



Is Video Visitation over Ethernet Really Possible?

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Abstract

MTI's Video Visitation System utilizes digital video encoding to create the ability to transmit live video over Ethernet and other standard networking schemes. This technology reduces the amount of wiring needed to install a video visitation system and also reduces the complexity of the head-end equipment. Many of our competitors still produce their systems using antiquated analog systems that have complex wiring schemes and expensive, complex head-end equipment such as PBX switchers. Some of these manufacturers argue that their systems are better because MTI's system is not actually possible. This article is written to debunk this argument.

Definitions

Analog Transmission: The reproduction or transmission of a signal over a medium such as copper wire, fiber optics, or radio wave, by simply amplifying or reconstructing the signal.

Digital Transmission: The transmission of a signal over a medium by means of sampling this signal digitally (measuring and storing voltage levels) and transmitting these samples.

Digital Encoding/Decoding: The task of compressing (encoding) or decompressing (decoding) a digital transmission (stream). Encoding compresses a digital stream by representing the values in this stream in shorter fashion. Decoding reverses this process so as to reproduce the original digital stream.

User Datagram Protocol (UDP): A network transmission protocol that routes a set of digital values (a packet) from a source to destination. This protocol is "connectionless", which means that the protocol does not attempt to verify that a packet arrives at the destination.



Ethernet Switch: A standard network component that provides multiple ports for separate Ethernet connections. A switch stores and retransmits information that it receives on each port. This means that, unlike an Ethernet hub, there is no risk of collision between packets transmitted on separate ports.

Discussion

Is it possible to perform Video Visitation over an Ethernet network? The short answer is, given the current networking technology, absolutely Yes! It simply requires some common sense calculations to prove that, not only is digital video visitation possible, digital video visitation is unbelievably simple and expandable.

The first variable in this proof is the required bandwidth for a single video visitation session. Using Windows Media© video and audio encoding and decoding, MTI can achieve a bandwidth of around 1 Mbps per session. This means that full motion (25 fps) NTSC standard video (320 x 240) and phone quality audio can be transmitted both ways for 1 Mbps.

Now, at first glance, this might seem like a large amount of bandwidth. This brings us to our second variable. The standard maximum bandwidth for each port on Ethernet switches these days is 100 Mbps. That means that each line from each video visitation unit has a maximum capacity of 100 Mbps. Therefore, each session is only using 1% of the possible bandwidth available on each port of a switch.

Not only that, but MTI uses Ethernet switches that provide 2.2 Gbps bandwidth between ports and also have fiber optic uplinks between switches. This means that one video visitation session uses 0.05% of the available bandwidth of the switch. So, if I wanted to implement a video visitation system that used 80% of a 2.2 Gbps backbone, I would have to provide 3520 video visitation units (this would allow for 1760 simultaneous sessions).

The question will undoubtedly come up: "Doesn't all of this digital transmission run the risk of network collisions and loss of data?" Again, given advancements in switch technology, the answer is No! Switches provide a collisionless delivery system. There is no risk of two packets colliding with each other



during transmission. Also, MTI utilizes the UDP protocol to ensure that the video and audio stay real-time. If a packet is lost, the end-user will rarely even notice.

Add on top of this math and logic the fact that Ethernet networks are becoming the standard mode of communications for data and voice systems. Also, Ethernet-based systems are far easier to configure and expand. Finally, the work force and available expertise for the maintenance and repair of Ethernet-based networks is far greater than specialized analog systems.

Taking all of this into consideration, MTI's digital video visitation system is a no-brainer, but there is one more factor to consider. MTI's system runs on 48 VDC power, which is below the shock threshold. This allows for both power and data lines to be pulled inside the same conduit, which cuts conduit costs in half. Add in the fact that CAT5e and CAT6 are much cheaper wiring options than coax cable and you have a much more cost-effective system than comparative analog systems.

The final nail in the coffin of analog systems is the fact that digital systems give the designer and end user much more flexibility with respect to added features. Monitoring, Break-in, and recording features are a simple extension of the digital system. Recording is as simple as adding another Ethernet line. Also, each individual video visitation unit is an embedded computer, which makes features like text-based messaging and document display a breeze. As with most markets, in the realm of video visitation systems, digital is the way to go.