5.7.2 Multicast Facts

Multicasting creates logical groups of hosts—messages sent to the group are received by all group members. Multicasting is typically used for streaming video and audio applications, such as video conferencing.

Without multicasting, messages sent to a specific group only use the following:

Method	Description
Unicast	Messages are sent to a specific host address. The sending device must know the IP address of all recipients, and must create a separate packet for each destination device.
Broadcast	A single packet is sent to the broadcast address and is processed by all hosts. All hosts, and not just group members, receive the packet. Broadcast packets are not typically forwarded by routers, so broadcast traffic is limited to within a single subnet.

IGMP

The Internet Group Management Protocol (IGMP) is used to identify group members and to forward multicast packets on to the segments where group members reside. IGMP routers keep track of the attached subnets that have group members, using the following process:

1. A router sends out a host membership query. This query is addressed to the IP address 224.0.0.1.
   - The address 224.0.0.1 is never assigned to a group because it is used for the query messages sent by routers.
2. Hosts that are members of any groups respond with a list of the groups they belong to. Each group is identified with a multicast IP address in the range of 224.0.0.0 to 239.255.255.255.
3. The router uses these responses to compile a list of the groups on the subnet that have group members. Routers do not keep track of individual hosts that are members of a group; they simply compile a list of groups on the subnet that have at least one member.
4. When a host joins a new group, it automatically sends a join group message to the router. When the last host in a group leaves the group, it sends a leave group message to the router.
5. The IGMP router reports to upstream routers that they have members of a specific group.
   - Upstream routers are the routers that exist between the router and the server that sends out the multicast data stream. They keep track of downstream routers that have group members.

Multicast Stream

The following process is used when sending a multicast stream:

1. The sending server sends packets addressed to the multicast group.
2. Routers receive the multicast packets and check their lists of group members.
   - If the router is connected to a subnet that has group members, or if the subnet includes a downstream router with group members, the multicast packet is sent on that subnet.
   - If a subnet does not have any group members, the packet is not forwarded on that subnet.
   - If a router does not have any subnets with group members, the packet is dropped and not forwarded.
3. Each intermediary router performs the same tasks until the data stream eventually reaches the multicast client.

Additional Facts

Additional multicasting facts include:

- Frames that contain multicast traffic are sent to a special MAC address. The MAC address begins with 01-00-5E, with the last portion being a form of the IP multicast group address. A single multicast MAC address could be shared by up to 5 other IP multicast addresses.
- A regular switch that receives multicast traffic sends the traffic out all ports, because the destination MAC address will be an unknown address. This means that a host might see multicast traffic on its segment, even if it isn't a member of the group. However, hosts that are not members of the group will not process the frame because they will not associate the multicast MAC address with their own address.
- IGMP snooping on a switch allows the switch to control which ports get IGMP traffic for a specific group. With IGMP snooping, the switch identifies which ports include members of a specific multicast group. When a message is received for a group, the message is sent only to the ports that have a group member connected.