

AVx VideoLink

Camera Video Distribution Over Unreliable Wide-Area Networks



AVx VideoLink is a client-server software application that manages the distribution of network camera video across unreliable, or variable bandwidth, data links. In such situations, occasional loss of data packets from the video stream can have an exaggerated effect on the continuity of a video stream, with loss of picture quality within a frame and over time.

AVx VideoLink is an adaptive real-time encoding process that automatically adjusts the encoding parameters of the video distribution to adapt to varying network loads, latency, and loss of packets. It provides significantly improved image quality when the underlying network is unreliable through packet loss or variable bandwidth, as is often the case with wide area networks, for example.

Network Protocols

Camera video encoded by standard compression protocols such as H.264 can be distributed using protocols such as RTSP or ONVIF. For local area networks where the network is generally reliable and packet loss is very low, the distribution is straightforward and no special precautions are needed.

Using standard network protocols such as UDP/IP, there is no guarantee that packets will be delivered in sequence, or even at all, but in practical network configurations with simple networks the reliability is sufficient to maintain a real-time data stream.

For wide area networks composed of several layers of varying reliability, the packet loss arising from UDP distribution may become significant. Depending on which part of the compressed video stream is lost, the effect may be to lose a portion of an image or even a whole sequence of images, potentially lasting many hundreds of milliseconds. Reliable network protocols, such as TCP/IP, provide a mechanism for guaranteeing delivery of data by verifying receipt and resending when necessary. However, for real-time distribution, delayed delivery of network data will result in increased latencies in the display and the additional overhead of multiple retries will soon overload the network. A more intelligent solution is needed.

AVx Video Link Encoding

AVx VideoLink is a solution to the problem of unreliable networks. It implements an encoding scheme that uses feedback from the receiving client to guide the encoding process, allowing the encode quality to dynamically adjust to the available network capacity. A limited number of retries are permitted to maintain the consistency of the data stream, but the encoder can also abort the retries if the latency becomes too large. This allows the encoding process to accommodate some packet loss with significantly improved resilience over normal UDP-based delivery methods.

Both server and relay applications are remote-controllable using Cambridge Pixel's network API, which allows very flexible run-time configuration of allocation of physical camera inputs to input streams. Display clients can connect to the AVx VideoLink relay application using standard RTSP or ONVIF protocols, providing an effectively transparent end-to-end link from camera to display.

Features:

- Windows 10 compatible
- Accepts RTSP or ONVIF camera video inputs
- Re-encodes video for network distribution
- Automatic adaption of encoding quality
- Resilient video distribution
- Channel priority support
- Supports wide-area networks and point-to-point links
- Client application recovers original RTSP or ONVIF data streams
- Multi-channel – up to 8 cameras
- Multi-client connections – up to 8 clients

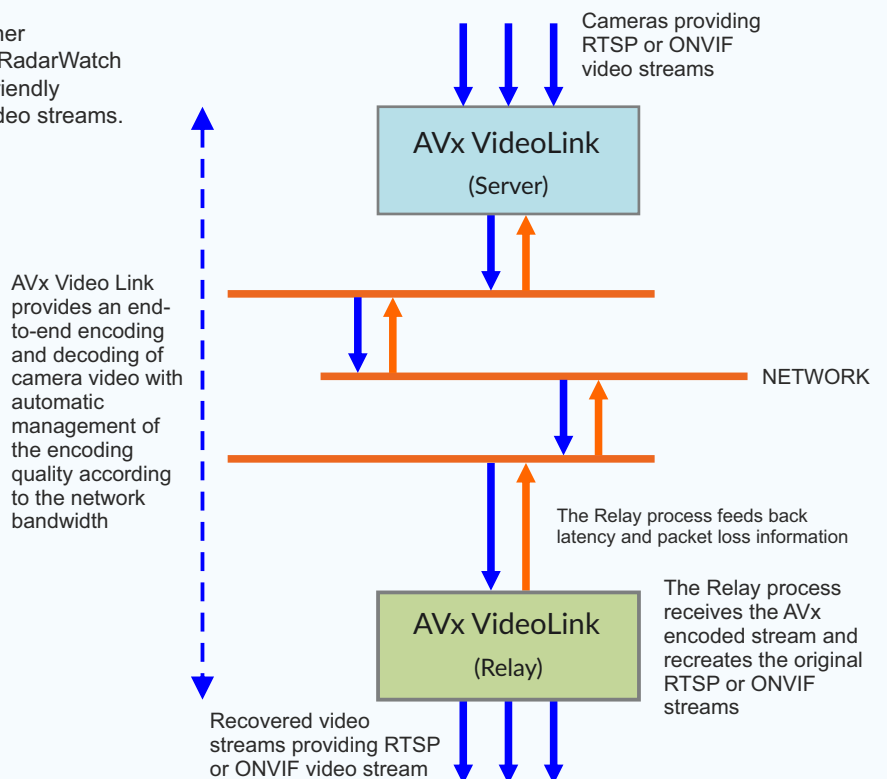


A maximum per-channel bitrate can be specified, allowing only a portion of the available link bandwidth to be used so that other applications can share the link. If latency or packet loss worsen at any given time, the bitrate is automatically reduced from the configured maximum.

AVx VideoLink can use a combination of hardware-based and software-based H.264 encoding in the server application, allowing optimum use of the resources available. As well as encoding camera video at an adaptive rate to meet the pre-configured or real-time bitrate requirements, the server application can optionally modify the frame rate to meet the constraints of the link bandwidth.

AVx VideoLink can be used in conjunction with other Cambridge Pixel products. For example, the SPx RadarWatch application provides a field-proven and operator-friendly combined display of radar and multiple camera video streams.

The SPx RDR application can record radar video and camera video together with other data streams. SPx RDR can be deployed near the sensors, co-located with the AVx VideoLink server, to record 'original quality' camera video that can then be replayed, at the same time as live video, across a WAN or point-to-point link for display. ■



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