

White Paper

Static Multicast Forwarding



Central Management Switches

LGS-2624C

LGS-2816C-RPS



Abstract:

In the case of industrial network, managing the multicast video by IGMP snooping is a consensus for MIS. However, could IGMP snooping really satisfy for its video stream management in transportation surveillance project?

Implementation of MRT Surveillance:

MRT (Mass Rapid Transit) is one of the significant transportation in daily life. However, a mass population security either on platform or the gateway of the train relies on the surveillance system that is to ensure the real time alerting, thus provides the MIS to evaluate the incident and take preventive action if necessary. The surveillance system is designed to ensure the safety of MRT amenity, station facility, parking lot etc for each passenger.

Considering the multiple monitoring spots with deficiency of human resources, most MRT surveillance system are digitalized to comply with SMART AI Management System in order to assist MIS people, so the video stream transmission by IP is the primary method for surveillance in MRT application. Consequently, to beef up the stability of video transmission and quality as well as support of the high resolution are the key factors of constructing a successful project in surveillance industry.

In most of surveillance projects, video stream are transmitted by muticast packets, hence they are depending on the IGMP protocol to utilize the Multicast traffic. IGMP (Internet Group Management Protocol) is a part of IP protocol, which has one querior in subnet to communicate the group members with the server. It enables the querior to record which server currently belongs to which multicast group so that the switch will transmit the multicast packet to certain specified servers. In other words, the functionality of IGMP is to recognize and manage the multicast address in the network.

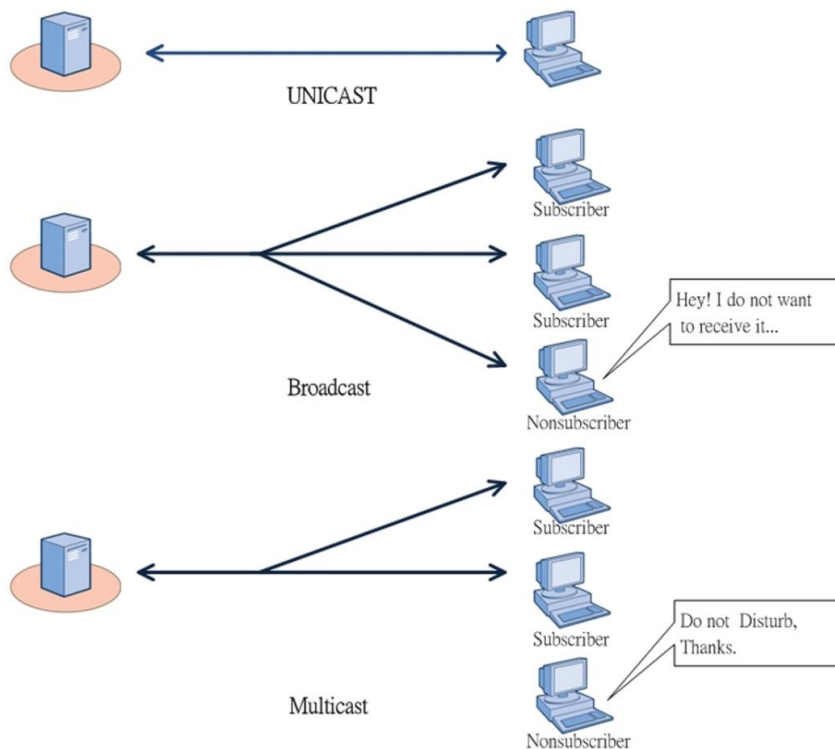


Fig1. Difference between Unicast 、 Broadcast and Multicast

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IGMP Bottlenecks:

Among the real applications, the video streams are not completely managed by IGMP. For example, each IP camera in MRT surveillance system has to transmit the video to SMART AI Management System and video server simultaneously so that the system manager can monitor the areas via video server and being alerted by AI Management System once incident occurred. Thus, the huge flow of IP CAM video are transmitted to AI Management System and video server to ensure both sides can obtain the synchronous video stream. Under this circumstance, IP CAM and switches must apply multicast method through IGMP. However, under the IGMP snoop management, each set of video resource (IP camera) has to establish one IGMP group. But there are 126 IP cameras in MRT station, which turns out to be 126 IGMP groups. A large amount of IGMP groups could cause the follow issues:

1. Managing large quantity of IGMP groups is time consuming for MIS to identify that all sources (IP cameras) are established correctly for their own IGMP group.
2. Switches will be high loaded to maintain large amount of IGMP groups.
3. The multicast IP address could be easily overlapped accidentally when IGMP group is re-built due to the IP cameras being moved or replaced.

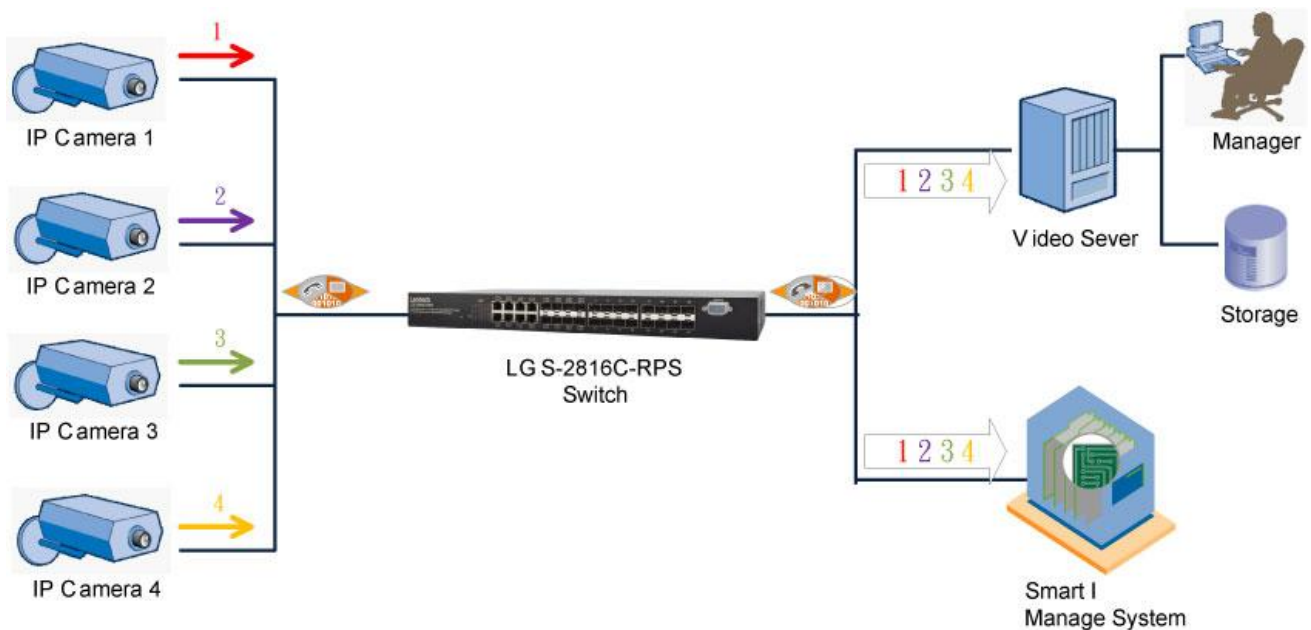


Fig2. Application of surveillance system in MRT station

Static Multicast Forwarding:

In viewing of the above concerns, the MIS brings up their requests to reduce their management tasks. The multicast clients are stationary so that it doesn't need to always register "leave and join", and allow switch to send the multicast datagram to designate port without worrying the client missing the video when IP cam is replaced. So, the switches must support Static Multicast Forwarding function to route the multicast datagram to fixed switch ports. Comparing the IGMP Snooping, the relation between IGMP Snooping and Static Multicast Forwarding equivalents to the Address Learning and Static MAC Forwarding in MAC Table. IGMP snooping activates automatically and delivers the corresponding multicast packet to an appropriate port; In contrast, Static Multicast Forwarding is manually delivering the multicast packet to indicated port.

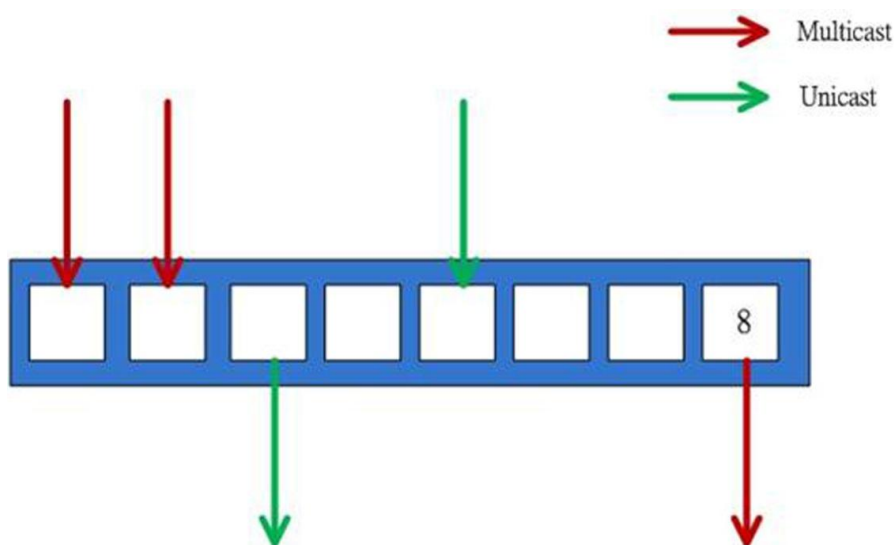


Fig3. The Multicast data will be forwarded to switch port 8 automatically by SMF function and Unicast data will not be influenced.

Advanced Static Multicast Forwarding

In large-scale of MRT surveillance project, there will be more than one set of SMART AI Management and video server to perform the demands of Load balance and Redundancy. Thus, switches must have capabilities of not only for Static Multicast Forwarding but configuring each static record for different multicast IP address. Meanwhile, the multicast data will be transmitted to corresponding switch port by dedicated multicast IP address so it could comply with the demands of load balance and redundancy by users.

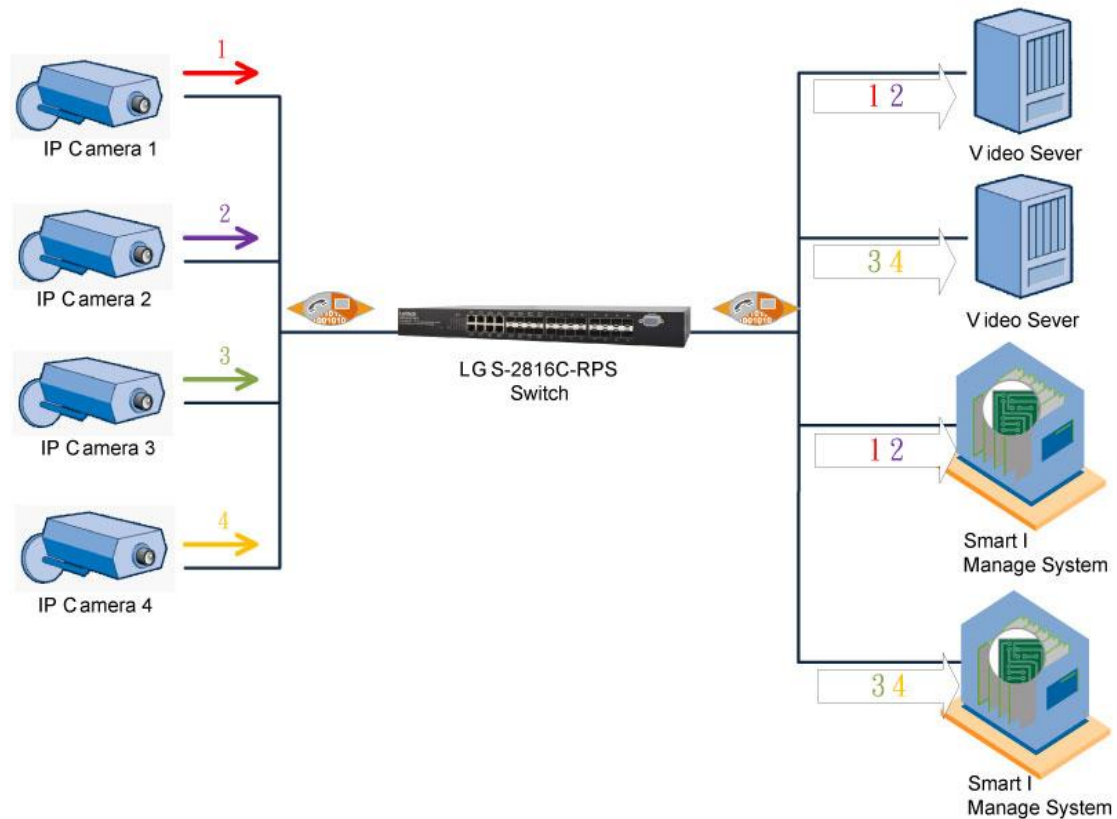




Fig4. Application of Advanced Static Multicast forwarding

Conclusion:

From the MRT surveillance application, huge amount of video streams are required to transmit to SMART AI Management System and video server simultaneously from each IP camera. Broadcasting is not capable as it will be flooding bandwidth thus cause the heavy loading to network throughput. Unicast cannot build the media transmission from one point to more points at the same time. In weighing of considerations above, the best is to adopt the multicast to transmit the video stream. During the multicast transmission, the switches must have function to support Static Multicast Forwarding to manage large amount of multicast IP addresses effectively. Furthermore, in large-scale of transportation project, switches must configure corresponding switch port through unique multicast IP address for fulfilling the demands of load balance and redundancy by MIS.

Product Introduction:

Central Management Switches series	
Model Name	Description
 LGS-2816C-RPS	16 100/1000M SFP + 8 10/100/1000T/Dual Speed SFP Combo L2 Plus Managed Switch w/ Redundant Power Supply
 LGS-2624C	20 10/100/1000T + 4 100/1000M SFP Combo + 2 100/1000M SFP L2 Plus Managed Switch

Features:

- **Full Gigabit Central Management Switch**
- **Advanced Security SSH/SSL/ACL/TACAS+**
- **DNV Type Approval for Maritime***
- **Operation Temperature -25C°~60C°**

