



Configurar sistemas Multimedia Audio/Video AV sobre redes IP Multicast

AUTO-IGMP en los DGS-1210
ProAV en los DGS-1520



Alberto LM
Presales Engineer
D-Link Iberia



■ Qué vamos a ver

- Tráfico Multicast:

Problemas / Soluciones

- Protocolo IGMP Snooping
- Configuración en Switches

Smart & Managed de D-Link

- Hands-on
- Vídeo de la sesión práctica aquí

<https://youtu.be/d3ba7Zp7KUo>



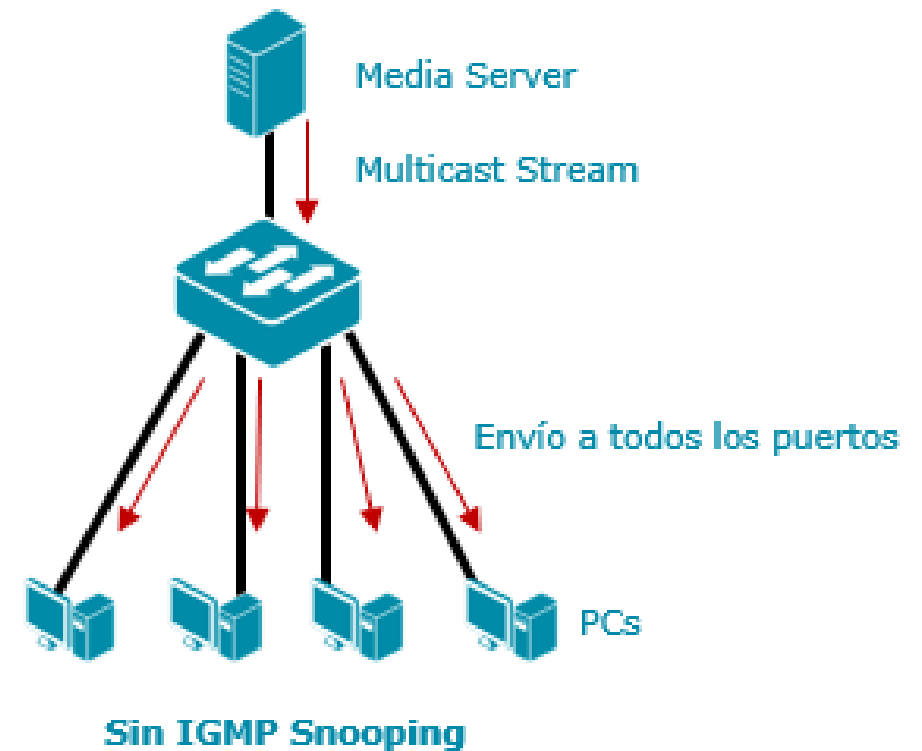
Tráfico Multicast

- No solo IPTV...
- En redes domésticas con servicios Triple-Play
- En redes profesionales:
 - Hoteles
 - Hospitales
 - Displays
 - Megafonía, ...



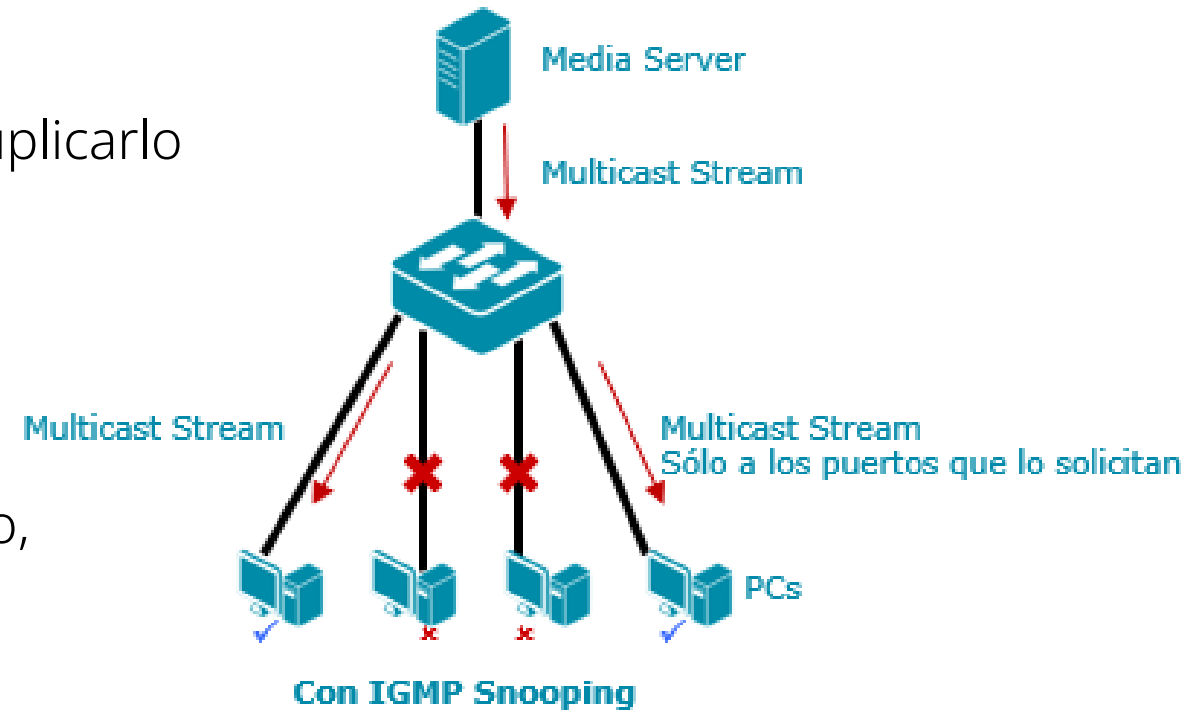
■ Multicast & IGMP Snooping – El equipo perfecto

- Principal ventaja del tráfico **multicast**:
permite enviar a múltiples receptores
un único flujo de datos sin necesidad de duplicarlo
- ¿Inconvenientes?
Las tramas Multicast son reenviadas
por todos los puertos del switch
excepto por el puerto por donde ha llegado,
inundando así toda la VLAN



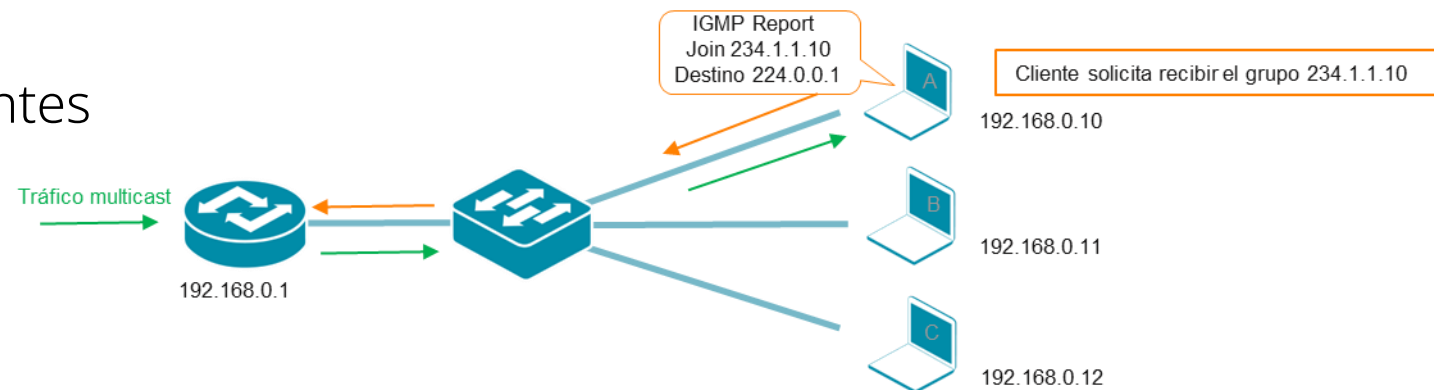
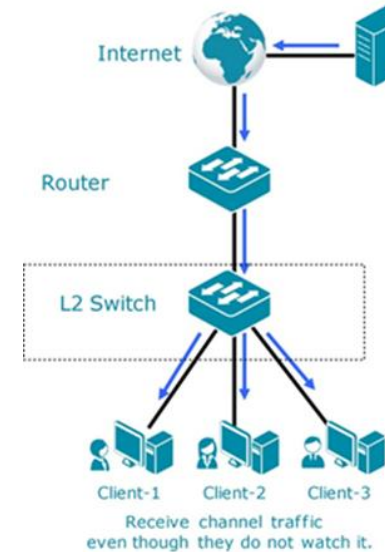
■ Multicast & IGMP Snooping – El equipo perfecto

- Principal ventaja del tráfico **multicast**:
permite enviar a múltiples receptores
un único flujo de datos sin necesidad de duplicarlo
- ¿Inconvenientes?
Las tramas Multicast son reenviadas
por todos los puertos del switch
excepto por el puerto por donde ha llegado,
inundando así toda la VLAN
- Gracias al protocolo **IGMP Snooping**
se evita la saturación en la red
y se gestiona el tráfico de manera eficiente



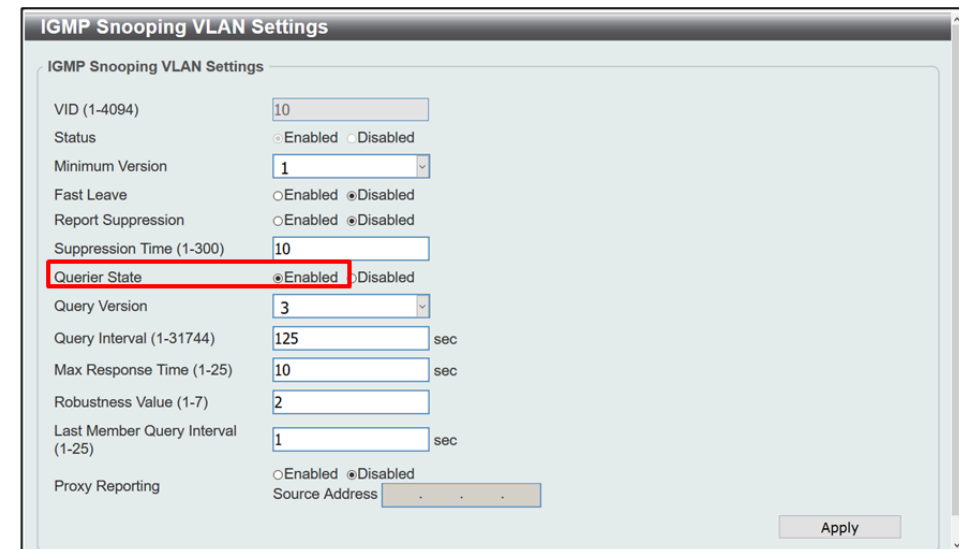
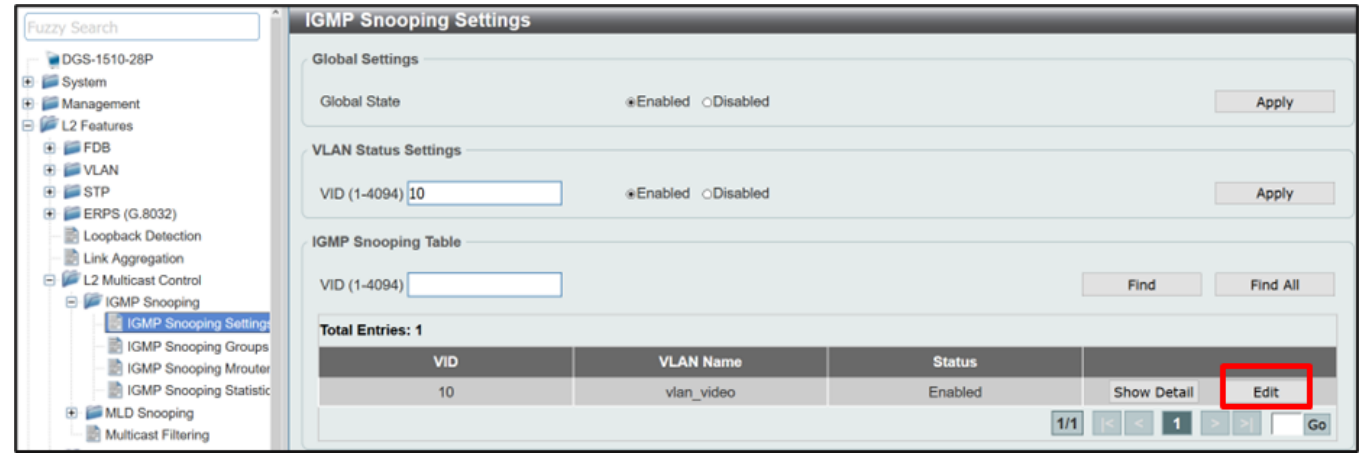
IGMP (Internet Group Management Protocol)

- Los routers y switches pueden actuar como Querier, enviando consultas (Queries) y escuchando las peticiones IGMP de los clientes (Report)
- El tráfico sólo llega a los receptores que lo solicitan
- Permite la entrada y salida de clientes a un grupo (o canal)
- Un cliente puede pertenecer a varios grupos multicast



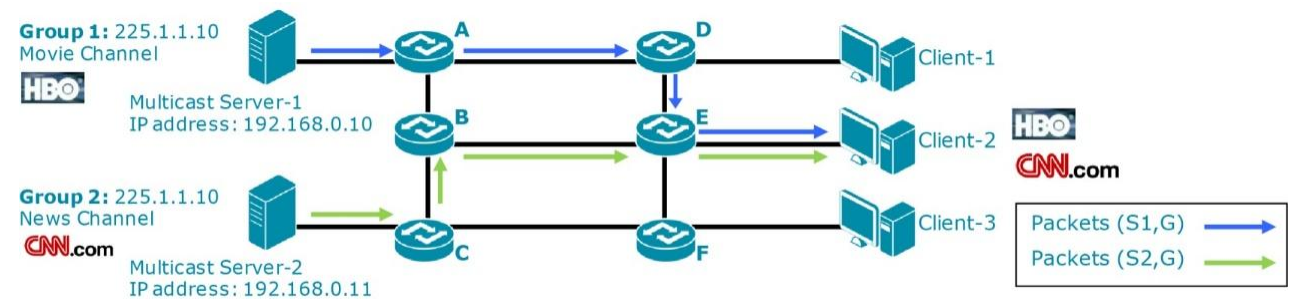
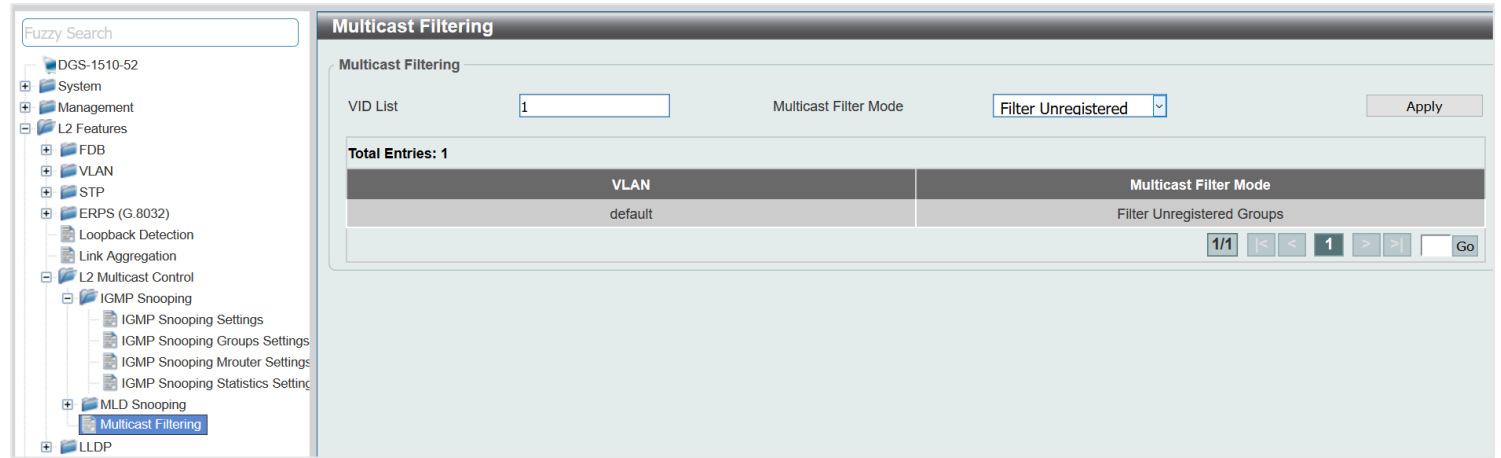
Configuración en Switches D-Link

- Switch tipo 1 – Querier:
Habilitar IGMP Snooping,
con Querier en la VLAN
con tráfico multicast,
al ser el más cercano a la fuente
- Switches tipo 2 - Acceso:
Habilitar IGMP Snooping
para la VLAN con tráfico multicast
en el resto de switches



■ Buenas Prácticas

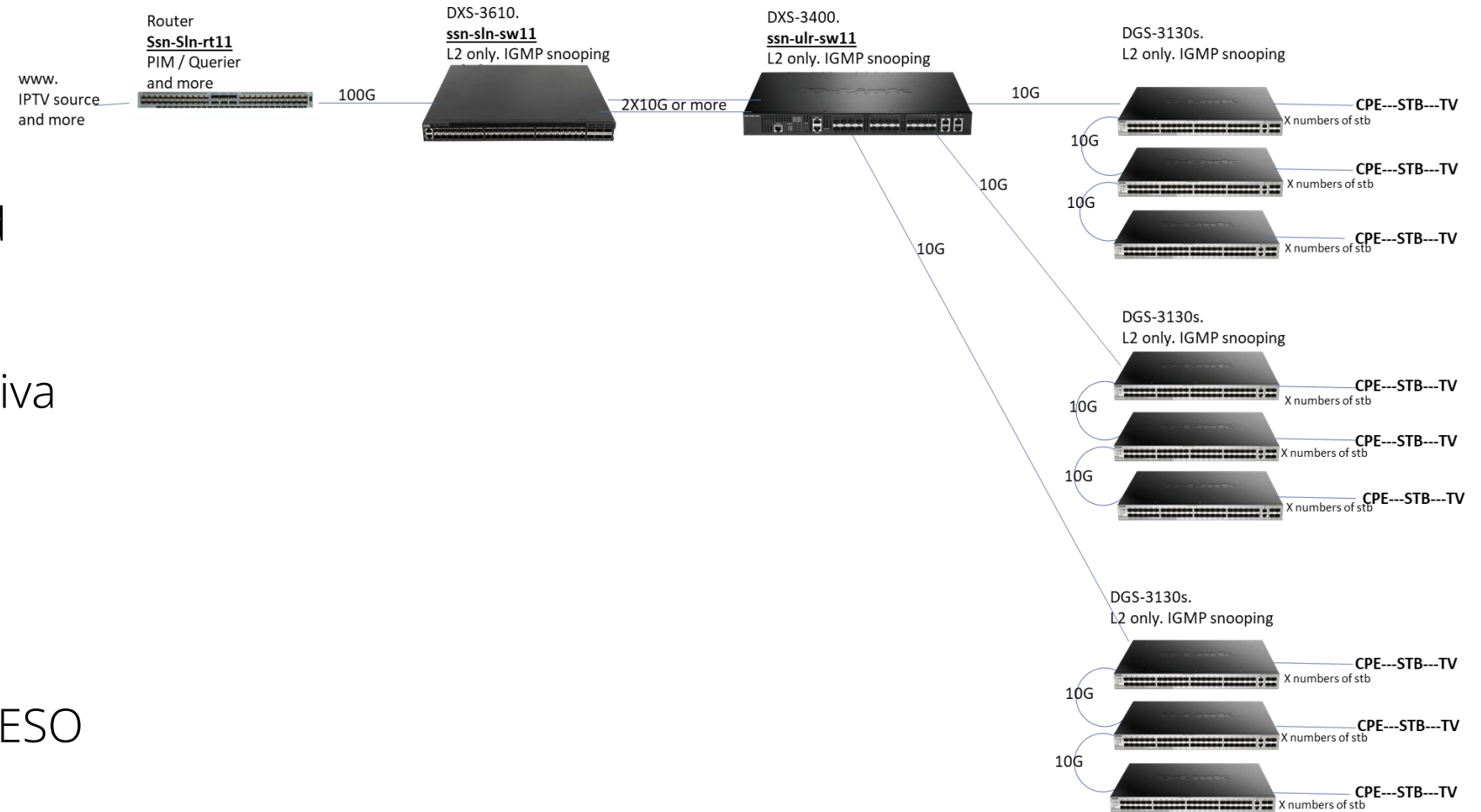
- L2 Multicast con VLAN dedicada
- IGMPv2 es buena opción
- IGMP Fast Leave
en los switches de acceso
- IGMP Querier
en un único dispositivo
- Filter Unregistered:
Habilitar filtrado de grupos multicast
no registrados.
Por defecto, el switch reenvía
todo el tráfico multicast
(forward unregistered)



Example: If client-2 only wants to see movie channel (HBO), it just needs to include Server-1 into its report.

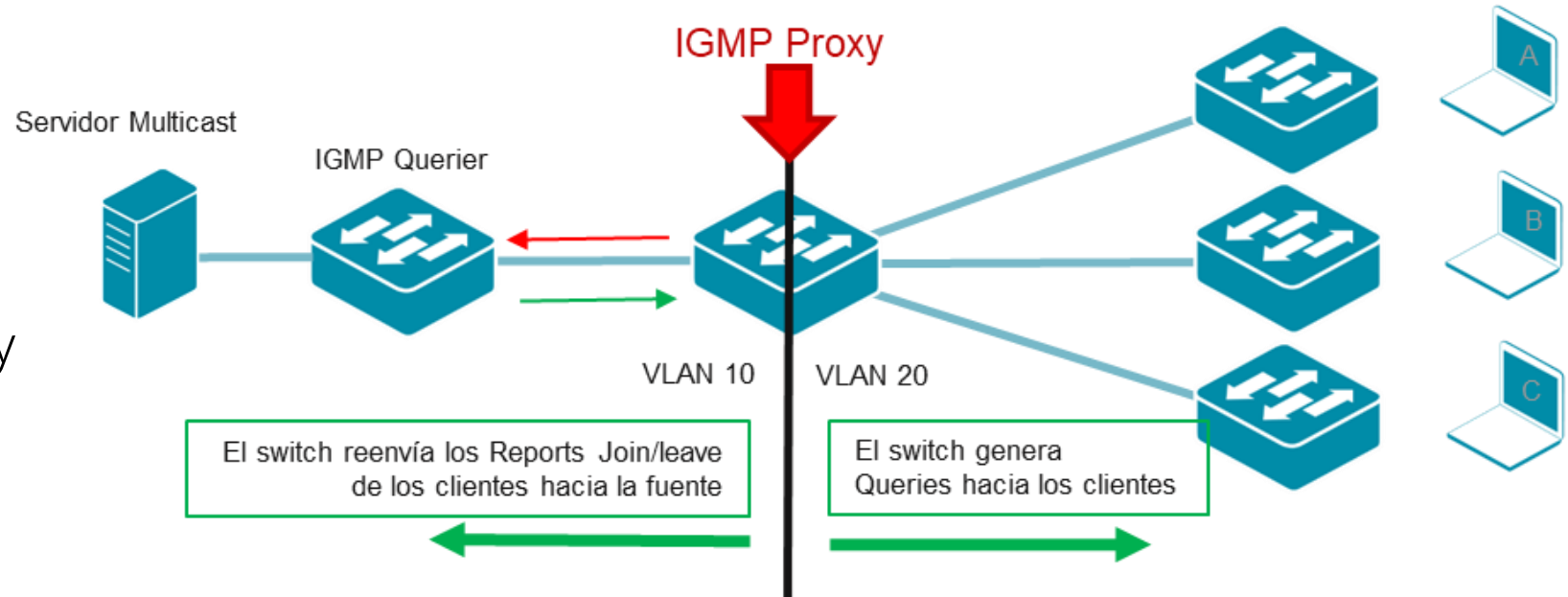
Casos de Éxito

- Querier conectado a puerto de alta velocidad
- L2 Multicast
- Reserva de VLAN exclusiva para el tráfico Multicast
- Equipos CORE de mayor performance que los equipos de ACCESO



IGMP Proxy

- Situación:
servidores multicast y clientes
en VLANs diferentes
- Solución:
IGMP Proxy
- Un switch con IGMP Proxy
entre las 2 VLANs
- IGMP proxy se comporta
como Querier
y como cliente



IGMP Proxy - Configuración

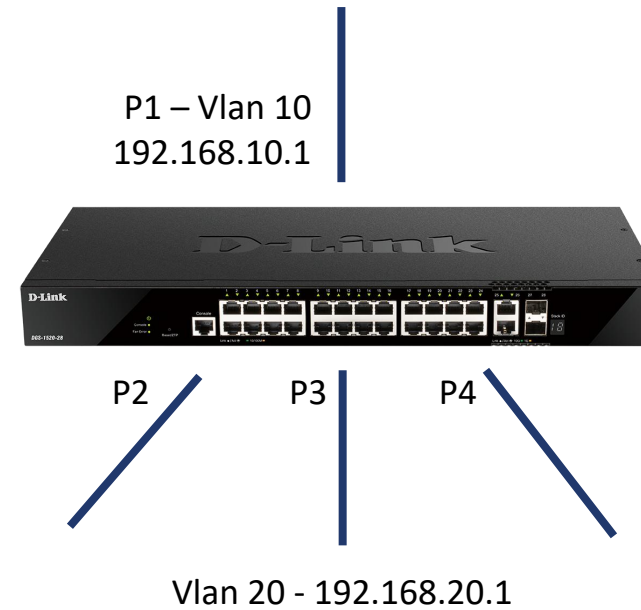
```
configure terminal
vlan 10,20
exit
```

```
interface vlan 10
ip address 192.168.10.1 255.255.255.0
Exit
```

```
interface vlan 20
ip address 192.168.20.1 255.255.255.0
exit
```

```
interface ethernet1/0/1
switchport mode access
switchport access vlan 10
```

```
interface range ethernet1/0/2-4
switchport mode access
switchport access vlan 20
```



```
ip igmp proxy
interface vlan 10
ip igmp proxy upstream
exit
```

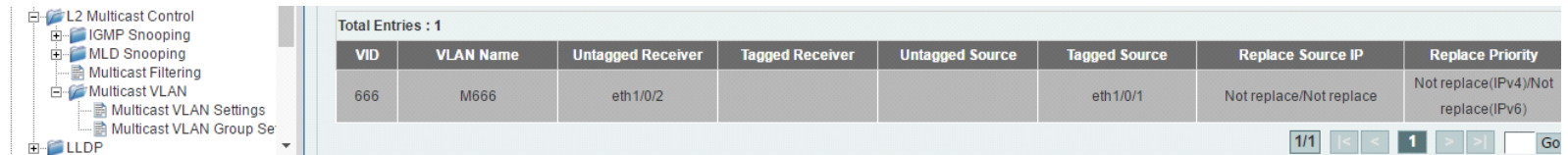
```
ip igmp proxy
interface vlan 20
ip igmp proxy downstream
exit
```

ISM VLAN

- IGMP Snooping Multicast VLAN
- Varias VLANs de clientes

Misma VLAN Multicast

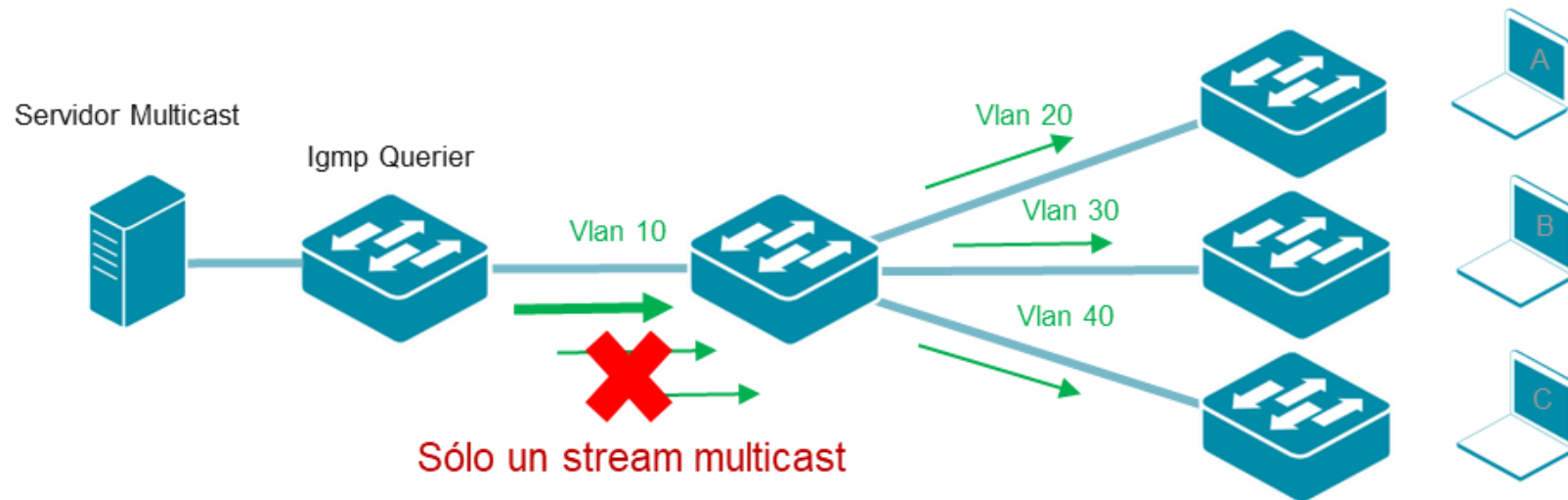
- Eficiente:
mismo flujo multicast
para diferentes VLANs



The screenshot shows a configuration menu on the left with options: L2 Multicast Control, IGMP Snooping, MLD Snooping, Multicast Filtering, Multicast VLAN, Multicast VLAN Settings, Multicast VLAN Group Se, and LLDP. The main area displays a table with 1 entry for VID 666, named M666. The table columns are: VID, VLAN Name, Untagged Receiver, Tagged Receiver, Untagged Source, Tagged Source, Replace Source IP, and Replace Priority.

VID	VLAN Name	Untagged Receiver	Tagged Receiver	Untagged Source	Tagged Source	Replace Source IP	Replace Priority
666	M666	eth 1/0/2			eth 1/0/1	Not replace/Not replace	Not replace(IPv4)/Not replace(IPv6)

Navigation controls at the bottom right show '1/1' entries, with the first entry selected.



ISM VLAN - Configuración

```
configure terminal  
mvlan ipv4 enable
```

```
mvlan vlan 10  
member source tagged ethernet 1/0/1  
member receiver untagged ethernet 1/0/2-4  
exit  
vlan 10  
multicast filtering-mode filter-unregistered  
exit
```

```
vlan 20,30,40  
exit
```

```
interface Ethernet1/0/2  
switchport mode access  
switchport access vlan 20  
exit  
interface Ethernet1/0/3  
switchport mode access  
switchport access vlan 30  
exit  
interface Ethernet1/0/4  
switchport mode access  
switchport access vlan 40  
exit
```

P1 – Vlan 10
192.168.10.1



P2 – Vlan 20
192.168.20.1

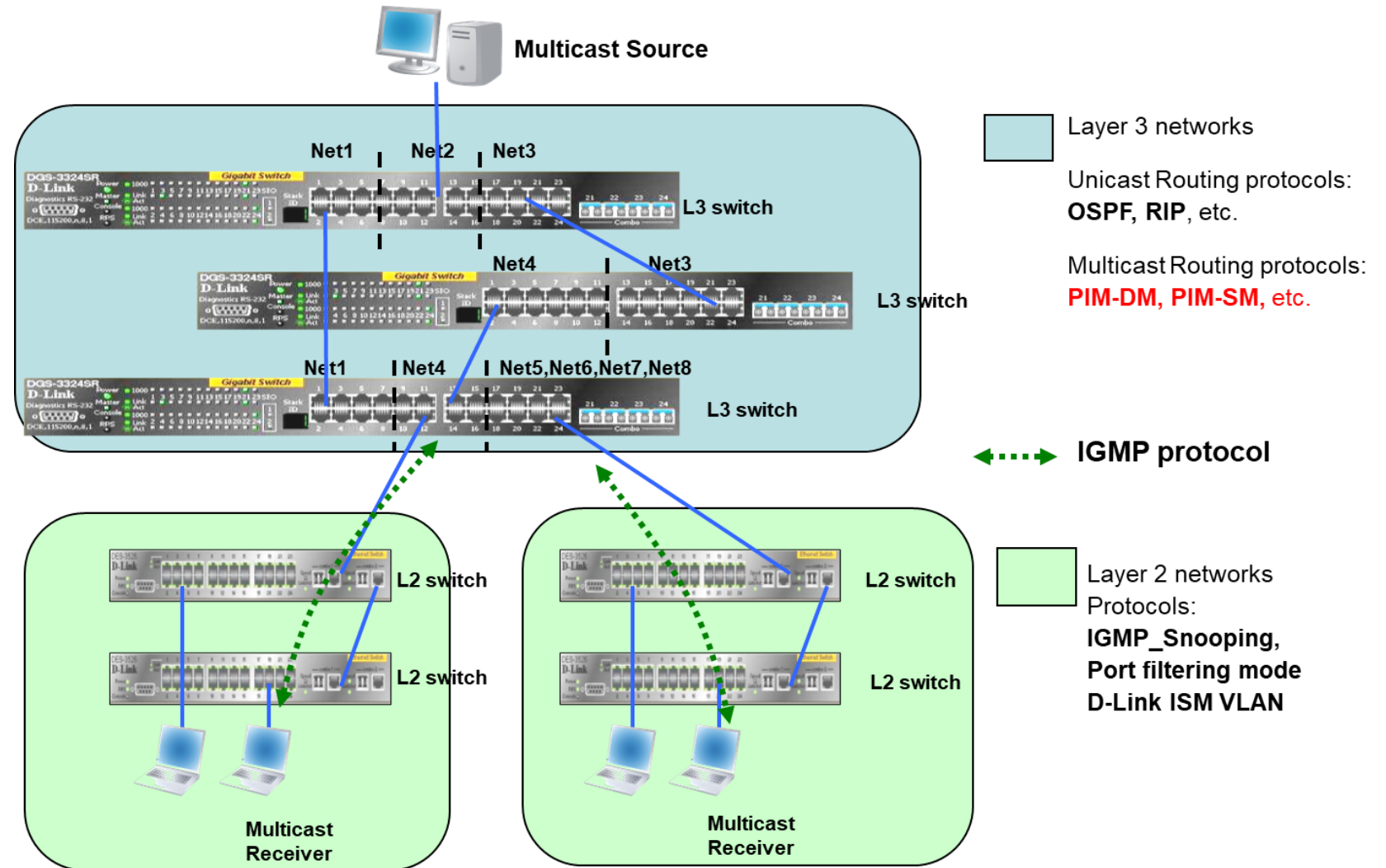
P3 – Vlan 30
192.168.30.1

P4 – Vlan 40
192.168.40.1

```
Switch#sh mvlan  
IPv4 Multicast VLAN State      : Enabled  
IPv6 Multicast VLAN State      : Disabled  
Forward Unmatched              : Disabled  
Ignore VLAN                    : Disabled  
  
MVLAN 10  
Name                           : MVLAN0010  
Untagged Receiver              : 1/0/2-1/0/4  
Tagged Receiver                :  
Untagged Source                :  
Tagged Source                  : 1/0/1  
Replace Source IP              : Not replace/Not replace  
Replace Priority               : Not replace (IPv4)/Not  
  
Total Entries: 1
```

L3 Multicast

- Routing Multicast
- PIM (Protocol Independent Multicast)
 - PIM-DM
 - PIM-SM
 - DVMRP
 - ...
- Mensajes:
 - join
 - prune



■ D-Link Smart Switches – L2 MULTICAST

DGS-1210



DGS-1250



DGS-1510



DMS-1250



DXS-1210



■ D-Link Managed Switches – L3 MULTICAST

DGS-1520



DGS-3130



DGS-3630



DMS-3130



DXS-3410



DXS-3610



■ DGS-1210 Fx – Nueva funcionalidad: Auto IGMP



Smart+ Managed Gigabit Switches DGS-1210 Series

Estado del producto (Hardware version: Fx): **Activo** ⓘ

- 8 a 52 puertos Gigabit
- Uplinks SFP fibra óptica
- Opciones PoE+ (PoE Budget hasta 370W)
- Funciones Advanced Layer 2 y Layer 3 (Static Routing)

■ Auto IGMP disponible a partir de la versión 6.32.008

D-Link®

DGS-1210 F1 Series Firmware Release Notes



Firmware Version: 6.32.008
Boot Code Version: 1.02.001
MIB Version: 6.31.002
D-View Module Version: N/A
Published: Dec.07, 2023

DGS-1210-28P

- System
- VLAN
- L2 Functions
 - Jumbo Frame
 - Port Mirroring
 - Loopback Detection
 - MAC Address Table
 - Spanning Tree
 - Link Aggregation
 - Multicast
 - Auto IGMP**
 - IGMP Snooping
 - MLD Snooping
 - Multicast Forwarding
 - Multicast Filtering Mode
 - SNTP
 - LLDP

Auto IGMP Configuration

Auto IGMP  ☒ Enabled ☐ Disabled Apply

Auto IGMP VLAN

1 ▼ Add

Auto IGMP Table (Max. 6)

VLAN ID	VLAN Name	Delete
---------	-----------	--------

Auto IGMP – Facilidad a golpe de clic

IGMP Snooping Configuration

IGMP Snooping Global Settings

IGMP Snooping: ☒ Enabled ☐ Disabled ☒ Report to all ports

Host Timeout (130-153025): sec Router Timeout (60-600): sec

Robustness Variable (2-255): Last Member Query Interval (1-25): sec

Query Interval (60-600): sec Max Response Time (10-25): sec

When Querier state is enabled, the Host Timeout is calculated as the formula :
(Host Timeout = Robustness Variable * Query Interval + Max Response Time)

IGMP Snooping VLAN Settings

VLAN ID	VLAN Name	State	Querier State	Fast Leave	Router Ports	Multicast Entries
1	default	Enabled	Disabled	Disabled		View

Multicast Filtering Mode

From Port: To Port: Filtering Mode: [Apply](#)

Multicast Filtering Mode Table	
Forwarding List	
Filtering List	1-28

Auto IGMP – Facilidad a golpe de clic

DGS-1210-28P

- System
- VLAN
- L2 Functions
 - Jumbo Frame
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Auto IGMP Configuration

Safeguard

Auto IGMP ☐ Enabled ☒ Disabled Apply

Auto IGMP VLAN 1 Add

Auto IGMP Table (Max. 6)

VLAN ID	VLAN Name	Delete
---------	-----------	--------

VID Settings

Safeguard

VID 2

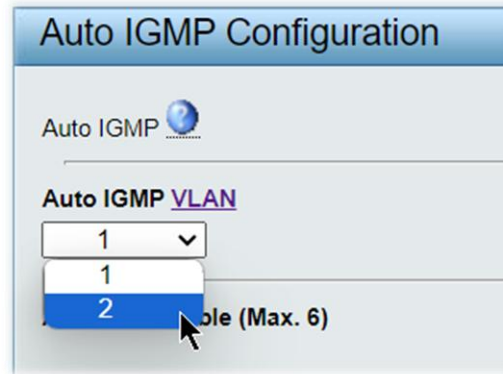
VLAN Name VLAN2

Maximum 20 characters. Back Apply

Port	Select All	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Untagged	All	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tagged	All	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Not member	All	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒

Port	Select All	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Untagged	All	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tagged	All	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Not member	All	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☒

Auto IGMP – Facilidad a golpe de clic



The image shows the full 'Auto IGMP Configuration' window. It has a title bar with the text 'Auto IGMP Configuration' and a 'Safeguard' button. Below the title bar, there is a section labeled 'Auto IGMP' with a help icon. To the right of this section, there are two radio buttons: 'Enabled' (selected) and 'Disabled'. To the right of these radio buttons, there is an 'Apply' button. Below the 'Auto IGMP' section, there is a section labeled 'Auto IGMP VLAN' with a dropdown menu. The dropdown menu is open, showing two options: '1' and '2'. The option '2' is highlighted in blue. To the right of the dropdown menu, there is an 'Add' button. Below the 'Auto IGMP VLAN' section, there is a section labeled 'Auto IGMP Table (Max. 6)'. This section contains a table with three columns: 'VLAN ID', 'VLAN Name', and 'Delete'.

VLAN ID	VLAN Name	Delete
---------	-----------	--------

Auto IGMP – Facilidad a golpe de clic

IGMP Snooping Configuration

IGMP Snooping Global Settings

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IGMP Snooping VLAN Settings

VLAN ID	VLAN Name	State	Querier State	Fast Leave	Router Ports	Multicast Entries
1	default	Enabled	Disabled	Disabled		View
2	VLAN2	Enabled	Enabled	Enabled		View

Apply

Multicast Filtering Mode

From Port: To Port: Filtering Mode:

Multicast Filtering Mode Table	
Forwarding List	
Filtering List	1-28

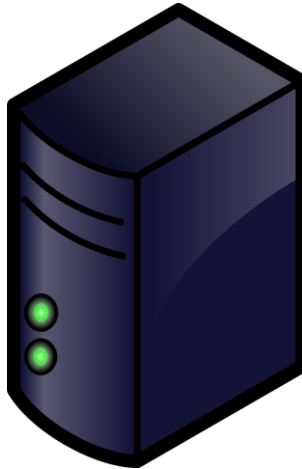
Escenario práctico

DGS-1520



CORE

QUERIER



DGS-1510



ACCESO



■ Sin IGMP Snooping

Me llega un tráfico que no he solicitado

Capturing from Ethernet

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/>

No.	Time	Source	Destination	Protocol	Length	Info
24816	157.234437	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24817	157.241387	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24818	157.241387	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24819	157.241522	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24820	157.241592	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24821	157.249442	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24822	157.249442	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24823	157.249615	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24824	157.249615	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24825	157.249615	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24826	157.254113	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24827	157.254174	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24828	157.254278	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24829	157.262107	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24830	157.262107	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24831	157.262107	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24832	157.262217	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328
24833	157.271726	10.90.90.101	239.255.100.1	UDP	1370	58856 → 5001 Len=1328

■ Habilito IGMP Snooping en el switch de Core (Querier)

IGMP Snooping Settings

Global Settings

Global State ☒ Enabled ☐ Disabled Apply



IGMP Snooping Settings

Global Settings

Global State ☒ Enabled ☐ Disabled Apply

VLAN Status Settings

VID (1-4094) ☐ Enabled ☒ Disabled Apply

IGMP Snooping Table

VID (1-4094) Find Show All

Total Entries: 1

VID	VLAN Name	Status	
1	default	Enabled	Show Detail Edit

1/1 < < **1** > > Go

■ Habilito el Querier State para dicho switch

IGMP Snooping VLAN Settings

IGMP Snooping VLAN Settings

VID (1-4094)	1
Status	☐ Enabled ☐ Disabled
Minimum Version	1 ▼
Fast Leave	☐ Enabled ☒ Disabled
Report Suppression	☐ Enabled ☒ Disabled
Suppression Time (1-300)	10
Querier State	☒ Enabled ☐ Disabled
Query Version	2 ▼
Query Interval (1-31744)	25 sec
Max Response Time (1-25)	10 sec
Robustness Value (1-7)	2
Last Member Query Interval (1-25)	1 sec
Proxy Reporting	☐ Enabled ☒ Disabled
Rate Limit (1-1000)	☒ No Limit
Ignore Topology Change	☐ Enabled ☒ Disabled

Source Address

Apply

■ Habilito IGMP Snooping en el switch de acceso

IGMP Snooping Settings

Global Settings

Global State ☒ Enabled ☐ Disabled

Apply



Fuzzy Search

- DGS-1510-20
 - System
 - Management
 - L2 Features
 - FDB
 - VLAN
 - STP
 - ERPS (G.8032)
 - Loopback Detection
 - Link Aggregation
 - L2 Multicast Control
 - IGMP Snooping
 - IGMP Snooping Settings**
 - IGMP Snooping Groups Settings
 - IGMP Snooping Mrouter Settings
 - IGMP Snooping Statistics Settings
 - MLD Snooping
 - Multicast Filtering

IGMP Snooping Settings

Global Settings

Global State ☒ Enabled ☐ Disabled

Apply

VLAN Status Settings

VID (1-4094) ☒ Enabled ☐ Disabled

Apply

IGMP Snooping Table

VID (1-4094)

Find Find All

Total Entries: 1

VID	VLAN Name	Status	
1	default	Enabled	Show Detail Edit

1/1 < < 1 > > Go

■ Habilito el fast leave en el switch de acceso

IGMP Snooping VLAN Settings

IGMP Snooping VLAN Settings

VID (1-4094)	1
Status	☐ Enabled ☐ Disabled
Minimum Version	1 ▼
Fast Leave	☒ Enabled ☐ Disabled
Report Suppression	☐ Enabled ☒ Disabled
Suppression Time (1-300)	10
Querier State	☐ Enabled ☒ Disabled
Query Version	2 ▼
Query Interval (1-31744)	25 sec
Max Response Time (1-25)	10 sec
Robustness Value (1-7)	2
Last Member Query Interval (1-25)	1 sec
Proxy Reporting	☐ Enabled ☒ Disabled
Source Address	. . .

 **Apply**

■ Habilito en ambos el filter unregistered

Multicast Filtering Mode

Multicast Filtering Mode

VID List Multicast Filtering Mode

Total Entries: 1

VLAN	Multicast Filtering Mode
default	Forward Unregistered

1/1 |< < 1 > >| Go



Multicast Filtering Mode

Multicast Filtering Mode

VID List Multicast Filtering Mode

Total Entries: 1

VLAN	Multicast Filtering Mode
default	Filter Unregistered

1/1 |< < 1 > >| Go

Con IGMP Snooping

No me llega ese tráfico que no he solicitado

*Ethernet

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

udp

No.	Time	Source	Destination	Protocol	Length	Info
37	8.860139	10.90.90.91	255.255.255.255	UDP	359	62992 → 62976 Len=317
71	20.319252	10.90.90.100	224.0.0.251	MDNS	85	Standard query 0x0000 PTR _microsoft_mcc_tcp.local, "QU" question
72	20.320462	fe80::15dd:6d17:cd59:8aaf	ff02::fb	MDNS	105	Standard query 0x0000 PTR _microsoft_mcc_tcp.local, "QU" question
73	21.327248	10.90.90.100	224.0.0.251	MDNS	85	Standard query 0x0000 PTR _microsoft_mcc_tcp.local, "QM" question
74	21.328582	fe80::15dd:6d17:cd59:8aaf	ff02::fb	MDNS	105	Standard query 0x0000 PTR _microsoft_mcc_tcp.local, "QM" question
150	38.845637	10.90.90.91	255.255.255.255	UDP	359	62992 → 62976 Len=317
238	68.843958	10.90.90.91	255.255.255.255	UDP	359	62992 → 62976 Len=317

Capturing from Ethernet

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

igmp

No.	Time	Source	Destination	Protocol	Length	Info
16	0.505432	10.90.90.100	224.0.0.252	IGMPv2	46	Membership Report group 224.0.0.252
17	0.505544	10.90.90.100	224.0.0.251	IGMPv2	46	Membership Report group 224.0.0.251
18	2.012554	10.90.90.100	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
19	2.511174	10.90.90.100	239.255.102.18	IGMPv2	46	Membership Report group 239.255.102.18
84	22.090352	10.90.90.92	224.0.0.1	IGMPv2	60	Membership Query, general
87	22.509044	10.90.90.100	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
88	23.514198	10.90.90.100	239.255.102.18	IGMPv2	46	Membership Report group 239.255.102.18
104	27.516493	10.90.90.100	224.0.0.252	IGMPv2	46	Membership Report group 224.0.0.252
105	31.517040	10.90.90.100	224.0.0.251	IGMPv2	46	Membership Report group 224.0.0.251
156	47.090225	10.90.90.92	224.0.0.1	IGMPv2	60	Membership Query, general
173	49.507109	10.90.90.100	224.0.0.252	IGMPv2	46	Membership Report group 224.0.0.252
174	49.507171	10.90.90.100	239.255.102.18	IGMPv2	46	Membership Report group 239.255.102.18
181	51.012703	10.90.90.100	239.255.255.250	IGMPv2	46	Membership Report group 239.255.255.250
184	54.013764	10.90.90.100	224.0.0.251	IGMPv2	46	Membership Report group 224.0.0.251



**GRACIAS
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