

ISO Layer 2 Multicast Capability for Video Feeds

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GarrettCom's IGMP-L2 software feature offers a simple alternative for managing multiple IP video surveillance cameras and monitors within an industrial site. IGMP-L2 is an enhancement of the industry-standard Internet Group Management Protocol, IGMP, which is used to direct multicast video feeds only to where they are needed, pruning unnecessary traffic and thus preserving network bandwidth. IGMP-L2 provides the same capabilities, but using a simplified approach. While IGMP requires ISO Layer 3 central-office routers, IGMP-L2 needs only ISO Layer 2 Magnum™ 6K Series industrial-grade Ethernet switches. The difference is that the IGMP-L2 user in industrial applications is relieved from the Layer 3 office-grade routers with their added complexity and expense. IGMP-L2, which is integrated into GarrettCom's highly regarded MNS-6K network management software for managed Ethernet Switches, is available with Release 3.5 and higher.

IP video cameras typically "multicast" packets of information, such as streaming video, to selected destinations using a single virtual network connection. Prior to the release of IGMP-L2, Layer 2 switches were only able to manage "unicast" packets, which require the source to send multiple identical packets, one to each potential destination, consuming (and wasting) massive amounts of bandwidth. With IGMP-L2, managed 6K Magnum Layer 2 switches can selectively manage multicast streaming video feeds, so that only the video feeds selected go over the network when and to where they are requested.

How IGMP Works

Prior to IGMP-L2, the only way to get selective IP video multicast traffic management was to use the long-established standard IGMP. Industry-standard IGMP takes advantage of what is typically called the "IP Layer" or "Layer 3" of the OSI Basic Reference Model to define a multicast structure that enables multicast traffic streams to be selectively managed. Layer 3, and IGMP operating at Layer 3, defines network addressing and routing protocols that support data delivery between any two nodes in a network. IGMP utilizes a class of addresses (Class D) with routing information that can be decoded by a Layer 3 device, such as an office-grade router. A multicast packet is sent

once, but can go to multiple users, significantly reducing traffic on the LAN. Three other classes of addresses (Class A, B, and C) are used to send IP packets with a specific address to a single remote user, called a unicast address.

Under IGMP, a Layer 2 switch must pass multicast streams up to a Layer 3 router for decoding and routing of the particular streams needed to go to their desired destinations. With IGMP,

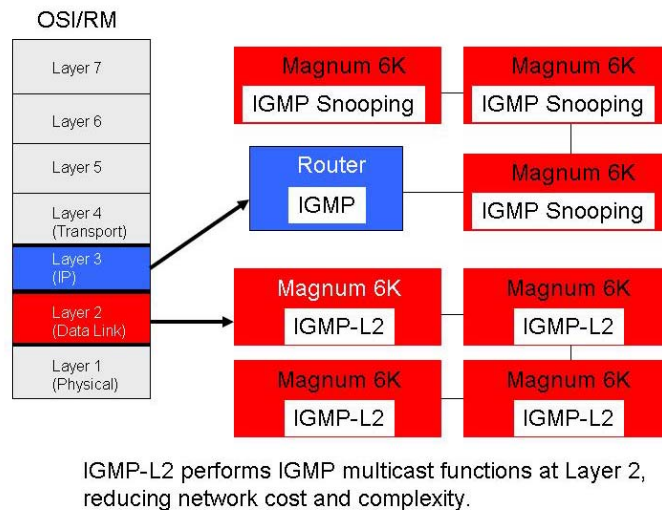
Layer 2 switches have to “snoop” on the decisions

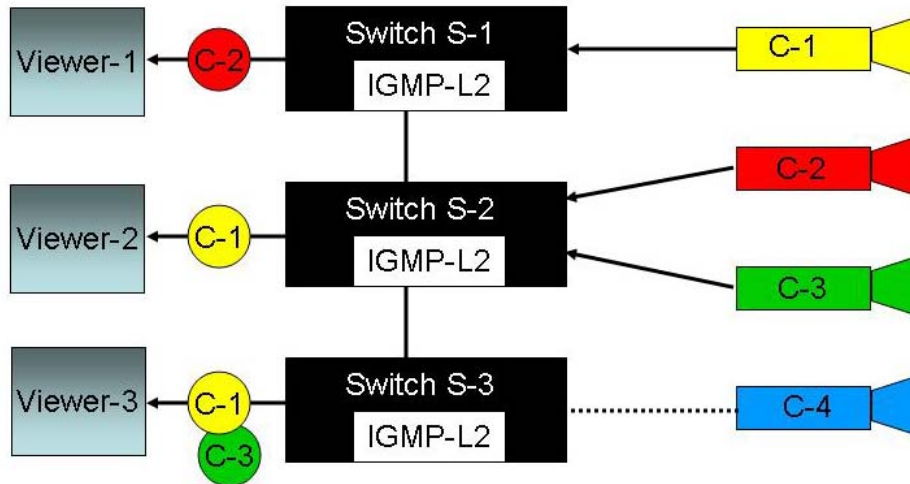
made up at Layer 3 in order to understand how to handle multicast video streams passing through.

How IGMP-L2 Works

In contrast to IGMP, GarrettCom’s new IGMP-L2 (patent pending) can perform the same selective management of multiple multicast streams as IGMP plus Snooping, utilizing a network of industrial-grade Magnum switches (which do not have the complexity or cost or time-delay of office-grade Layer 3 routers). Layer 2, the ISO Data Link Layer, describes the logical organization of data bits transmitted on a specific medium, in this case, an Ethernet network. IGMP-L2 relieves the user of network topology constraints and the potential multicast flooding that can be experienced with standard Layer 3 IGMP and Snooping. When implemented within an industrial LAN, such as a power utility substation or a remote factory or a traffic control system, IGMP-L2 simplifies the network and eliminates wasted bandwidth consumption while still permitting large numbers of multicast data streams to be efficiently handled with video feeds delivered to suit each viewing user’s needs.

The logic of IGMP-L2 operates to move the desired multicast streams through the minimum number of switches within the LAN, eliminating wasted streams that are transported through the LAN and then dropped. If a multicast stream source (such as a video camera) is not selected by anyone, all of its traffic will be dropped at the source and never move uselessly across the LAN.





Conclusions

In industrial networks, IP video is increasingly present due to the security advantages of video surveillance. With the new IP cameras, the network infrastructure can be readily used for this additional purpose. An efficient method of handling video feeds is needed to facilitate this trend, since most industrial Ethernet networks consist solely of hardened Layer 2 Ethernet switches.

The traditional IGMP plus Snooping approach that is used in office networks with routers, while complicated, can provide the functionality. But it comes with very high costs. It costs unnecessary office-grade routers. It costs the administrative complexity needed to incorporate upstream Layer 3 routers into the industrial network set-up and operation. It costs network traffic delays and loss of bandwidth needed to move video feeds upstream to Layer 3, through routers there, and back down again.

IGMP-L2 from GarrettCom Inc., operating at Layer 2 on Magnum industrial switches, avoids these costs and facilitates IP video surveillance in high-performance industrial networks.

For additional information, see http://www.garrettcom.com/techsupport/papers/igmp_l2.pdf