAT IS SQX

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SQX is Datapath's collective name for a range of IP AV streaming and compression technologies. SQX products create new possibilities for video delivery, transmission and storage whilst maintaining the ability to scale projects. SQX technologies provide functionality to support implementation ranging from single streams to fully inclusive systems that accommodate a wide array of inputs and outputs streaming from a variety of sources to a number of destinations.



In today's modern world it is imperative that video can be handled in many different ways. The transportation of video from one location to another has become critical in delivering the services that are required for professional AV projects. From real time remote access of surveillance cameras, or the distribution of AV content, to the recording and storing of video for later retrieval, the needs of the market demands technologies that meet these requirements.

## + DATAPATH SQX PRODUCTS

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### Video Compression in Control and Security Rooms

SQX technology can decode media for viewing locally on a video wall. SQX decode technologies include ActiveSQX and SoftSQX.

For a scalable PCIe based solution, ActiveSQX acts as a dedicated hardware accelerated decode engine that can work side-by-side with other ActiveSQX cards installed in the same system. ActiveSQX provides a large number of simultaneous decodes, all available within a single Windows desktop display surface, providing a uniquely scalable solution. Decoded video can be scaled to display on multiple screens, across screen boundaries, tiled and moved anywhere at any time.

SoftSQX is used as a low cost or rollover decoding engine taking advantage of the capabilities of the latest technology in system processors. Decoded video can be transferred at full Gen 2 PCI Express speed directly to the ImageDP4 graphics card for accelerated display on to a video wall.

## Wall Control SQX

Wall Control is a software application for controlling Vision, IP-Camera and third-party application windows on Datapath wall controller systems. It provides a graphical representation of the data wall and a toolbar through which to manipulate all available sources and applications. Wall Control allows for the creation and saving of video wall layout files. Wall Control can be used to interactively open, move, size and position any window on either the local machine or a remote network client machine. All Wall Control features and pre-configured layout files can be invoked using an extensive command line interface via RS232 or IP telnet services. Wall Control SQX incorporates support for the Datapath SQX decode products.

## ActiveSQX

Datapath's ActiveSQX is a powerful PCIe card designed to decode multiple streaming videos using an on-board processor. Multiple ActiveSQX cards can be used in a single system to support the management of entire CCTV systems or connect to online media libraries, streaming and decoding video for immediate video wall display.

This card is capable of simultaneously decoding and transferring up to 1.2 GBps of video data, equivalent to 12x 1080p 30 fps streams, to one or more Datapath ImageDP4 graphics cards. Scaling of the decoded streams is supported on the card. The ActiveSQX card is capable of simultaneously decoding up to 20x 1080p 30 fps incoming streams ensuring smooth transitions from stream to stream within carousel enabled windows.

The card supports the IP protocol stack, with on-board transport servers for RTSP and HTTP connections to video stream sources, further reducing the video stream management burden on the CPU.

In addition, the ActiveSQX has two 1 Gbps network ports - this keeps the motherboard network port and system CPU cycles available for running implementation-specific applications. The ActiveSQX card supports multicast and unicast streaming transport protocols. The ActiveSQX network interfaces support both DHCP and static IP address assignment using IPv4 and IPv6.

## SoftSQX

SoftSQX uses the advanced capabilities of the latest system CPUs to decode within the Datapath SQX framework even when no accelerated hardware resources are available. SoftSQX is designed for new and existing systems that may require the management of a number of compressed streams. With an ActiveSQX card, the system processor and other resource usage is kept very low. SoftSQX can use these resources to decode IP streams without requiring any additional configuration. This provides additional capabilities to make full use of the technology available, or to cater for times of high load. SoftSQX can typically decode an incoming bandwidth equivalent to 12x 1080p 30fps streams.

SoftSQX uses the same API as ActiveSQX hardware. When both ActiveSQX and SoftSQX are installed in a system, the API chooses which product to use based on the availability of resources on the system. ActiveSQX hardware will always be used in preference to SoftSQX. If the card is fully utilised, Wall Control SQX will roll over to SoftSQX to maintain maximum flexibility and system availability. A Wall Control SQX installation requires no new configuration or additional knowledge on the part of the user if ActiveSQX is installed into an existing system.

As developer products, both ActiveSQX and SoftSQX use the same Datapath developer API, SQXEasy. Whether a system uses ActiveSQX or SoftSQX is completely transparent to any developer using the SQXEasy API. ActiveSQX offers hardware decoding of multiple IP streams, SoftSQX offers CPU based decoding. Developers can explicitly

choose between decoding IP streams on ActiveSQX, SoftSQX or take advantage of automatic load balancing within the SQXEasy API.

The SQXEasy API makes it a simple matter to connect to an RTSP compressed network stream (such as a digital network CCTV camera) and to display the decoded video frames using a Datapath ImageDP4 graphics card. The two parameters needed at the simplest level is a window handle and an IP Stream URI.

## **ImageDP4**

The Datapath SQX decode technologies can deliver the decoded frames directly to a Datapath ImageDP4 graphics card. There may be multiple ImageDP4 cards in a system. A single ActiveSQX card could therefore decode 12 IP streams and transfer the frames to three different ImageDP4 cards for output to 12 screens. There may also be multiple ActiveSQX cards in a system providing a fully scalable solution.

The ImageDP4 is a PCI Express 2.0 card with 16 lanes. To receive four 1080p streams at 30 frames per second, the card must be installed in a slot with at least two lanes.

Both ActiveSQX and ImageDP4 are suitable for deployment within any PCIe based Video Wall Controller. The ActiveSQX card provides wall controllers with the flexibility to transparently integrate both compressed and uncompressed video streams.

## **VisionHD2-SQX**

The Datapath VisionHD2-SQX is an advanced video capture card with SQX technology that allows captured video to be encoded into H.264. Featuring independent capture channels the VisionHD2-SQX allows users to capture two high definition 1920x1200p video feeds and directly encode them into H.264 video using the on-board hardware based SQX processor. Each encoded video stream can be utilized by the SQX media server for distribution over a network or for storage on disk.

The Vision HD2-SQX also acts as a standard capture card based on the features of the VisionAV-HD. Full fidelity captured video can be transferred with low latency to graphics hardware or system memory buffers for viewing or further processing.

The VisionHD2-SQX supports all of the advanced features of any Datapath capture card, including intelligent handling of mode changes and no signal input. The VisionHD2-SQX capture functionality supports on-board scaling and colour space conversion.

A developer can use the features of the VisionHD2-SQX with either the Datapath RGBEasy API or the Microsoft DirectShow framework.

The Vision HD2-SQX is the perfect solution for a hybrid video wall. In this arrangement the VisionHD2 SQX provide high quality, low latency, capture of video sources for display on to the video wall, and at the same time the source can be encoded in hardware and streamed on to the network.