Xamu:

Exercici sobre IP Multicast:

Analitzeu la captura de Wireshark sobre IP Multicast (Unidad 6 - IP TV\Wireshark captures\IP Multicast\IPMulticast.pcap). Filtreu per veure els missatges IGMP i descriviu què passa, justificant la vostra resposta amb frases de l'estil: "Al paquet XX, la màquina amb adreça IP XX.XX.XX demana rebre el grup multicast XX.XX.XX i hi fa enviant un missatge del tipus XXX a la màquina XX, que pel que sembla deu ser el query router. Més endavant, el query router envia un missatge XXX que fa que ...". A la vostra descripció ha de quedar clar:

Quin és el rol de cada màquina que hi apareix. Hi ha un (o més d'un) query router? Qui és (són) i per què?

Quines màquines estan rebent cada grup multicast? Quines altes o baixes es produeixen?

Al obrir la captura i filtrar per tipus IGMP podem observar les següents interaccions:

	igmp					
539 1.812484		e Source	Destination	Protocol	Length Info	
543 1.823103 10.135.28.114 239.0.2.30 IGMPv2 60 Membership Report group 239.0.2.30 544 1.823157 10.135.28.114 239.0.2.2 IGMPv2 60 Membership Report group 239.0.2.2 553 1.852476 10.135.28.114 239.0.0.77 IGMPv2 60 Membership Report group 239.0.25.05 556 1.857221 1.1.1.1 224.0.0.252 IGMPv2 46 Membership Report group 239.0.255.255.256 567 1.892478 10.135.28.114 239.0.2.139 IGMPv2 60 Membership Report group 239.0.2.129 665 2.203173 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.139 826 2.766814 10.135.28.114 239.0.2.129 IGMPv2 60 Membership Report group 239.0.2.139 970 3.252652 10.135.28.114 239.0.2.129 IGMPv2 60 Membership Report group 239.0.2.129 982 3.282610 10.135.28.114 239.0.2.139 IGMPv2 60 Membership Report group 239.0.2.139 983 3.282801 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.2139	504 1.69	96777 10.135.28.1	.3 224.0.0.1	IGMPv2	60 Membership Query, general	
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6225 16.873247 10.135.28.114 239.0.2.30 IGMPv2 60 Membership Report group 239.0.2.30 6262 16.963592 10.135.28.114 239.0.2.129 IGMPv2 60 Membership Report group 239.0.2.129 6288 17.033503 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.130 11711 31.707257 10.135.28.113 224.0.0.1 IGMPv2 60 Membership Query, general 11714 31.794019 10.135.28.114 239.0.2.141 IGMPv2 60 Membership Report group 239.0.2.141 11718 31.856119 1.1.1.1 224.0.0.252 IGMPv2 46 Membership Report group 239.0.2.141 11719 31.856222 1.1.1.1 239.255.255.250 IGMPv2 46 Membership Report group 239.255.255.250 11723 31.894140 10.135.28.114 239.0.0.97 IGMPv2 60 Membership Report group 239.0.0.97 11755 32.054039 10.135.28.114 239.0.2.2 IGMPv2 60 Membership Report group 239.0.2.2 11761 32.074043 10.135.28.114 239.0.2.30 IGMPv2 60 Membership Report group 239.0.2.30 11764 32.084050 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.30	6213 16.8	848824 1.1.1.1	224.0.0.252	IGMPv2	46 Membership Report group 224.0.0.252	
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11755 32.054039 10.135.28.114 239.0.2.2 IGMPv2 60 Membership Report group 239.0.2.2 11761 32.074043 10.135.28.114 239.0.2.30 IGMPv2 60 Membership Report group 239.0.2.30 11764 32.084050 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.130	11719 31.8	856222 1.1.1.1	239.255.255.2	250 IGMPv2	46 Membership Report group 239.255.255.	250
11761 32.074043 10.135.28.114 239.0.2.30 IGMPv2 60 Membership Report group 239.0.2.30 11764 32.084050 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.130	11723 31.8			IGMPv2		
11764 32.084050 10.135.28.114 239.0.2.130 IGMPv2 60 Membership Report group 239.0.2.130	11755 32.0			IGMPv2		
	11761 32.0	074043 10.135.28.1	4 239.0.2.30	IGMPv2		
11794 32.174072 10.135.28.114 239.0.2.129 IGMPv2 60 Membership Report group 239.0.2.129	11764 32.0	084050 10.135.28.1	4 239.0.2.130	IGMPv2		
	11794 32.1	174072 10.135.28.1	4 239.0.2.129	IGMPv2	60 Membership Report group 239.0.2.129	

El que podem observar és la utilització del protocol IGMP per gestionar membres en grups multicast dins d'una xarxa IPv4.

Hi han 3 tipus de missatges:

Els missatges IGMP es poden classificar en tres tipus principals:

1. Membership Query

Aquest tipus de missatge és enviat pels enrutadors multicast per descobrir quins dispositius a la xarxa volen rebre tràfic d'un determinat grup multicast. Hi ha dos subtipus principals:

General Query (Consulta General): Enviada a l'adreça multicast 224.0.0.1, aquesta consulta demana a totes les màquines de la xarxa quins grups multicast estan interessades en rebre. Group-Specific Query (Consulta Específica de Grup): Enviada a un grup multicast específic, aquesta consulta demana als dispositius que estan en aquest grup si volen continuar rebent el tràfic.

En el wireshark podem veure aquesta informació com :

```
Frame 504: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
Ethernet II, Src: ZyxelCommuni_d0:41:e7 (40:4a:03:d0:41:e7), Dst: II
Internet Protocol Version 4, Src: 10.135.28.113, Dst: 224.0.0.1

Internet Group Management Protocol

[IGMP Version: 2]

Type: Membership Query (0x11)

Max Resp Time: 0,5 sec (0x05)

Checksum: 0xeefa [correct]

[Checksum Status: Good]

Multicast Address: 0.0.0.0
```

2. Membership Report

Aquest missatge és enviat per les màquines que volen unir-se a un grup multicast o confirmar que encara volen ser part d'un grup multicast específic. Quan un dispositiu rep una consulta de membre, respon indicant quins grups multicast està interessat en rebre. En el wireshark podem veure aquesta informació com :

```
> Frame 539: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
> Ethernet II, Src: AdvancedDigi_b6:66:6d (00:03:91:b6:66:6d), Dst: II
> Internet Protocol Version 4, Src: 10.135.28.114, Dst: 239.0.2.141

∨ Internet Group Management Protocol

[IGMP Version: 2]

Type: Membership Report (0x16)

Max Resp Time: 0,0 sec (0x00)

Checksum: 0xf871 [correct]

[Checksum Status: Good]

Multicast Address: 239.0.2.141
```

3. Leave Group

Aquest missatge és enviat per una màquina quan vol deixar de rebre tràfic d'un grup multicast específic. En rebre aquest missatge, l'enrutador de consulta pot enviar una consulta específica de grup per verificar si altres dispositius encara volen rebre el tràfic d'aquest grup abans de deixar de reenviar-lo.

En el wireshark podem veure aquesta informació com :

```
> Frame 826: 60 bytes on wire (480 bits), 60 bytes captured (480 bits)
> Ethernet II, Src: AdvancedDigi_b6:66:6d (00:03:91:b6:66:6d), Dst: II
> Internet Protocol Version 4, Src: 10.135.28.114, Dst: 224.0.0.2

∨ Internet Group Management Protocol

[IGMP Version: 2]

Type: Leave Group (0x17)

Max Resp Time: 0,0 sec (0x00)

Checksum: 0xf9b1 [correct]

[Checksum Status: Good]

Multicast Address: 239.0.0.77
```

En aquesta captura podem observar:

Paquet 504: Consulta de Membres

Origen: 10.135.28.113 Destinació: 224.0.0.1

Tipus de missatge: Membership Query, general

La màquina 10.135.28.113 envia una consulta general per determinar quins dispositius

estan interessats en rebre tràfic multicast per l'adreça multicast 224.0.0.1.

Rol: Aquesta màquina és l'enrutador de consulta (query router).

Paquets 539 al 553: Sol·licituds per Unir-se a Grups Multicast

Origen: 10.135.28.114

Destinació: 239.0.2.141, 239.0.2.30, 239.0.2.2, 239.0.0.77

Tipus de missatge: Membership Report group

La màquina 10.135.28.114 sol·licita unir-se als grups multicast 239.0.2.141, 239.0.2.30,

239.0.2.2, 239.0.0.77.

Rol: Aquesta màquina és un receptor que vol unir-se a diversos grups multicast.

Paquets 555 al 556: Sol·licituds per Unir-se a Grups Multicast

Origen: 1.1.1.1

Destinació: 224.0.0.252, 239.255.255.250 Tipus de missatge: Membership Report group

La màquina 1.1.1.1 sol·licita unir-se als grups multicast 224.0.0.252 i 239.255.255.250.

Rol: Aquesta màquina és un receptor que vol unir-se a aquests grups multicast.

Paquets 567 al 665: Sol·licituds per Unir-se a Grups Multicast

Origen: 10.135.28.114

Destinació: 239.0.2.129, 239.0.2.130

Tipus de missatge: Membership Report group

La màquina 10.135.28.114 sol·licita unir-se als grups multicast 239.0.2.129 i 239.0.2.130. Rol: Continuació de la màquina 10.135.28.114 sol·licitant unir-se a més grups multicast.

Paquet 826: Paquet de Sortida de Grup

Origen: 10.135.28.114 Destinació: 224.0.0.2

Tipus de missatge: Leave Group

La màquina 10.135.28.114 envia un missatge Leave Group per indicar que ja no desitja

rebre tràfic del grup 239.0.0.77.

Rol: Aquesta màquina deixa de ser receptor del grup multicast 239.0.0.77.

Paquet 952: Consulta de Membres

Origen: 10.135.28.113 Destinació: 224.0.0.1

Tipus de missatge: Membership Query, general

La màquina 10.135.28.113 envia una consulta general per determinar quins dispositius

estan interessats en rebre tràfic multicast per l'adreça multicast 224.0.0.1.

Rol: Aquesta màquina és l'enrutador de consulta.

Paquets 970 al 997: Sol·licituds per Unir-se a Grups Multicast

Origen: 10.135.28.114

Destinació: 239.0.2.129, 239.0.2.30, 239.0.2.141, 239.0.2.130, 224.0.0.252

Tipus de missatge: Membership Report group

La màquina 10.135.28.114 sol·licita unir-se als grups multicast 239.0.2.129, 239.0.2.30,

239.0.2.141, 239.0.2.130 i 224.0.0.252.

Rol: Continuació de la màquina 10.135.28.114 sol·licitant unir-se a més grups multicast.

Paquets 1015 al 1016: Sol·licituds per Unir-se a Grups Multicast

Origen: 1.1.1.1

Destinació: 224.0.0.252, 239.255.255.250 Tipus de missatge: Membership Report group

La màquina 1.1.1.1 sol·licita unir-se als grups multicast 224.0.0.252 i 239.255.255.250.

Rol: Continuació de la màquina 1.1.1.1 sol·licitant unir-se a més grups multicast.

Paquet 6157: Consulta de Membres

Origen: 10.135.28.113 Destinació: 224.0.0.1

Tipus de missatge: Membership Query, general

L'enrutador de consulta 10.135.28.113 envia una altra consulta general per determinar quins

dispositius volen rebre tràfic multicast.

Rol: Aquesta màquina és l'enrutador de consulta.

Paquets 6172-6172 i 6225- 6288: Sol·licituds per Unir-se a Grups Multicast

Origen: 10.135.28.114

Destinació: 239.0.2.2, 239.0.2.141, 224.0.0.252, 239.255.255.250, 239.0.2.30, 239.0.2.129,

239.0.2.130

Tipus de missatge: Membership Report group

La màquina 10.135.28.114 continua sol·licitant unir-se a diversos grups multicast.

Rol: Continuació de la màquina 10.135.28.114 sol·licitant unir-se a més grups multicast.

Paquets 6213 al 6214: Sol·licituds per Unir-se a Grups Multicast

Origen: 1.1.1.1

Destinació: 224.0.0.252, 239.255.255.250 Tipus de missatge: Membership Report group

La màquina 1.1.1.1 continua sol·licitant unir-se als grups multicast 224.0.0.252 i

239.255.255.250.

Rol: Continuació de la màquina 1.1.1.1 sol·licitant unir-se a més grups multicast.

Paquet 11711: Consulta de Membres

Origen: 10.135.28.113 Destinació: 224.0.0.1

Tipus de missatge: Membership Query, general

L'enrutador de consulta 10.135.28.113 envia una altra consulta general per assegurar-se de

les membresies actuals dels grups multicast, per l'adreça multicast 224.0.0.1.

Rol: Aquesta màquina és l'enrutador de consulta.

Paquets 11714, 11723 al 11794: Sol·licituds per Unir-se a Grups Multicast

Origen: 10.135.28.114

Destinació: 239.0.2.141, 239.0.0.97, 239.0.2.2, 239.0.2.30, 239.0.2.130, 239.0.2.129

Tipus de missatge: Membership Report group

La màquina 10.135.28.114 continua enviant sol·licituds per unir-se a diversos grups

multicast.

Rol: Continuació de la màquina 10.135.28.114 sol·licitant unir-se a aquests grups multicast.

Paquets 11718 al 11719: Sol·licituds per Unir-se a Grups Multicast

Origen: 1.1.1.1

Destinació: 224.0.0.252, 239.255.255.250 Tipus de missatge: Membership Report group

La màquina 1.1.1.1 continua sol·licitant unir-se als grups multicast 224.0.0.252 i

239.255.255.250.

Rol: Continuació de la màquina 1.1.1.1 sol·licitant unir-se als mateixos grups multicast.

En l'escenari podem trobar:

- Enrutador de Consulta (Query Router): 10.135.28.113

Envia consultes generals per determinar quins dispositius volen rebre tràfic multicast.

- Màquines Receptores:
 - 10.135.28.114:

Sol·licita unir-se a diversos grups multicast enviant informes. Grups multicast sol·licitats: 239.0.2.141, 239.0.2.30, 239.0.2.2, 239.0.0.77, 239.0.2.129, 239.0.2.130,239.0.2.141,239.0.0.97 Deixa de ser receptor del grup 239.0.0.77.

- 1.1.1.1:

Sol·licita unir-se a diversos grups multicast enviant informes. Grups multicast sol·licitats: 224.0.0.252, 239.255.255.250