MULTICASTING VIDEO OVER A LAN

How you set up your network for voice, data, video, and audio transmission can mean the difference between a network that operates efficiently and transparently to users and one that's slow and tedious.

Think of your network as a river of data. You have a steady current of data moving smoothly down the channel. All your network users are like tiny tributaries branching off the main river taking only as much water (bandwidth) as they need to process data. When you start to multicast voice, video, data, and audio over the LAN, those streams suddenly become the size of the main river. The result is that each user is basically flooded with data and it becomes almost if not impossible to do any other tasks. This scenario of sending transmission to every user on the network is called broadcasting, and it slows the network down to a trickle. But there are network protocol methods that alleviate this problem.

Unicasting vs. multicasting

Unicasting is sending data point-to-point, from one network device to another. Multicasting is transmitting data from one network device to multiple users.

When multicasting with Layer 2 switches, all attached network devices receive the network packets, whether they want them or not. When you multicast with Layer 3 switches (with multicast support), you send the network packets to only the exact client/receives who want them. You control where the river of data goes and put up locks to keep the river out of other user streams.

Unicasting technical details

Every device on a network has a MAC address and an IP address. In a typical network, we usually see a lot of unicast packets going from one device to another. The unicast packet header will contain the destination IP address of the device it needs to reach and typically resembles a Class C IP address ranging from 192.0.0.0 all the way to 223.255.255.255. These unicast packets are generated from a single source and are sent to a single receiving device. The source nodes, also known as network switches and routers, have a built-in routing table, which enables the unicast packet to find its destination by taking the shortest hop from one switch to another.

In a typical unicast network, you'll find that Layer 2 switches are used because they're very cost effective and can easily support these types of network communications.

Multicasting: Layer 2 vs. Layer 3 switches

In multicasting, a single device will transmit a network packet out to many, but not all, devices that are actively tuned in and want to receive the packet. A multicast IP address is a Class D address, which means it has a range of 224.0.0.0 to

239.255.255.255. The IP address range typically designated for multicasting protocols is between 224.0.0.0 through 224.0.0.255.

Multicasting with Layer 2 switches. Because a multicast head does NOT have a destination IP address, an average network switch (a Layer 2 switch without supported capabilities) will not know what to do with it. So the switch sends the packet out to every network port on all attached devices. When the client or network interface card (NIC) receives the packet, it analyzes it and discards it if not wanted.

Multicasting with Layer 3 switches. To solve the problem of sending packets to every device on the network, use a Layer 3 switch that supports IGMPv2 or IGMPv3 and packet forwarding (Internet Group Management Protocol [IGMP] supports multicasting on the physical network level).

The Layer 3 switch multicasts network packets only to devices that have tuned into the stream. It does not send the multicast packets to devices that don't want it. This makes multicasting with Layer 3 switches much more efficient than with Layer 2 switches.

The value of IGMP and Layer 3 switches

If you had a Layer 2 switch that didn't support IGMPv2 or IGMPv3 snooping, the switch would be able to handle only a few devices sending multicasting packets.

Layer 3 switches with IGMP support, however, are smart enough to know who wants to receive the multicast packet and who doesn't. When a client/receiving device want to tap into a multicasting stream, it responds to the multicast broadcast with an IGMP report. That's the equivalent of saying, "I want to connect to this stream." The IGMP report is only sent in the first cycle and initializes the connection between the multicast stream and receiving device.

If the client/receiving device was previously connected to the stream, it sends a grafting request to the Layer 3 switch. Grafting enables the IGMP-supported switch to remove the temporary block on the unicast routing table. The switch can then send the multicast packets to newly connected members of the multicast group.

When the client/receiving device no longer wants to receive the multicast packets, it sends a pruning request to the IGMP-supported switch, which temporarily removes the device from the multicast group and stream.

Basically what we're saying is…

If you plan on using multicasting protocols on your network, make sure you have routers or Layer 3 switches that support the IGMP protocol. Without this support, your network devices will be receiving so many multicasting packets, they will not be able to co communicate with other devices using different protocols, such as FTP.

Also, if you’re planning to send video from multiple sources over a LAN, a feature-rich, IGMP-supported Layer 3 switch also will give you the bandwidth control you need.

Be sure to configure the IGMP-supported switches for the particular application. Most Layer 3 switches right out of the box have IGMP support disabled.

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