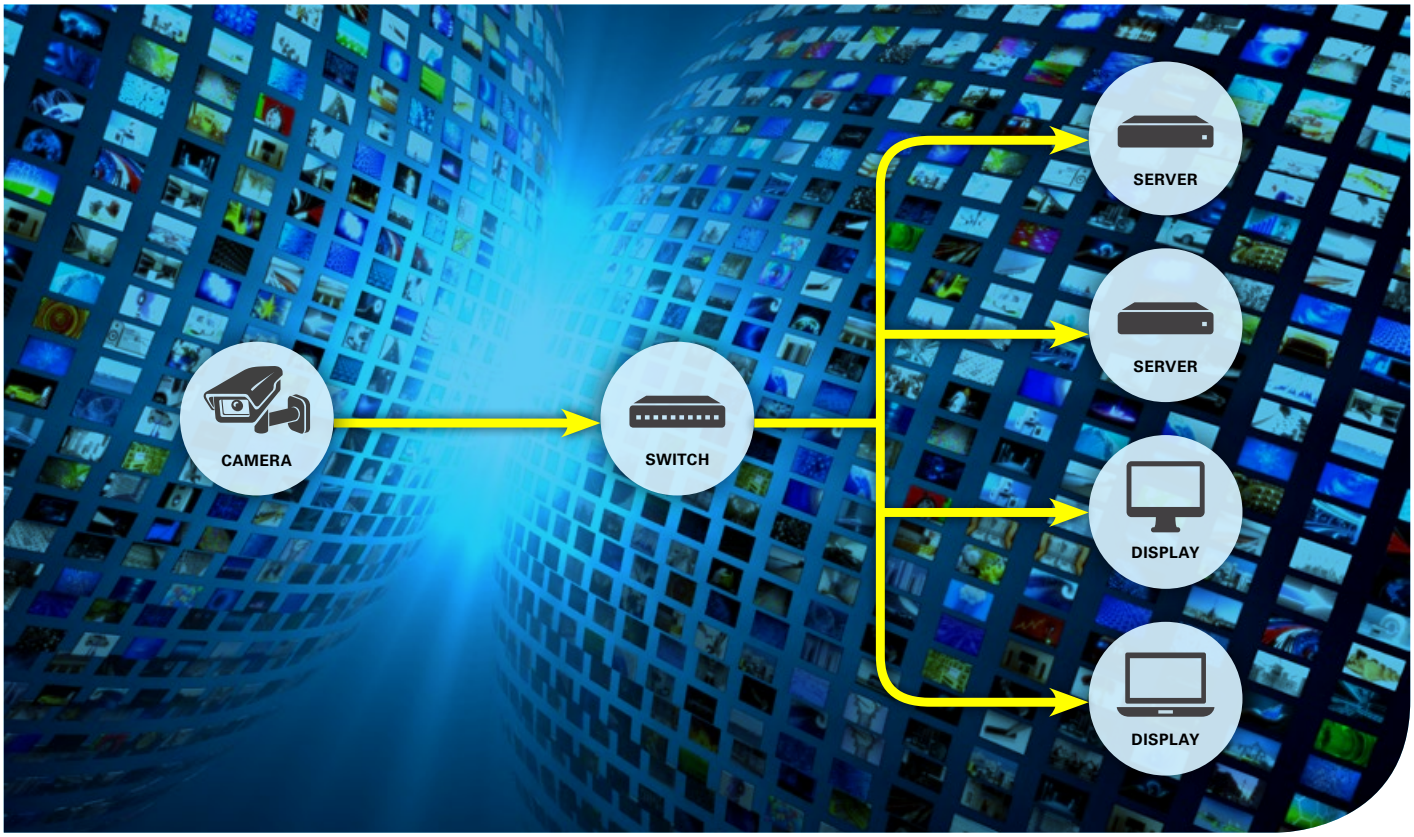
IP Multicasting

Improving bandwidth management in video surveillance



What is multicasting?

Multicasting refers to a communication method or technique in which a stream of data is transmitted from a single sender or source to multiple destinations on a network, eliminating the need for the data to be sent individually from the source to each 'interested' receiver.

Therefore, a camera or video encoder would only be required to send a single instance or copy of a video stream to a designated multicast IP address. The various switches and routers within the network duplicate and distribute the transmitted video packets to all interested recipients who have 'opted-in' to receive the video stream.

Dependent on the scope of the multicast-capable network these recipients can include control room operators, security teams on the ground, remote monitoring sites and third-party authorities such as government agencies and police.

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Why is it important?

A key benefit of using a multicast network with capable devices is the reduced strain on network infrastructure and to enable predictable bandwidth requirements. With multicasting, unlike other transmissions, the network bandwidth remains the same between the camera and the core of the network even as the number of receivers increases. This allows a network design team to accurately calculate the bandwidth requirements for each network node during the design phase.

More importantly, the capability of the camera or video encoding device should be carefully considered. These devices, when used without some form of multicast support (in other words single point-to-point transmission), are typically only capable of serving no more than a couple of users simultaneously. Without multicast support, the ability of the system to be expanded in the future, with further additional viewing locations, can be severely limited.

For these reasons, multicast video is becoming an increasingly attractive proposition, particularly as surveillance and control systems become larger and more complex and, cameras with higher resolutions are deployed.

Taking into considering most surveillance systems are recording video 24 hours a day continuously, all video streams are typically transmitted and present within the network at all times. This means that even if the system has only a single live viewing location, the benefits of using multicast can be realized from day one and paves the way for greater expansion in the future.

In high-risk environments – such as transportation, oil & gas and utilities – managing network traffic efficiently is crucial to eliminate potential system downtime.

While having a multicast-capable network is an innovative and arguably simple method of optimizing bandwidth management in video surveillance applications, it is important to note that the main benefit occurs where multiple users on the same network require access to the same live video stream.

Is multicasting the right choice for me?

The answer to this question largely depends on the capability of the cameras and encoders used, the size of the network and whether there is a plan to scale up the system in the foreseeable future or upgrade to higher resolution cameras. Higher resolution cameras (such as HD and 4K) require significantly more bandwidth than their standard definition counterparts. For a small network consisting of up to two or three workstations, the need for a multicast network is not as significant compared to larger operations where a video stream is typically transmitted to a greater number of viewers.

For these enterprise-class networks, multicasting can deliver significant cost savings and long-term investment protection as it reduces bandwidth requirements and optimizes network resources, which is crucial to avoid overloaded capacity and contention.

Key considerations

Although the benefits of multicasting are apparent, it does involve a more complex configuration from a network perspective compared to using unicast, particularly for organizations with existing legacy systems in which some of the network nodes may not be able to support a multicast transmission.

Having the support of a network professional or CCIE-certified network engineer to configure and manage a multicast network is therefore crucial. The system must also be supported by a number of components, including multicast-enabled cameras, routers and switches, without which multicast transmission via the network is not possible.

However, having the right configuration and components is not the only requirement to effectively manage the multicast traffic over the network. You will also need a surveillance solution capable of managing multiple transmission methods within the same network. This is because IP video sources may not always transmit identically and certain segments of a network may not necessarily support multicast. Ideally, the chosen solution should deliver the flexibility to be configurable to meet the needs of the organization and to prepare for the reception of either unicast or multicast traffic independently for each video source as per the system architecture and network design.

Taking an alternative route

If the network is not multicast-enabled, recording servers may provide a workaround solution via network video recording (NVR) devices available on the market that can offer the capability to deliver multiple copies of a single video stream from a variety of proprietary and third-party cameras and encoders. In simple terms, they can convert a unicast video source into one with a much greater unicast capability.

Alternatively, if the network is multicast-enabled, yet one or more cameras or encoders are incapable of transmitting multicast traffic, again a recording server may offer the ability to retransmit the video back onto the network using multicast to serve the various viewing workstations and wall displays found within most common surveillance solutions.

Both of these options make sensible use of a recording device to overcome the need to offer a full end-to-end multicast solution, either due to the limitations of the equipment available, or the absence of network expertise in configuring the network and devices for multicast.

Within another scenario, the network as a whole may fall under the scope and jurisdiction of more than one company or management team (perhaps even spanning several geographical boundaries) posing an extra challenge towards providing a unified, end-to-end multicast solution.

These various routes while useful are not without risk. Relying on a recording server for live video streaming distribution creates a single point of failure, which can have catastrophic results in high-risk surveillance security environments such as airports and public spaces.

It is therefore imperative to use a device with reliable failover capability to minimize – or eliminate – any potential system downtime to provide both resilience and redundancy to the critical function of storing and re-broadcasting live images.

Contact Synectics for assistance with surveillance system design requirements to meet your needs at sales@synecticsglobal.com.

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Specifications subject to change. E & OE.

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