



LACP

Link Aggregation
Control Protocol



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Agenda

LACP – Link Aggregation Control Protocol

- ✓ Bucles en la Red
- ✓ Agregación de Enlaces
- ✓ Stacking con LACP Distribuido
- ✓ Hands-on

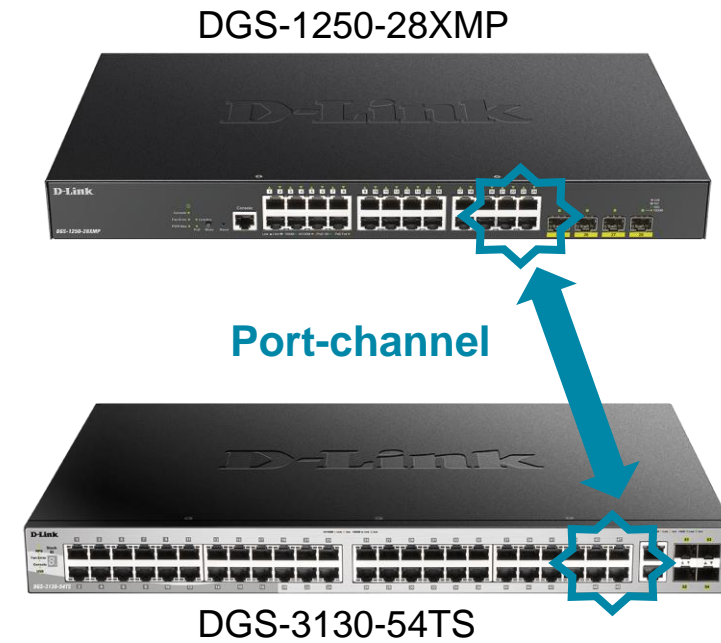
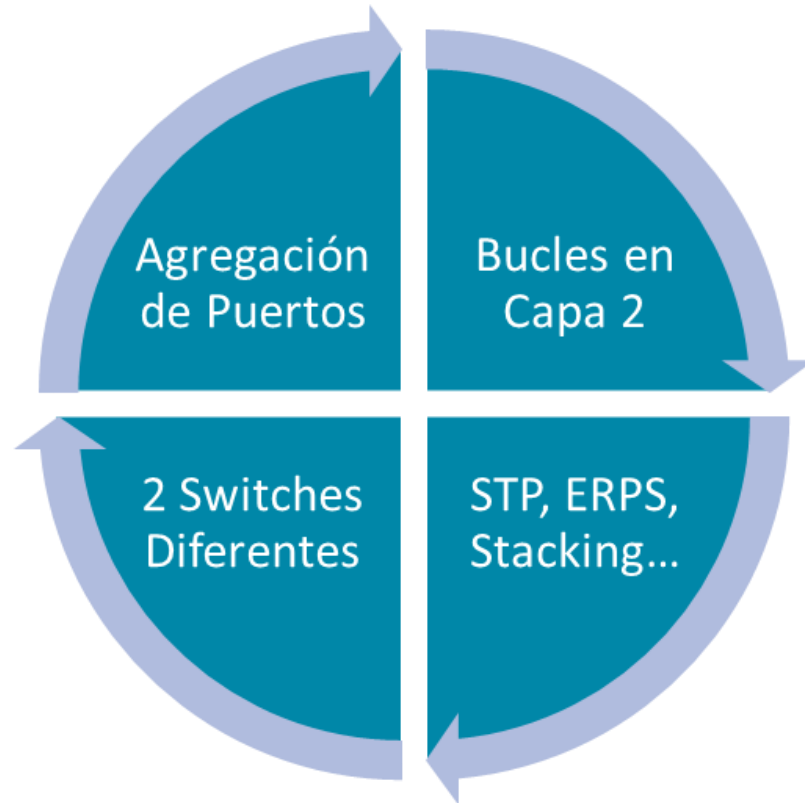
Acceso al video de la sesión

<https://youtu.be/giEYgVp7VBQ>



■ Bucles en la Red

Redundancia y Optimización



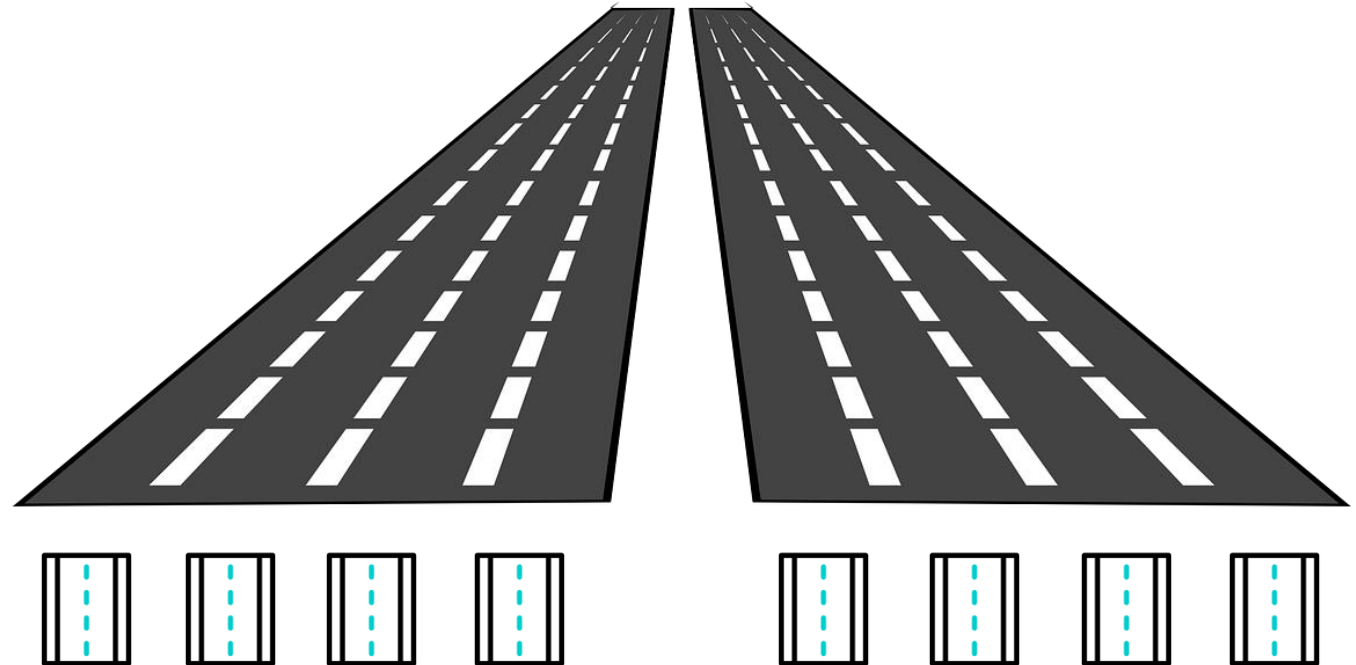
En qué consiste LACP

Mejorar el Diseño y Rendimiento

~~¿Multiplico el ancho de Banda?~~

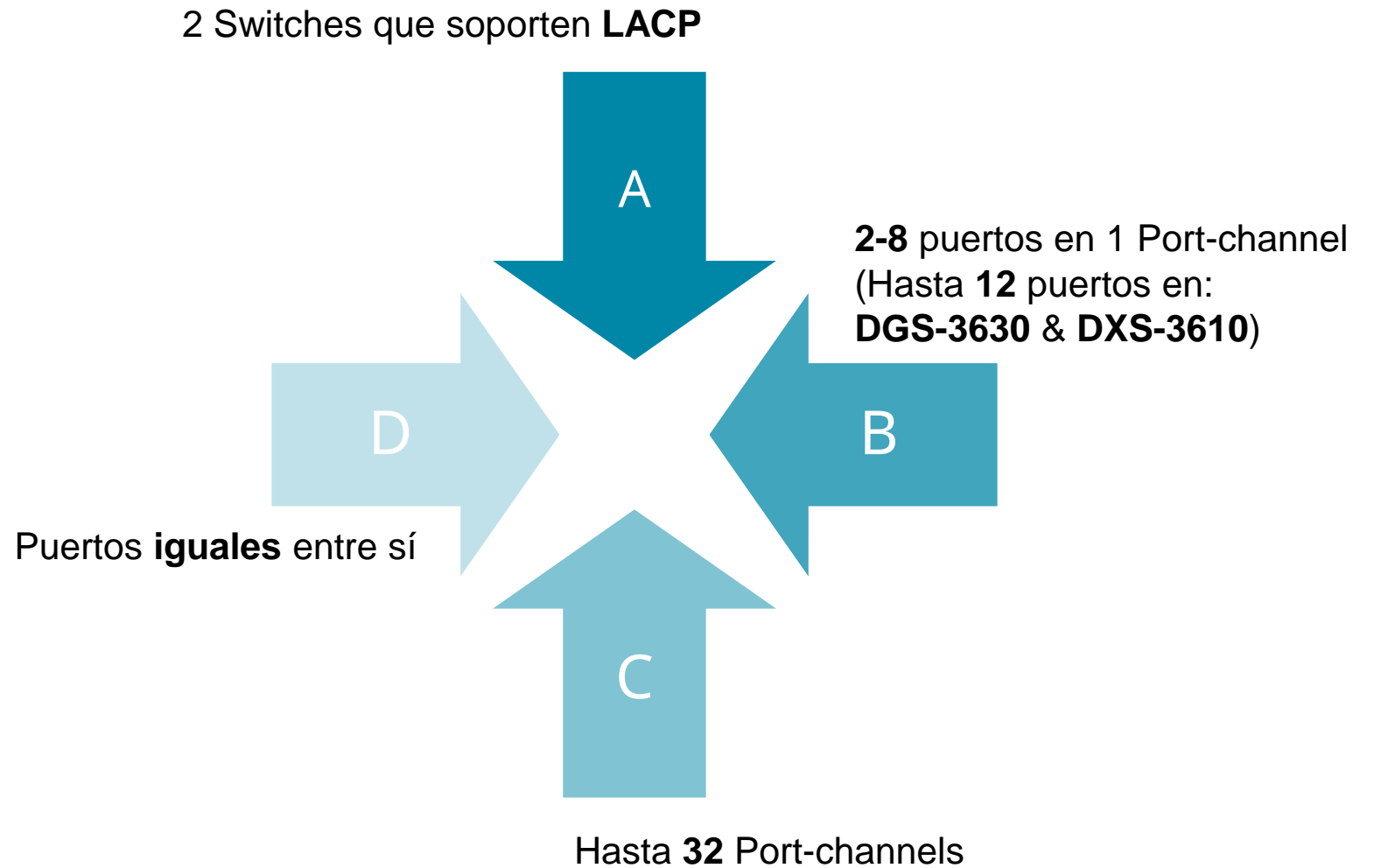


Balanceo la Carga
de Manera Eficiente



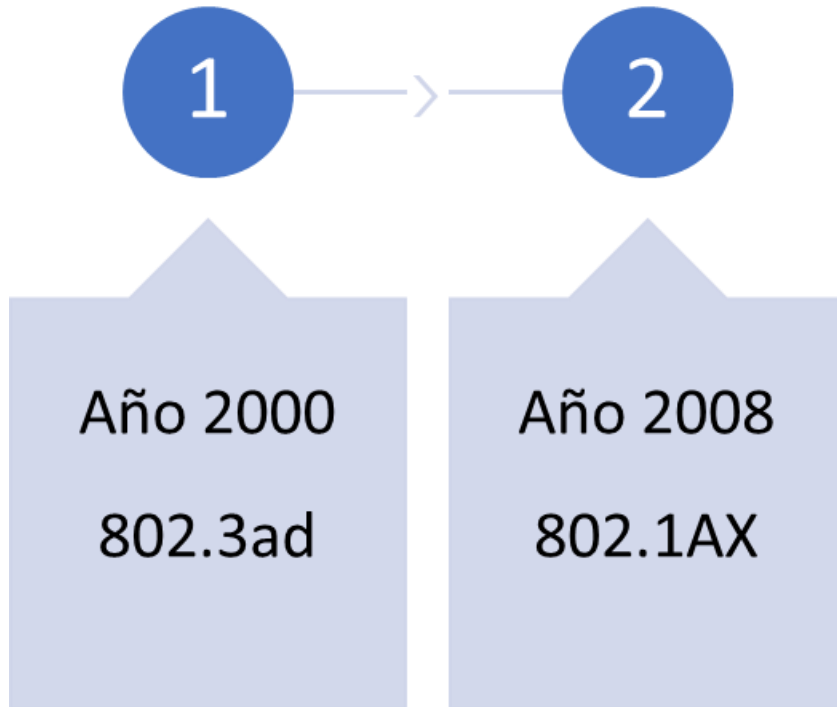
Agregación de Enlaces

Un Enlace Lógico
Formado por varios
Enlaces Físicos



¿802.3ad u 802.1AX?

Ambos son LACP



Technical Specifications			/ DGS-1520 Series
Software			
Stackability	Physical stacking <ul style="list-style-type: none">10GBase-T and SFP+Up to 8 units per stackUp to 80 Gbps stacking bandwidthRing/chain topology support	Virtual stacking <ul style="list-style-type: none">D-Link Single IP Management (SIM)Up to 32 units per virtual stack	
L2 Features	MAC Address Table: 16,384 entries Flow Control <ul style="list-style-type: none">802.3x Flow ControlHOL Blocking Prevention Jumbo Frames up to 10,240 Bytes 802.1AX/802.3ad Link Aggregation <ul style="list-style-type: none">Max. 32 groups per device, 8 ports per group Spanning Tree Protocols <ul style="list-style-type: none">802.1D STP802.1w RSTP802.1s MSTPBPDU FilteringRoot GuardLoop Guard	Loopback Detection Port Mirroring <ul style="list-style-type: none">Supports One-to-One, Many-to-OneSupports Mirroring for both Tx/RxSupports 4 mirroring groups Flow mirroring <ul style="list-style-type: none">Supports Ingress Mirroring only VLAN Mirroring RSPAN L2 Protocol Tunneling Ethernet Ring Protection Switching (ERPS) v1/v2	

Configuración

Datos a tener en cuenta

Port Channel Information

Port Channel 2
Protocol LACP

Port Channel Detail Information

Port	LACP Timeout	Working Mode
eth1/0/11	Short	Active
eth1/0/12	Short	Active

Port Channel Neighbor Information



Uno de los extremos en **ACTIVE**

Mismo timeout en ambos (**SHORT / LONG**)

Verificar state **BNDL** y status **UP**

Configurar en **trunk** a posteriori el **Port-channel**

Formas de Balancear

Diferentes Estrategias para Mejorar el Rendimiento

IP

MAC

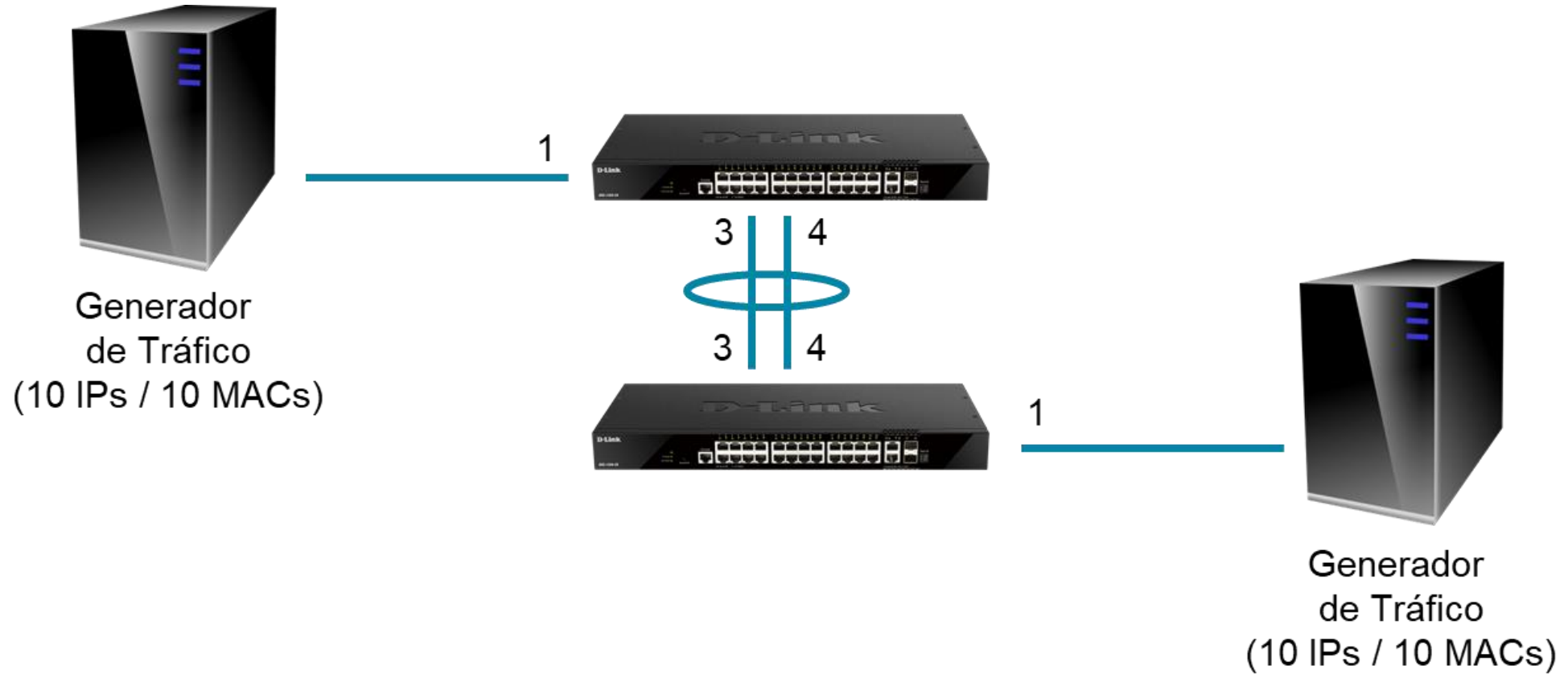
PORT

SRC

DST

Formas de Balancear

Diferentes Estrategias para Mejorar el Rendimiento



Formas de Balancear

Diferentes Estrategias para Mejorar el Rendimiento

```
Switch#show mac-address-table
```

VLAN	MAC Address	Type	Ports
1	00-11-11-11-11-11	Dynamic	eth1/0/1
1	00-11-11-11-11-12	Dynamic	eth1/0/1
1	00-11-11-11-11-13	Dynamic	eth1/0/1
1	00-11-11-11-11-14	Dynamic	eth1/0/1
1	00-11-11-11-11-15	Dynamic	eth1/0/1
1	00-11-11-11-11-16	Dynamic	eth1/0/1
1	00-11-11-11-11-17	Dynamic	eth1/0/1
1	00-11-11-11-11-18	Dynamic	eth1/0/1
1	00-11-11-11-11-19	Dynamic	eth1/0/1
1	00-11-11-11-11-1A	Dynamic	eth1/0/1
1	00-15-20-52-00-02	Static	CPU
1	02-22-22-22-22-22	Dynamic	port-channel1
1	02-22-22-22-22-24	Dynamic	port-channel1
1	02-22-22-22-22-26	Dynamic	port-channel1
1	02-22-22-22-22-28	Dynamic	port-channel1
1	02-22-22-22-22-2A	Dynamic	port-channel1
1	02-22-22-22-22-2C	Dynamic	port-channel1
1	02-22-22-22-22-2E	Dynamic	port-channel1
1	02-22-22-22-22-30	Dynamic	port-channel1
1	02-22-22-22-22-32	Dynamic	port-channel1
1	02-22-22-22-22-34	Dynamic	port-channel1
1	0C-0E-76-41-D4-83	Dynamic	port-channel1
1	0C-0E-76-41-D4-84	Dynamic	port-channel1

Total Entries: 23

```
con t
interface Ethernet1/0/3
channel-group 1 mode active
exit
interface Ethernet1/0/4
channel-group 1 mode active
exit
```

```
port-channel load-balance src-dst-mac
```

```
Switch#show channel-group load-balance
```

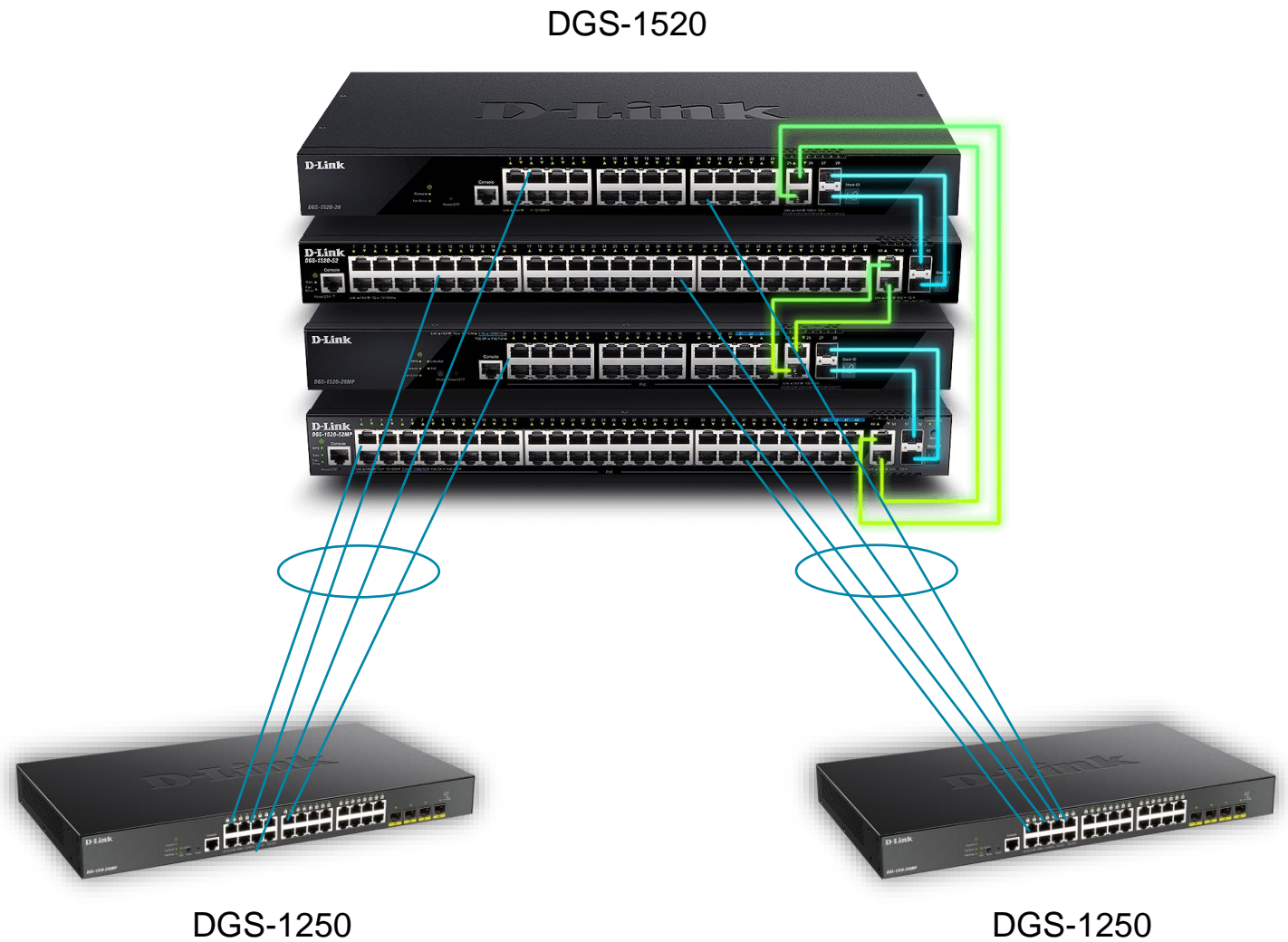
```
load-balance algorithm: src-dst-mac
```

```
Switch#show interfaces utilization
```

Port	TX packets/sec	RX packets/sec	Utilization
eth1/0/1	0	1488100	50
eth1/0/2	0	0	0
eth1/0/3	743832	1	25
eth1/0/4	743827	1	25
eth1/0/5	0	0	0
eth1/0/6	0	0	0
eth1/0/7	0	0	0
eth1/0/8	0	0	0
eth1/0/9	0	0	0
eth1/0/10	0	0	0
eth1/0/11	0	0	0
eth1/0/12	0	0	0

Stacking con LACP Distribuido

Mejora de Redundancia y Performance



Configuración de LACP

Switch DGS-1520

Link Aggregation

System Priority (1-65535):

Load Balance Algorithm:

System ID: 4096.A4-2A-95-6B-01-20

Channel Group Information

From Port: To Port: Group ID (1-32): Mode:

Note: Each Channel Group supports up to 8 member ports.

Total Entries: 1

Channel Group	Protocol	Max Ports	Member Number	Member Ports	
Port-channel1	LACP	8	8	eth1/0/3-1/0/10	<input type="button" value="Delete Channel"/> <input type="button" value="Show Detail"/>

Configuración de LACP

Switch DGS-1520

Port Channel

Port Channel Description Information

Port Channel: 1
Description:

Port	Status	Administrative	Description	
Port-channel1	up	enabled	Agregado troncal	<input type="button" value="Delete Description"/>

Fuzzy Search

- DGS-1520-28
 - System
 - System Information Settings
 - Peripheral Settings
 - Port Configuration
 - Interface Description**
 - Loopback Test
 - System Log
 - Time and SNTP
 - Time Range
 - Reset Button Settings
 - Management
 - L2 Features
 - FDB
 - VLAN
 - VLAN Tunnel
 - STP
 - ERPS (G.8032)
 - Loopback Detection
 - Link Aggregation

Interface Description

Interface Description

Total Entries: 32

Interface	Status	Administrative	Description
eth1/0/21	down	enabled	
eth1/0/22	down	enabled	
eth1/0/23	down	enabled	
eth1/0/24	down	enabled	
eth1/0/25	down	enabled	
eth1/0/26	down	enabled	
eth1/0/27	down	enabled	
eth1/0/28	down	enabled	
mgmt	down	enabled	
Port-channel1	up	enabled	Agregado troncal

3/4 |< < 2 3 4 > >| Go

Configuración de LACP

Switch DGS-1520

Port Channel Information

Port Channel 1
Protocol LACP

Port Channel Detail Information

Port	LACP Timeout	Working Mode	LACP State	Port Priority	Port Number	
eth1/0/3	Short	Active	bndl	32768	3	<input type="button" value="Edit"/>
eth1/0/4	Short	Active	bndl	32768	4	<input type="button" value="Edit"/>
eth1/0/5	Short	Active	bndl	32768	5	<input type="button" value="Edit"/>
eth1/0/6	Short	Active	bndl	32768	6	<input type="button" value="Edit"/>
eth1/0/7	Short	Active	bndl	32768	7	<input type="button" value="Edit"/>
eth1/0/8	Short	Active	bndl	32768	8	<input type="button" value="Edit"/>
eth1/0/9	Short	Active	bndl	32768	9	<input type="button" value="Edit"/>
eth1/0/10	Short	Active	bndl	32768	10	<input type="button" value="Edit"/>

Port Channel Neighbor Information

Port	Partner System ID	Partner Port Number	Partner LACP Timeout	Partner Working Mode	Partner Port Priority
eth1/0/3	32768,E8-CC-18-36-10-D8	3	Short	Active	32768
eth1/0/4	32768,E8-CC-18-36-10-D8	4	Short	Active	32768
eth1/0/5	32768,E8-CC-18-36-10-D8	5	Short	Active	32768
eth1/0/6	32768,E8-CC-18-36-10-D8	6	Short	Active	32768
eth1/0/7	32768,E8-CC-18-36-10-D8	7	Short	Active	32768
eth1/0/8	32768,E8-CC-18-36-10-D8	8	Short	Active	32768
eth1/0/9	32768,E8-CC-18-36-10-D8	1	Short	Active	32768
eth1/0/10	32768,E8-CC-18-36-10-D8	2	Short	Active	32768

Configuración de LACP

Switch DGS-1520

```
switch#show channel-group channel detail

Flag:
  S - Port is requesting Slow LACPDU      F - Port is requesting fast LACPDU
  A - Port is in active mode              P - Port is in passive mode
LACP state:
  bndl:   Port is attached to an aggregator and bundled with other ports.
  hot-sby: Port is in a hot-standby state.
  indep:  Port is in an independent state(not bundled but able to switch data
          traffic)
  down:   Port is down.

Channel Group 1
Member Ports: 8, Maxports = 8, Protocol: LACP
Description: Agregado troncal

Port          Flags  LACP  Port  Port
              State Priority Number
-----
eth1/0/3     FA    bndl  32768  3
eth1/0/4     FA    bndl  32768  4
eth1/0/5     FA    bndl  32768  5
eth1/0/6     FA    bndl  32768  6
eth1/0/7     FA    bndl  32768  7
eth1/0/8     FA    bndl  32768  8
eth1/0/9     FA    bndl  32768  9
eth1/0/10    FA    bndl  32768  10
```

Configuración de LACP

Switch DGS-1520

```
Switch#show channel-group channel 1 neighbor

Flag:
  S - Port is requesting Slow LACPDU      F - Port is requesting fast LACPDU
  A - Port is in active mode              P - Port is in passive mode

Channel Group 1

  Port                Partner                Partner  Partner  Partner
                    System ID                PortNo   Flags    Port_Pri
-----
eth1/0/3             32768,E8-CC-18-36-10-D8  3        FA       32768
eth1/0/4             32768,E8-CC-18-36-10-D8  4        FA       32768
eth1/0/5             32768,E8-CC-18-36-10-D8  5        FA       32768
eth1/0/6             32768,E8-CC-18-36-10-D8  6        FA       32768
eth1/0/7             32768,E8-CC-18-36-10-D8  7        FA       32768
eth1/0/8             32768,E8-CC-18-36-10-D8  8        FA       32768
eth1/0/9             32768,E8-CC-18-36-10-D8  1        FA       32768
eth1/0/10            32768,E8-CC-18-36-10-D8  2        FA       32768
```


▀ Configuración de LACP

Switch DGS-1520

```
Switch#show channel-group load-balance
load-balance algorithm: src-dst-ip

Switch#show channel-group sys-id
System-ID: 4096,A4-2A-95-6B-01-20

Switch#show channel-group

load-balance algorithm: src-dst-ip
System-ID: 4096,A4-2A-95-6B-01-20

Group          Protocol
-----
1              LACP
```

System Priority & Port Priority

Mejores cuanto
menor valor numérico

DGS-1510-52X



- System Priority: 32768
MAC Address: **E8-CC-18-36-10-D8**
Port Priority:
- Puertos 11-12: 32768
 - Puertos 13-14: 32768
- Speed Ports:
- Puertos 11-12: 1000M
 - Puertos 13-14: 1000M



DGS-1520-28

- System Priority: 32768
MAC Address: **A4-2A-95-6B-01-20**
Port Priority:
- Puertos 11-12: 32768
 - Puertos 13-14: 32768
- Speed Ports:
- Puertos 11-12: 1000M
 - Puertos 13-14: 1000M

System Priority & Port Priority

Formamos el LACP
(aún sin conectar los cables)

Link Aggregation

System Priority (1-65535): 32768
Load Balance Algorithm: Source Destination MAC
System ID: 32768.E8-CC-18-36-10-D8

Channel Group Information

From Port: eth1/0/11 To Port: eth1/0/14 Group ID (1-32): 1 Mode: Active

Note: Each Channel Group supports up to 8 member ports.

Total Entries: 1

Channel Group	Protocol	Max Ports	Member Number	Member Ports	
Port-channel1	LACP	8	4	1/0/11-1/0/14	Delete Channel Channel Detail

Link Aggregation

System Priority (1-65535): 32768
Load Balance Algorithm: Source Destination MAC
System ID: 32768.A4-2A-95-6B-01-20

Channel Group Information

From Port: eth1/0/11 To Port: eth1/0/14 Group ID (1-32): 1 Mode: Active

Note: Each Channel Group supports up to 8 member ports.

Total Entries: 1

Channel Group	Protocol	Max Ports	Member Number	Member Ports	
Port-channel1	LACP	8	4	eth1/0/11-1/0/14	Delete Channel Show Detail

System Priority & Port Priority

Cambiamos la velocidad a los puertos 11-12 de ambos switches

Port Settings

From Port: eth1/0/11 To Port: eth1/0/12 State: Enabled MDIX: Auto Auto Downgrade: Disabled Flow Control: Off

Duplex: Auto Speed: 100M Capability Advertised: 10M 100M 1000M Description: 54 chars

Port	Link Status	State	MDIX	Flow Control		Duplex	Speed	Auto Downgrade	Description
				Send	Receive				
eth1/0/1	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/2	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/3	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/4	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/5	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/6	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/7	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/8	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/9	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/10	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	Auto-speed	Disabled	
eth1/0/11	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	100M	Disabled	
eth1/0/12	Down	Enabled	Auto-MDIX	Off	Off	Auto-duplex	100M	Disabled	

```
Switch#configure terminal
Switch(config)#interface range ethernet 1/0/11-12
Switch(config-if-range)#speed 100
Switch(config-if-range)#
```

System Priority & Port Priority

Al enlazarlos:
forma el bundle
con los puertos más bajos
(mejor prioridad)

Port Channel Information

Port Channel 1
Protocol LACP

Port Channel Detail Information

Port	LACP Timeout	Working Mode	LACP State	Port Priority	Port Number	
eth1/0/11	Short	Active	bndl	32768	11	Edit
eth1/0/12	Short	Active	bndl	32768	12	Edit
eth1/0/13	Short	Active	hot-sby	32768	13	Edit
eth1/0/14	Short	Active	hot-sby	32768	14	Edit

Port Channel Neighbor Information

Port	Partner System ID	Partner PortNo	Partner LACP Timeout	Partner Working Mode	Partner Port Priority
eth1/0/11	32768,A4-2A-95-6B-01-20	11	Short	Active	32768
eth1/0/12	32768,A4-2A-95-6B-01-20	12	Short	Active	32768
eth1/0/13	32768,A4-2A-95-6B-01-20	13	Short	Active	32768
eth1/0/14	32768,A4-2A-95-6B-01-20	14	Short	Active	32768

System Priority & Port Priority

Al enlazarlos:
forma el bundle
con los puertos más bajos
(mejor prioridad)

```
Switch#show channel-group channel detail

Flag:
  S - Port is requesting Slow LACPDU      F - Port is requesting fast LACPDU
  A - Port is in active mode              P - Port is in passive mode
LACP state:
  bndl:      Port is attached to an aggregator and bundled with other ports.
  hot-sby:   Port is in a hot-standby state.
  indep:     Port is in an independent state(not bundled but able to switch data
            traffic)
  down:      Port is down.

Channel Group 1
Member Ports: 4, Maxports = 8, Protocol: LACP
Description:

```

Port	Flags	LACP State	Port Priority	Port Number
eth1/0/11	FA	bndl	32768	11
eth1/0/12	FA	bndl	32768	12
eth1/0/13	FA	hot-sby	32768	13
eth1/0/14	FA	hot-sby	32768	14

System Priority & Port Priority

Mejoramos la prioridad de los puertos 13-14 en el DGS-1510

Port	LACP Timeout	Working Mode	LACP State	Port Priority	Port Number	
eth1/0/11	Short	Active	bndl	32768	11	Edit
eth1/0/12	Short	Active	bndl	32768	12	Edit
eth1/0/13	Short	Active	hot-sby	4096	13	Apply
eth1/0/14	Short	Active	hot-sby	32768	14	Edit

```
Switch#configure terminal
Switch(config)#interface ethernet 1/0/14
Switch(config-if)#lacp port-priority 4096
Switch(config-if)#
```

Port	LACP Timeout	Working Mode	LACP State	Port Priority	Port Number	
eth1/0/11	Short	Active	bndl	32768	11	Edit
eth1/0/12	Short	Active	bndl	32768	12	Edit
eth1/0/13	Short	Active	hot-sby	4096	13	Edit
eth1/0/14	Short	Active	hot-sby	4096	14	Edit

System Priority & Port Priority

Mejoramos la prioridad del switch DGS-1510

Link Aggregation

System Priority (1-65535)	<input type="text" value="4096"/>	<input type="button" value="Apply"/>
Load Balance Algorithm	Source Destination MAC ▾	<input type="button" value="Apply"/>
System ID	32768,E8-CC-18-36-10-D8	

```
Switch#configure terminal
Switch(config)#lacp system-priority 4096
Switch(config)#
```



System Priority & Port Priority

Ahora hace caso
a la prioridad de los puertos
y cambia el bundle

Port	LACP Timeout	Working Mode	LACP State	Port Priority	Port Number	
eth1/0/11	Short	Active	hot-sby	32768	11	<input type="button" value="Edit"/>
eth1/0/12	Short	Active	hot-sby	32768	12	<input type="button" value="Edit"/>
eth1/0/13	Short	Active	bndl	4096	13	<input type="button" value="Edit"/>
eth1/0/14	Short	Active	bndl	4096	14	<input type="button" value="Edit"/>

```
Switch#show channel-group channel detail
Flag:
 S - Port is requesting Slow LACPDUs   F - Port is requesting fast LACPDU
 A - Port is in active mode             P - Port is in passive mode
LACP state:
 bndl:  Port is attached to an aggregator and bundled with other ports.
 hot-sby: Port is in a hot-standby state.
 indep:  Port is in an independent state(not bundled but able to switch data
         traffic)
 down:   Port is down.

Channel Group 1
Member Ports: 4, Maxports = 8, Protocol: LACP
Description:

      LACP      Port      Port
Port  Flags  State  Priority  Number
-----
eth1/0/11  FA   hot-sby   32768    11
eth1/0/12  FA   hot-sby   32768    12
eth1/0/13  FA   bndl     4096     13
eth1/0/14  FA   bndl     4096     14
```

Programa de Canal VIP+

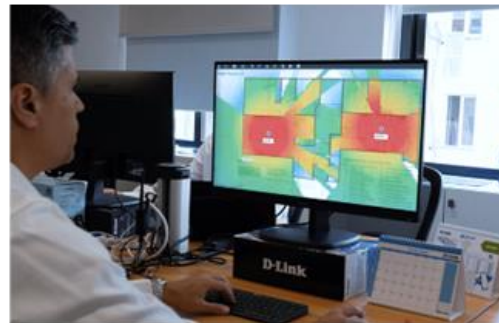
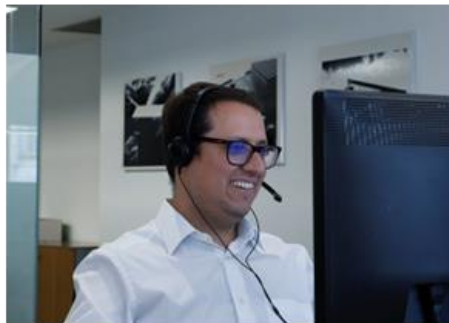


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- Formación y certificación online bajo demanda (D-Link Academy)
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