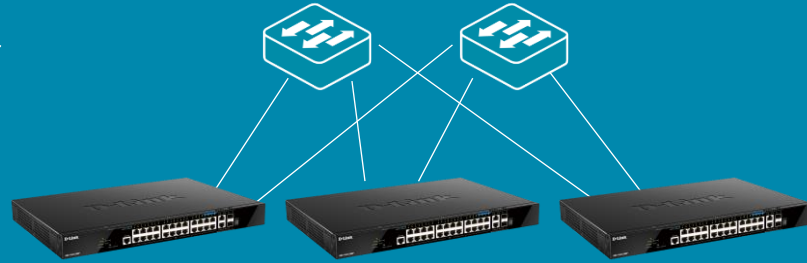


D-Link[®]



MSTP (Multiple Spanning Tree)

Eliminación de bucles y
optimización de uso en redes malladas



Alberto LM
Presales Engineer
D-Link Iberia

Qué vamos a ver

- Bucles. Enemigo público nº1
- Mecanismos de prevención
- STP y sus modalidades
- Por qué MSTP (802.1s)
- Configuración de MSTP
- Hands-on

MST Configuration Identification

MST Configuration Identification

Configuration Name

Revision Level (0-65535)

Digest AC36177F50283CD4B83821D8AB26DE62

Private VLAN Synchronize

Private VLAN Synchronize

Instance ID Settings

Instance ID (1-64)

Action

VID List

Total Entries: 4

Instance ID	VID List
CIST	10-4094
1	1-3
2	4-6
3	7-9

VIDEO DE LA CLASE PRÁCTICA AQUÍ

<https://youtu.be/xBaqVNQTZ2k?si=uM95rAJUULP66Lnx>

Evitar bucles en la red

- Loopback detection (LBD)
- ERPS (Ring Protection)
- Spanning-tree
 - STP
 - RSTP
 - MSTP



Modalidades de STP

- STP (IEEE 802.1D) – Radia Perlman

1990 – Spanning Tree

- RSTP (IEEE 802.1w)

2004 – Rapid Spanning Tree

- MSTP (IEEE 802.1s)

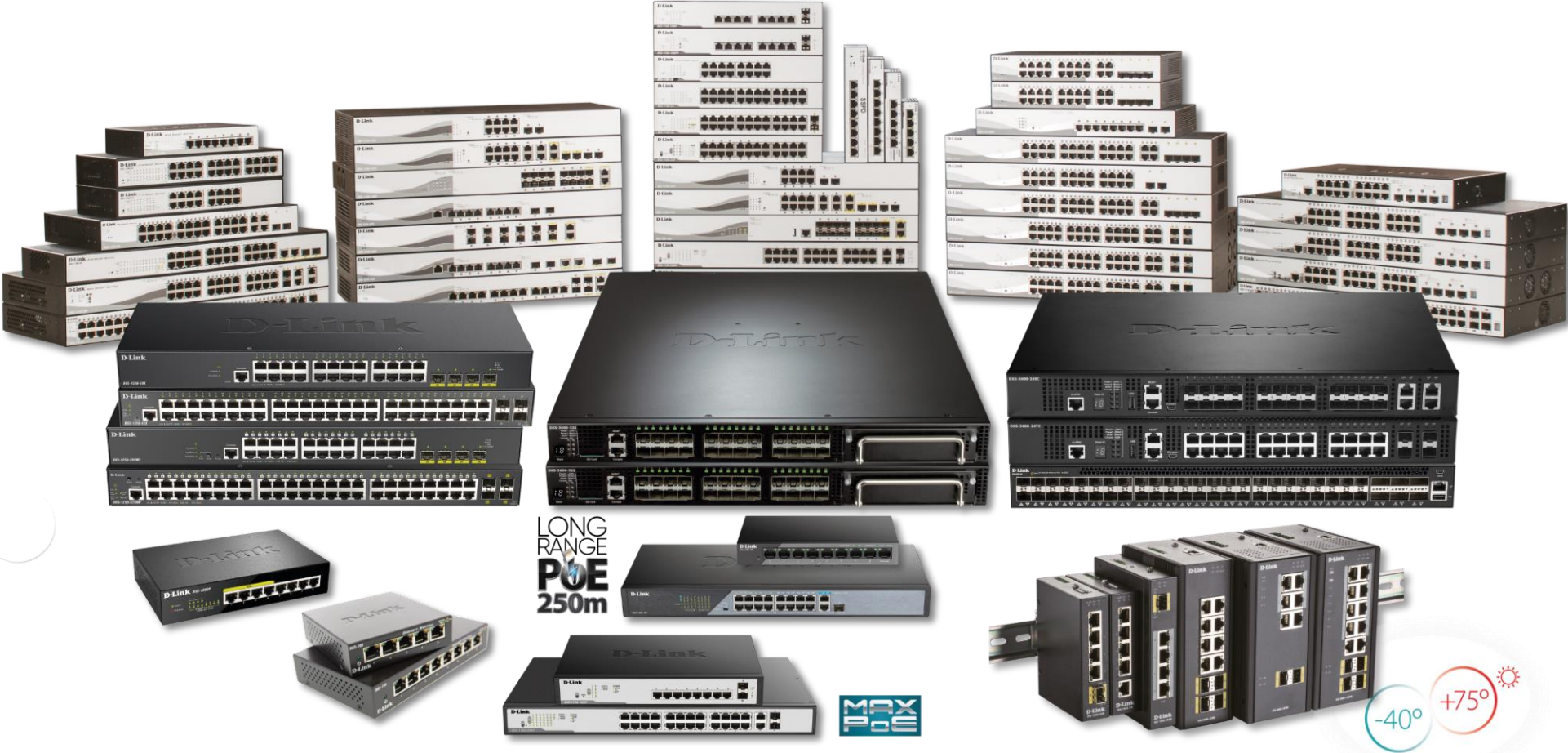
2005 – Multiple Spanning Tree

The screenshot displays a network configuration interface for a device (DGS-1520-52). The left sidebar shows a tree view of configuration categories, with 'STP Global Settings' selected. The main panel shows the configuration for 'STP Global Settings'.

STP Global Settings

- STP State**
 - STP State: Disabled Enabled
- STP Traps**
 - STP New Root Trap: Disabled Enabled
 - STP Topology Change Trap: Disabled Enabled
- STP Mode**
 - STP Mode: RSTP (dropdown)
- STP Priority**
 - Priority (0-61440): 32768 (dropdown)
- STP Configuration**
 - Bridge Max Age (6-40): 20 sec
 - Bridge Forward Time (4-30): 15 sec
 - Max Hops (1-40): 20 times

D-Link Switches con MSTP



D-Link Switches con MSTP



DMS-1100

DMS-3130



DGS-1510



DGS-3130

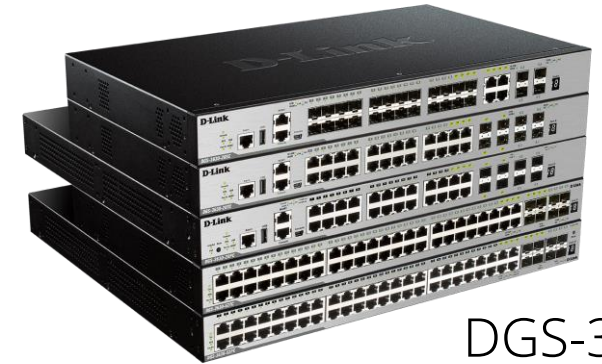


DGS-1210

HW Fx
& /ME



DGS-1520



DGS-3630



DGS-1250



DXS-1210



DXS-3400

DXS-3610

■ D-Link Switches Industriales con MSTP



DIS-200G Series

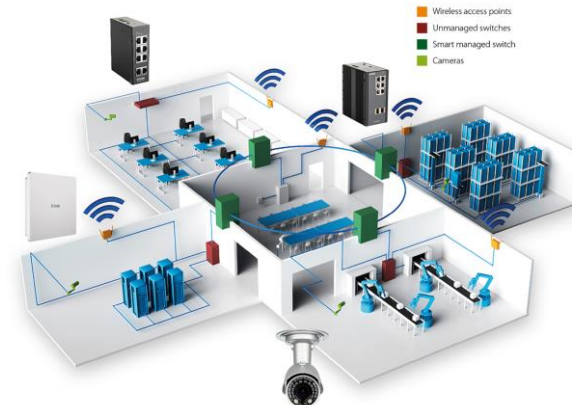


DIS-300G Series



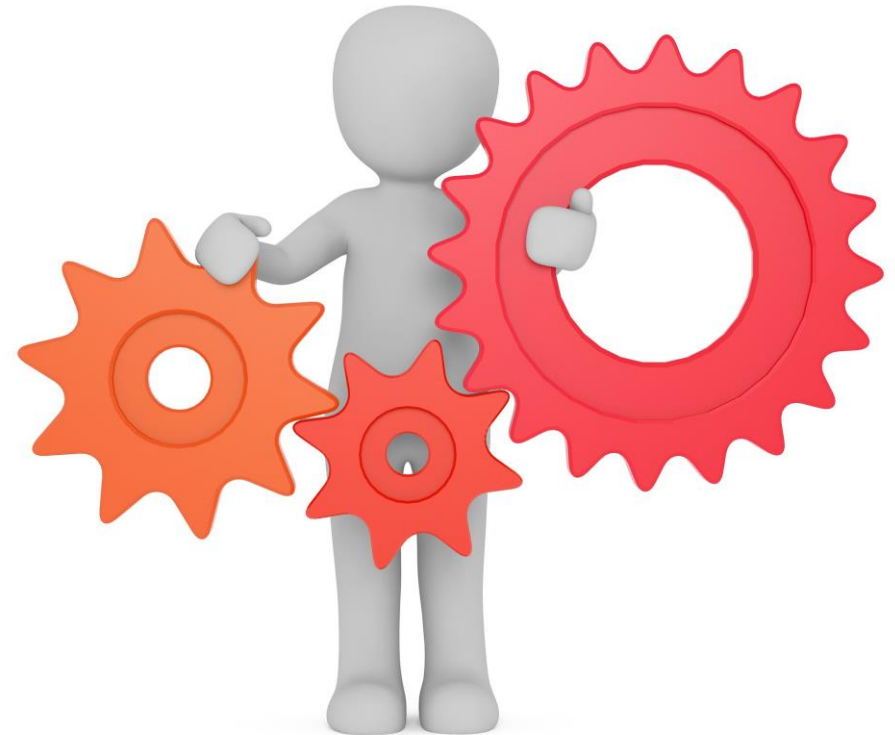
DIS-700G-28XS

> D-Link Industrial Automation



■ Ventajas de MSTP

- Mapear diferentes VLANs a una única instancia
- La reducción del número total de ST reducirá la carga de CPU de un switch
- Mejora la utilización de la infraestructura
- Mejora la distribución del tráfico, dividiendo las VLANs por zonas y tráfico



Funcionamiento de MSTP

- CIST (Common and Internal Spanning Tree)

Es la instancia 0

Por defecto, todas las VLANs están mapeadas con la CIST

Instance ID Settings

Instance ID (1-64)

Action ▼

VID List

Total Entries: 1

Instance ID	VID List
CIST	1-4094

■ Misma región MST

- Nombre
- Número de revisión
- VLAN database

MST Configuration Identification

MST Configuration Identification

Configuration Name

Revision Level (0-65535)

Digest AC36177F50283CD4B83821D8AB26DE62

Private VLAN Synchronize

Private VLAN Synchronize

Instance ID Settings

Instance ID (1-64)

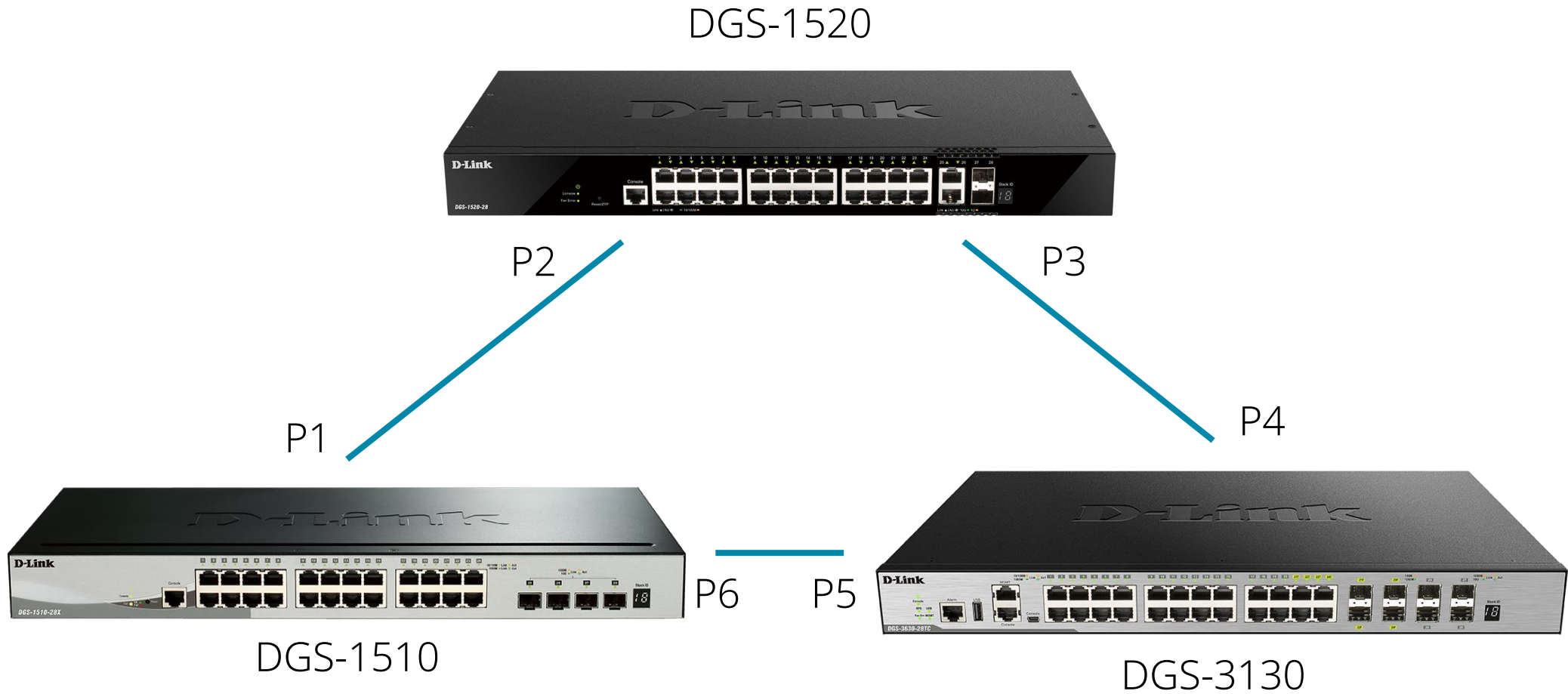
Action

VID List

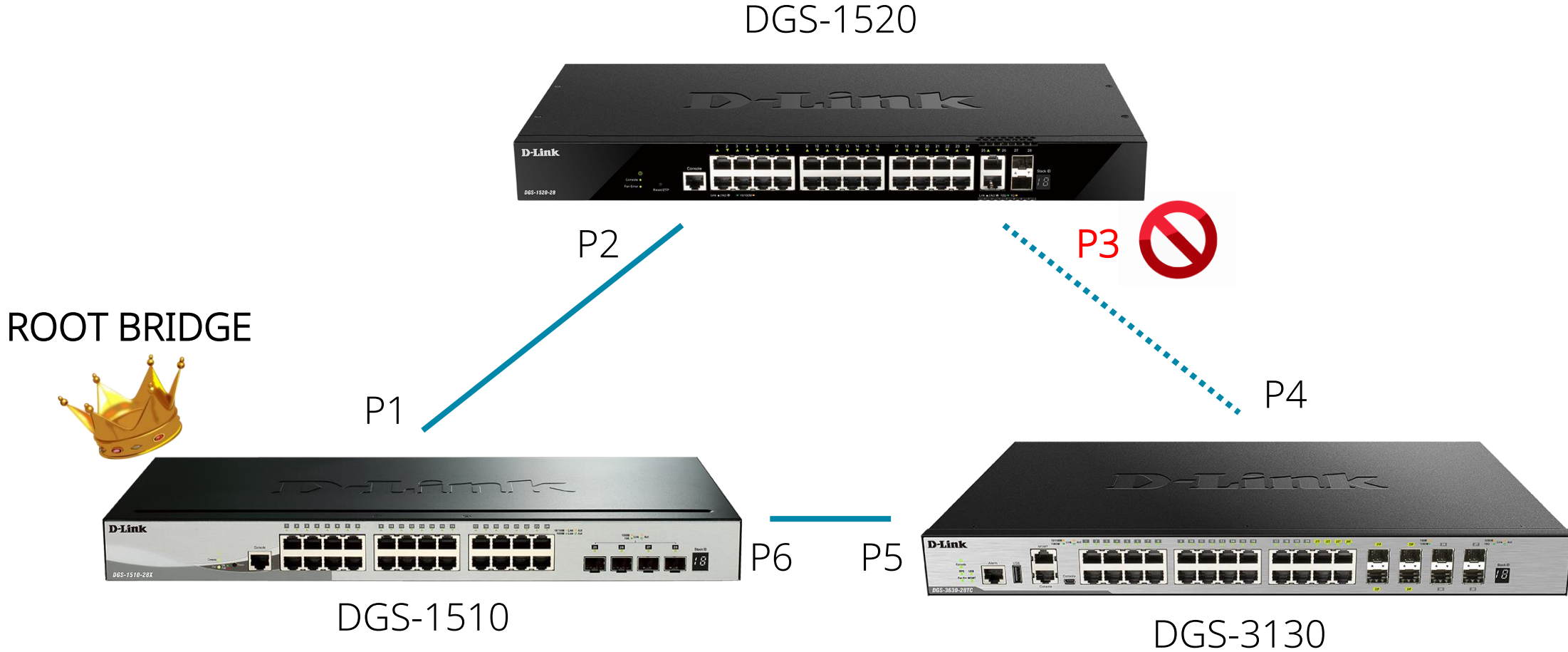
Total Entries: 4

Instance ID	VID List
CIST	31-4094
1	1-10
2	11-20
3	21-30

Escenario



Resultado – Instancia 1 (VLANs 1-10)



Resultado – Instancia 2 (VLANs 11-20)

ROOT BRIDGE



DGS-1520



P2

P3

P1

P4



DGS-1510

P6

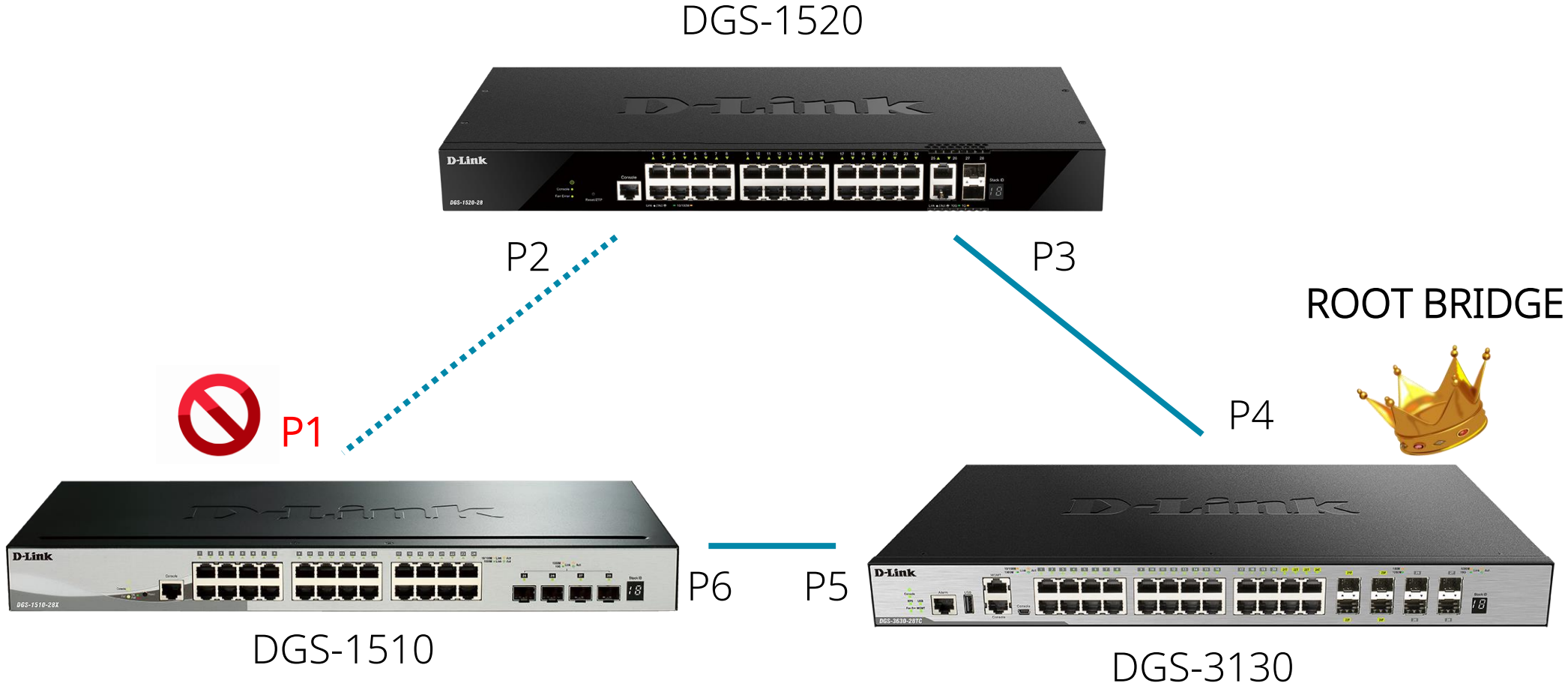


P5



DGS-3130

Resultado – Instancia 3 (VLANs 21-30)



Configuración de MSTP (WEB UI)

- Creamos las VLANs

802.1Q VLAN

802.1Q VLAN

VID List

Find VLAN

VID (1-4094)

Total Entries: 1

VID	VLAN Name	Description	Tagged Member Ports	Untagged Member Ports	VLAN Type	
1	default			1/0/1-1/0/52		<input type="button" value="Edit"/> <input type="button" value="Delete"/>

1/1 < < 1 > > Go

Configuración de MSTP (WEB UI)

- Configuramos en trunk los puertos de interconexión entre los switches

Configure VLAN Interface

Configure VLAN Interface

Port	eth1/0/1	<input checked="" type="checkbox"/> Clone	
VLAN Mode	Trunk	From Port	To Port
Acceptable Frame	Admit All	eth1/0/2	eth1/0/4
Ingress Checking	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled		
Native VLAN	<input checked="" type="checkbox"/> Native VLAN		
VID (1-4094)	1		
Action	None		
Allowed VLAN Range			
Current Allowed VLAN Range			

Back Apply

Configuración de MSTP (WEB UI)


- Seleccionamos el modo MSTP

The screenshot displays the 'STP Global Settings' configuration page. It is organized into several sections, each with an 'Apply' button:

- STP State:** STP State is set to Disabled and Enabled.
- STP Traps:** STP New Root Trap is Disabled and Enabled. STP Topology Change Trap is Disabled and Enabled.
- STP Mode:** STP Mode is set to 'MSTP' in a dropdown menu.
- STP Priority:** Priority (0-61440) is set to '32768' in a dropdown menu.
- STP Configuration:** This section contains several parameters:
 - Bridge Max Age (6-40): 20 sec
 - Bridge Forward Time (4-30): 15 sec
 - Max Hops (1-40): 20 times
 - Bridge Hello Time (1-2): 2 sec
 - TX Hold Count (1-10): 6 times
 - NNI BPDU Address: Dot1d

Configuración de MSTP (WEB UI)

- Introducimos un nombre de configuración para nuestro MSTP



The screenshot displays the 'MST Configuration Identification' page in the D-Link Web UI. On the left, a navigation tree shows the path: DGS-1520-52 > L2 Features > STP > MST Configuration Identification. The main content area is titled 'MST Configuration Identification' and contains the following fields:

- Configuration Name:** A text input field containing 'MSTP_DLINK'.
- Revision Level (0-65535):** A text input field containing '0'.
- Digest:** A text input field containing the hexadecimal value 'AC36177F50283CD4B83821D8AB26DE62'.

Below these fields, there are two sections:

- Private VLAN Synchronize:** A section with a 'Private VLAN Synchronize' label and an 'Apply' button.
- Instance ID Settings:** A section that is partially visible at the bottom of the page.

An 'Apply' button is also located at the end of the main configuration section.

- El número de revisión lo podemos dejar a 0

Configuración de MSTP (WEB UI)

- Creamos las INSTANCIAS y añadimos las VLANs vinculadas a cada una

MST Configuration Identification

MST Configuration Identification

Configuration Name

Revision Level (0-65535)

Digest AC36177F50283CD4B83821D8AB26DE62 Apply

Private VLAN Synchronize

Private VLAN Synchronize Apply

Instance ID Settings

Instance ID (1-64)

Action

VID List Apply

Total Entries: 4

Instance ID	VID List		
CIST	31-4094	Edit	Delete
1	1-10	Edit	Delete
2	11-20	Edit	Delete
3	21-30	Edit	Delete

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

Configuración de MSTP (WEB UI)

- Habilitamos el estado del MSTP

STP Global Settings

STP State

STP State Disabled Enabled Apply

STP Traps

STP New Root Trap Disabled Enabled

STP Topology Change Trap Disabled Enabled Apply

STP Mode

STP Mode MSTP Apply

STP Priority

Priority (0-61440) 32768 Apply

STP Configuration

Bridge Max Age (6-40)	<input type="text" value="20"/> sec	Bridge Hello Time (1-2)	<input type="text" value="2"/> sec
Bridge Forward Time (4-30)	<input type="text" value="15"/> sec	TX Hold Count (1-10)	<input type="text" value="6"/> times
Max Hops (1-40)	<input type="text" value="20"/> times	NNI BPDU Address	Dot1d Apply

Configuración de MSTP (WEB UI)

- Asignamos diferentes prioridades a las distintas instancias

STP Instance

Total Entries: 4

Instance	Instance State	Instance Priority	
CIST	Enabled	32768(32768 sysid 0)	Edit
1	Enabled	32769(32769 sysid 1)	Edit
2	Enabled	24576	Apply
3	Enabled	28675(28675 sysid 3)	Edit

1/1 < < 1 > > Go

- Así, un puerto podrá tener diferentes roles/estados según la VLAN a la que pertenezca

MSTP Port Information

MSTP Port Information

Port: eth1/0/3 Clear Detected Protocol Find

eth1/0/3 Settings

Instance ID	Cost	Priority	Status	Role	
CIST	20000	128	Forwarding	Designated	Edit
1	20000	128	Blocking	Alternate	Edit
2	20000	128	Forwarding	Designated	Edit
3	20000	128	Forwarding	Root	Edit

1/1 < < 1 > > Go

■ Configuración de MSTP (CLI)

- Creamos las VLANs

```
Switch#configure terminal
Switch(config)#vlan 2-30
Switch(config-vlan)#
```

- Configuramos en trunk los puertos de interconexión entre los switches

```
Switch(config)#interface range ethernet 1/0/1-4
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#
```

Configuración de MSTP (CLI)

- Seleccionamos el modo MSTP

```
Switch(config)#spanning-tree mode ?
 mstp  Multiple Spanning Tree Protocol
 rstp  Rapid Spanning Tree Protocol
 stp   Spanning Tree Protocol

Switch(config)#spanning-tree mode mstp
Switch(config)#
```

- Introducimos un nombre de configuración para nuestro MSTP

```
Switch(config)#spanning-tree mst configuration
Switch(config-mst)#name MSTP_DLINK
Switch(config-mst)#revision 0
Switch(config-mst)#
```

■ Configuración de MSTP (CLI)

- Creamos las INSTANCIAS y añadimos las VLANs vinculadas a cada una

```
Switch(config)#spanning-tree mst configuration
Switch(config-mst)#instance 1 vlans 1-10
Switch(config-mst)#instance 2 vlans 11-20
Switch(config-mst)#instance 3 vlans 21-30
Switch(config-mst)#
```

- Habilitamos el estado del MSTP

```
Switch(config)#spanning-tree global state enable
Switch(config)#
```


Configuración de MSTP (CLI)

- Asignamos diferentes prioridades a las distintas instancias

```
Switch(config)#spanning-tree mst 2 priority 24576
```

- Así, un puerto podrá tener diferentes roles/estados según la VLAN a la que pertenezca

```
Switch#show spanning-tree mst interface ethernet 1/0/3  
  
eth1/0/3  
Configured link type: auto, operation status: point-to-point  
Configured fast-forwarding: auto, operation status: non-edge  
Bpdu statistic counter: sent: 5394, received: 5366  
  
Instance Role      State      Cost      Priority  
----- ----      -  
MST00    designated forwarding 20000     128.3  
MST01    alternate blocking   20000     128.3  
MST02    designated forwarding 20000     128.3  
MST03    root          forwarding 20000     128.3
```

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**GRACIAS
OBRIGADO**

