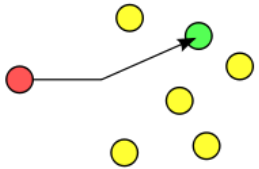
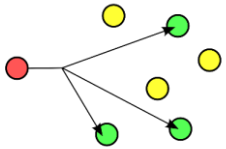
WAGO LEAN MANAGED SWITCHES

IGMP Snooping Overview

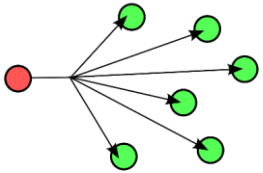
WHAT IS IGMP AND WHAT IS MULTICAST



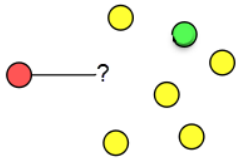
Unicast – single sender to single receiver



Multicast – single sender to many receivers



Broadcast – single sender to all receivers



DLF – Destination Lookup Failure (no where to send)

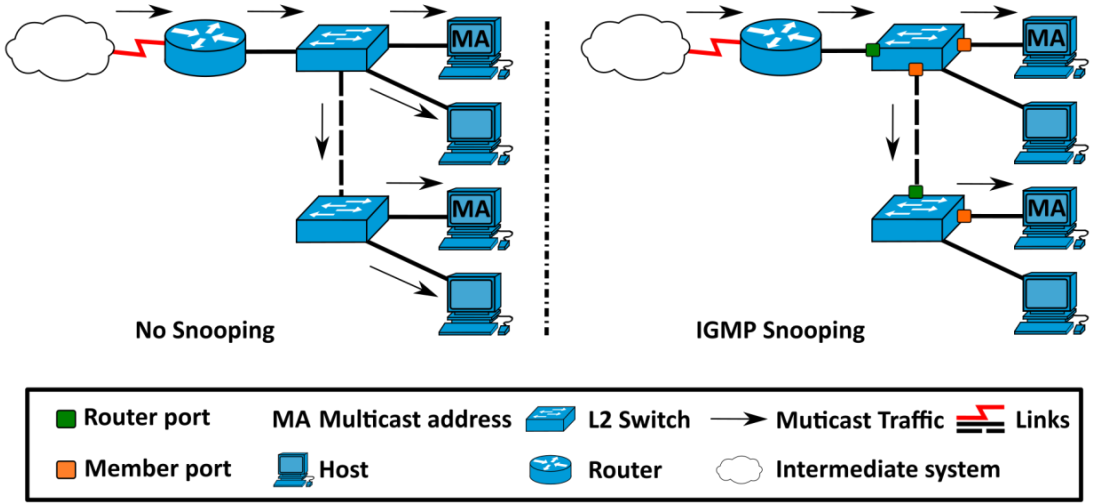
IGMP (Internet Group Multicast Protocol)

The Internet Group Management Protocol (IGMP) is a communications protocol used by hosts (PLCs, Drives, othe) and adjacent level 2 switches and level 3 routers on IPv4 networks to establish multicast group memberships. IGMP is an integral part of IP multicast and allows the network to direct multicast transmissions only to hosts that have requested them.

IGMP can be used for one-to-many networking applications such as online streaming video and gaming, and allows more efficient use of resources when supporting these types of applications.

WHAT IS IGMP SNOOPING

IGMP snooping is the process of listening to Internet Group Management Protocol (IGMP) network traffic to control delivery of IP multicasts. Network switches with IGMP snooping listen in on the IGMP conversation between hosts and routers and maintain a map of which links need which IP multicast transmission. Multicasts may be filtered from the links which do not need them, conserving bandwidth on those links.

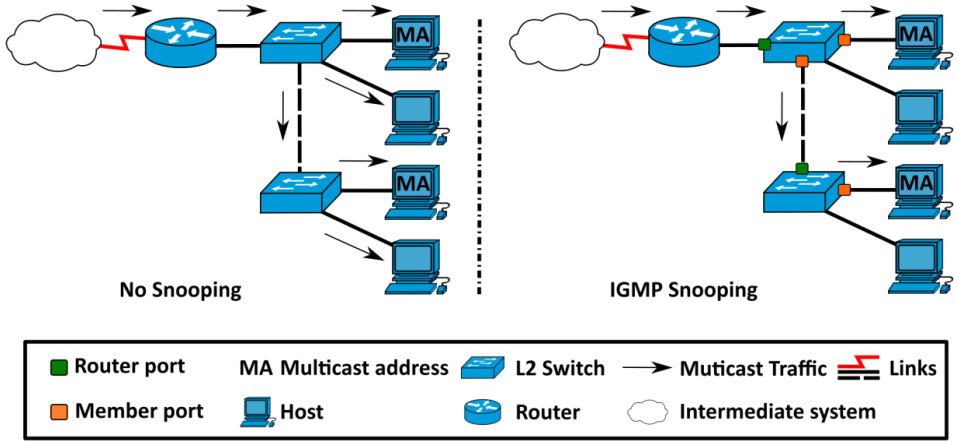


WHAT IS IGMP SNOOPING QUERIER

IGMP querier
In order for IGMP, and thus IGMP snooping, to function, a multicast router must exist on the network and generate IGMP queries. Without a querier IGMP membership reporting may be incomplete and the tables associating member ports and multicast groups are potentially incomplete and snooping will not work reliably. Some IGMP snooping implementations include full querier capability.

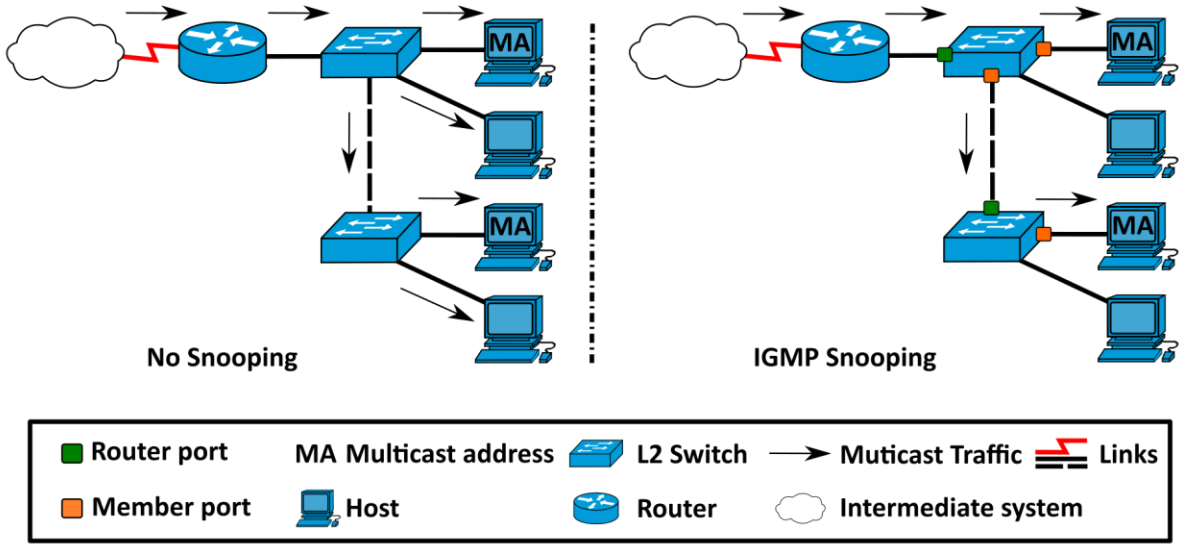
IGMPv2 and IGMPv3 contain provision for selecting a querier when multiple are available. The querier with the lowest IP address is given the role.[2][3]

IGMP general queries from the querier must be unconditionally forwarded by all switches involved in IGMP snooping.[1]



HOW DOES IGMP WORK

A Layer 2 switch monitors the queries sent from the router and generates a table of what host devices subscribe to the multicast. When a multicast message is sent, then the switch will forward the message only to ports with devices that are subscribed.



WHAT ARE MULTICAST MESSAGES

A **multicast address** is a logical identifier for a group of hosts in a computer network that are available to process datagrams or frames intended to be multicast for a designated network service. Multicast addressing can be used in the link layer (layer 2 in the OSI model), such as Ethernet multicast, and at the internet layer (layer 3 for OSI) for Internet Protocol Version 4 (IPv4) or Version 6 (IPv6) multicast.

IP multicast address range	Description	Routable
224.0.0.0 to 224.0.0.255	Local subnetwork[1]	No
224.0.1.0 to 224.0.1.255	Internetwork control	Yes
224.0.2.0 to 224.0.255.255	AD-HOC block 1[2]	Yes
224.1.0.0 - 224.1.255.255	Reserved[3][4]	
224.3.0.0 to 224.4.255.255	AD-HOC block 2[5]	Yes
225.0.0.0 to 231.255.255.255	Reserved[3][4]	
232.0.0.0 to 232.255.255.255	Source-specific multicast[1]	Yes
233.0.0.0 to 233.251.255.255	GLOP addressing[6]	Yes
233.252.0.0 to 233.255.255.255	AD-HOC block 3[7]	Yes
234.0.0.0 to 234.255.255.255[*citation needed*]	Unicast-prefix-based	Yes
234.0.0.0 to 238.255.255.255	Reserved[3][4]	
239.0.0.0 to 239.255.255.255	Administratively scoped[1]	Yes

IGMPv2 destination address[9]:§9

Message Type	Multicast Address
General Query	All hosts (224.0.0.1)
Group-Specific Query	The group being queried
Membership Report (all IGMP versions)	The group being reported
Leave Group	All routers (224.0.0.2)

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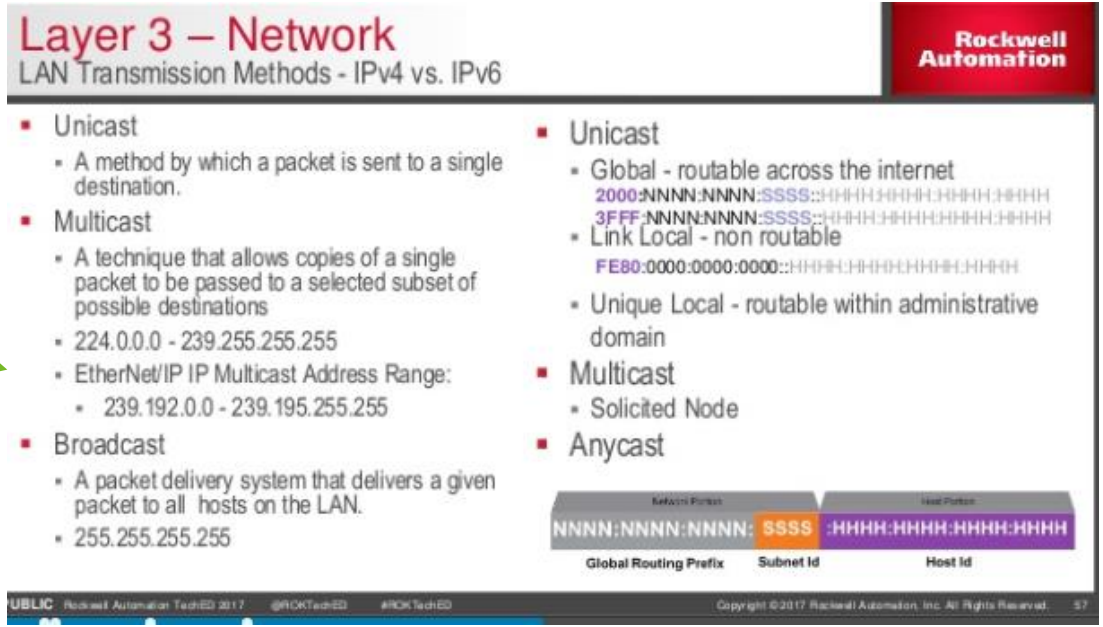
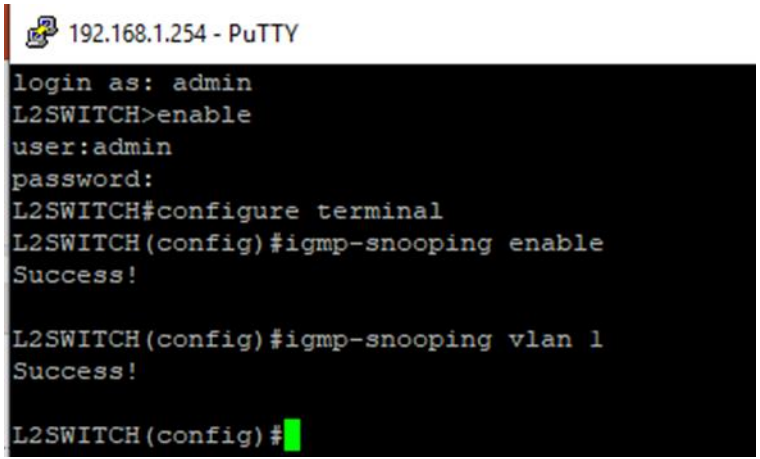
A multicast address is associated with a group of interested receivers. According to RFC 3171, addresses 224.0.0.0 to 239.255.255.255 (formerly Class D addresses) are reserved as multicast addresses in IPv4.

IGMP SNOOPING – ETHERNET/IP



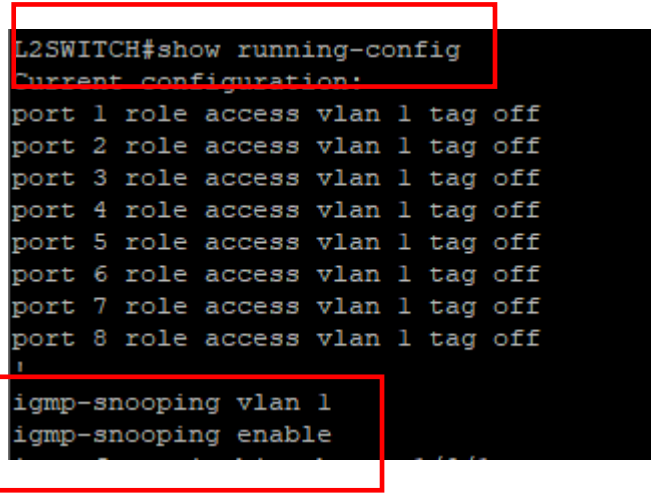
HOW TO SET UP IGMP SNOOPING IN A WAGO LEAN MANAGED SWITCH

IGMP Snooping is not available via the Web Based Management…



- Use a terminal program like PuTTY to connect to the switch
- Log in as admin
- Next type in enable to configure the switch
- Default: admin/wago
- Enter the configure terminal mode
- To enable Igmp snooping type in igmp-snooping enable
- Should see Success!
- Next you need to assign the vlan to be used. If no vlans are setup on the switch you need to assign the default vlan 1
- Type in igmp-snooping vlan 1
- Should see Success!

HOW TO CHECK IF IGMP SNOOPING IS ENABLED



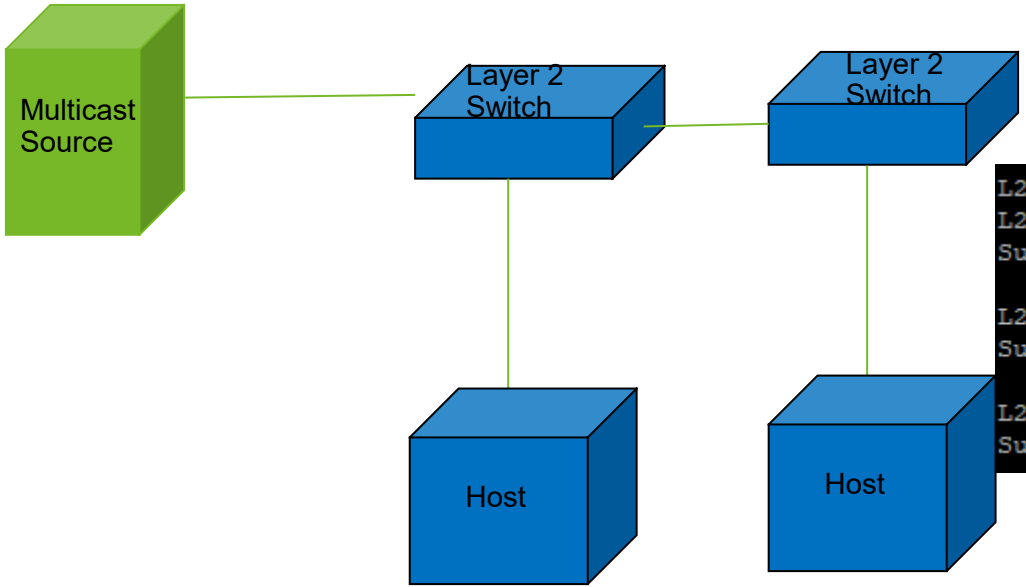
- Use a terminal program like PuTTY to connect to the switch
- Log in as admin
- Type in show running-config

- The switch will indicate that Igmp-snopping is enabled on Vlan1

WHAT IF THERE IS NO ROUTER ON THE NETWORK??

In local networks there may not be a router in the network to send out the general query (GQ). If there is no GQ then the layer 2 switch will not know where the multicast information should be sent.

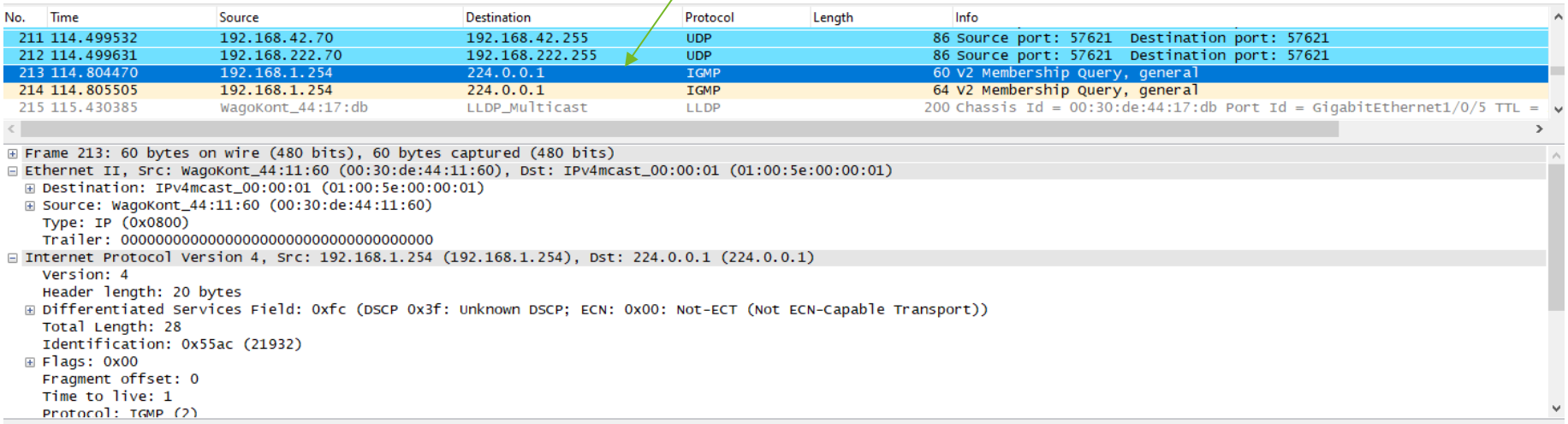
Therefore the WAGO Lean managed switch can be set up to be the querier and the user can set up how often the GQ is sent. The standard is 125 seconds. Also the vlan to be used needs to be setup. If no vlans set up, you must configure the default as vlan 1




```
L2SWITCH#configure terminal
L2SWITCH(config)#igmp-snooping querier enable
Success!

L2SWITCH(config)#igmp-snooping querier interval 125
Success!

L2SWITCH(config)#igmp-snooping querier vlan 1
Success!
```

WIRESHARK EXAMPLE

Sent by LMS with IGMP-Snooping Querier enabled to all hosts



HOW TO CHECK IGMP SNOOPING INFORMATION

```
L2SWITCH#show igmp-snooping vlan VLANLISTS
The IGMP snooping on the Switch is enabled.
The IGMP snooping is enabled in VLAN(s): 1
The unknown multicast packets will be dropped.

      Querier   Immediate    Group             Querier   Immediate    Group
Port  mode      leave        Counts      Port  mode      leave        Counts
----  -------   ---------  -------       ----  -------   ---------  -------
 1    auto      disabled      0/256       2     auto      disabled      0/256
 3    auto      disabled      0/256       4     auto      disabled      0/256
 5    auto      disabled      0/256       6     auto      disabled      0/256
 7    auto      disabled      0/256       8     auto      disabled      0/256
```

Use show igmp-snooping vlan VLANLIST

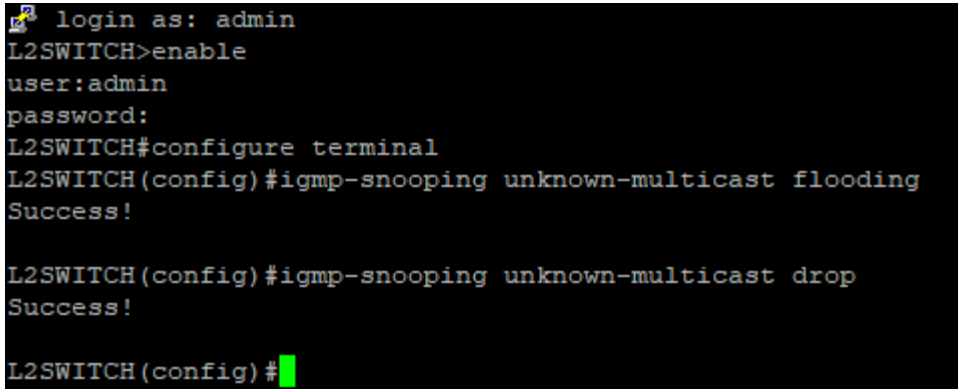
```
L2SWITCH#show igmp-snooping querier vlan VLANLISTS
The IGMP snooping querier on the Switch is enabled.
The IGMP snooping querier interval is 125.

The IGMP snooping querier is enabled in VLAN(s): 1
  VLAN       Querier
 ------   -----------------
     1     192.168.1.254
```

Use show igmp-snooping querier vlan VLANLIST

UNKNOWN MULTICAST DATA

Unknown multicast data refers to multicast data for which no forwarding entries exist in the IGMP snooping forwarding table. This feature enables the device to forward unknown multicast data only to the router port. If the device does not have a router port, unknown multicast data will be dropped.

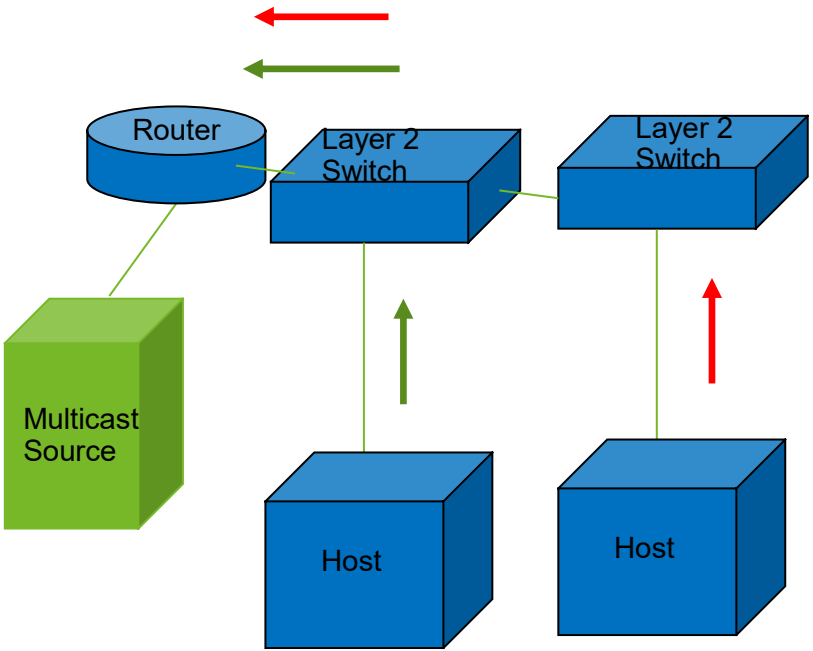
It is possible to set up the switches to either drop the unknown multicast data or set it to flood all the ports in the VLAN



WHAT IS IGMP PROXY

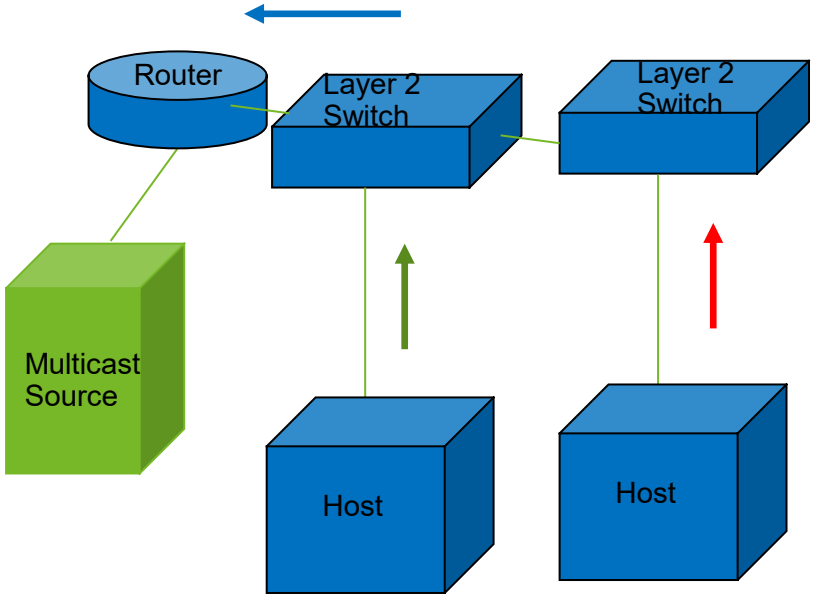
IGMP Proxy will aggregate reports to Routers

Proxy Disabled: All responses to IGMP queries are forwarded to the router



Proxy Enabled: Switch will send aggregated report to router

Proxy snooping reduces the number of IGMP reports sent toward an IGMP router.



IGMP SNOOPING PROXY SETUP

To enable or disable IGMP Snooping Proxy in the Lean Managed Swich use the CLI

```
L2SWITCH#configure terminal
L2SWITCH(config)#igmp-snooping proxy enable
Success!

L2SWITCH(config)#igmp-snooping proxy disable
Success!

L2SWITCH(config)#
```

TOOLS: SHOW IGMP GROUPS

To show the current IGMP group membership type in the CLI show ip igmp groups

```
L2SWITCH#show ip igmp groups
Total entries: 3.
Group  IP        Server IP        Status    VLAN  Ports
---------------  ---------------  --------  ----  -------------------------------
---------
239.255.255.250  172. 29.233. 70  Dynamic   1     3
224.  0. 23. 12    0.  0.  0.  0  Dynamic   1     3
239. 83.100.109    0.  0.  0.  0  Dynamic   1     3

L2SWITCH#
```

TOOLS: SHOW IGMP SNOOPING QUERIER

To display information about the IP address and receiving port for the IGMP query type show ip ipmg snooping querier

```
L2SWITCH#show ip ipmg snooping querier
Total entries: 3.
Group  IP        Server IP        Status    VLAN  Ports
---------------  ---------------  --------  ----  ------------------------------------
239.255.255.250  172. 29.233. 70  Dynamic   1     3
224.  0. 23. 12    0.  0.  0.  0  Dynamic   1     3
239. 83.100.109    0.  0.  0.  0  Dynamic   1     3
```

TOOLS: SHOW IP MROUTE

To display information about the IP multicast routing table type show ip mroute

```
L2SWITCH#show ip mroute
Total entries: 3.
Group  IP        Server IP        Status    VLAN  Ports
---------------  ---------------  --------  ----  --------------------
239.255.255.250  172. 29.233. 70  Dynamic   1     3
224.  0. 23. 12    0.  0.  0.  0  Dynamic   1     3
239. 83.100.109    0.  0.  0.  0  Dynamic   1     3
```