

D-Link®



MSTP (Multiple Spanning Tree)

Eliminación de bucles y
optimización de uso en redes malladas



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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: MSTP_DLINK

Revision Level (0-65535): 1

Digest: AC36177F50283CD4B83821D8AB26DE62

Private VLAN Synchronize

Private VLAN Synchronize

Instance ID Settings

Instance ID (1-64):

Action: Add VID

VID List: 1 or 3-5

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

STP Priority

Priority (0-61440): 32768

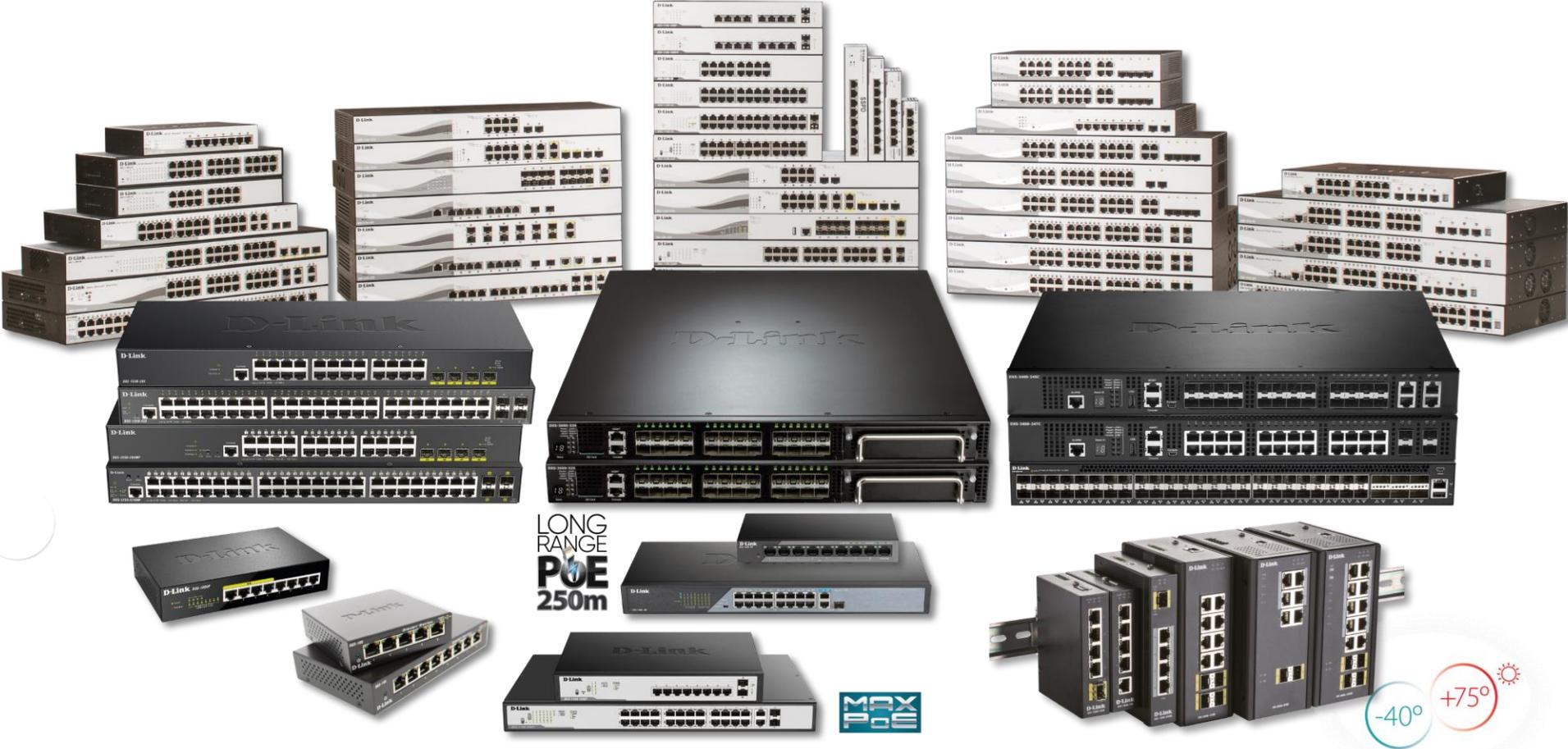
STP Configuration

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



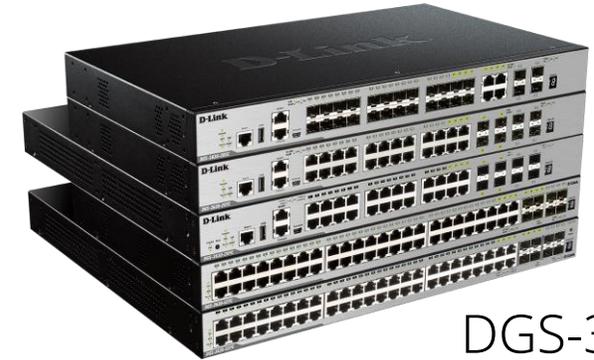
DGS-3130



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

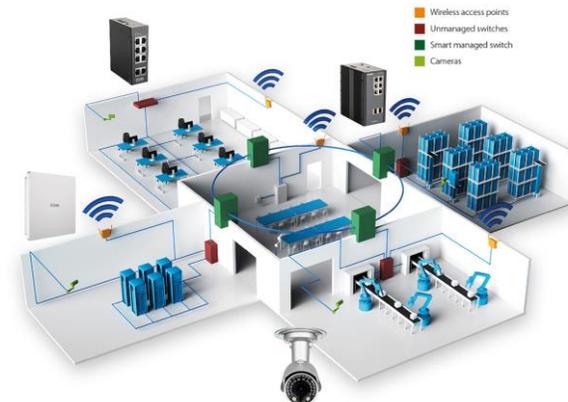


DIS-300G Series



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)

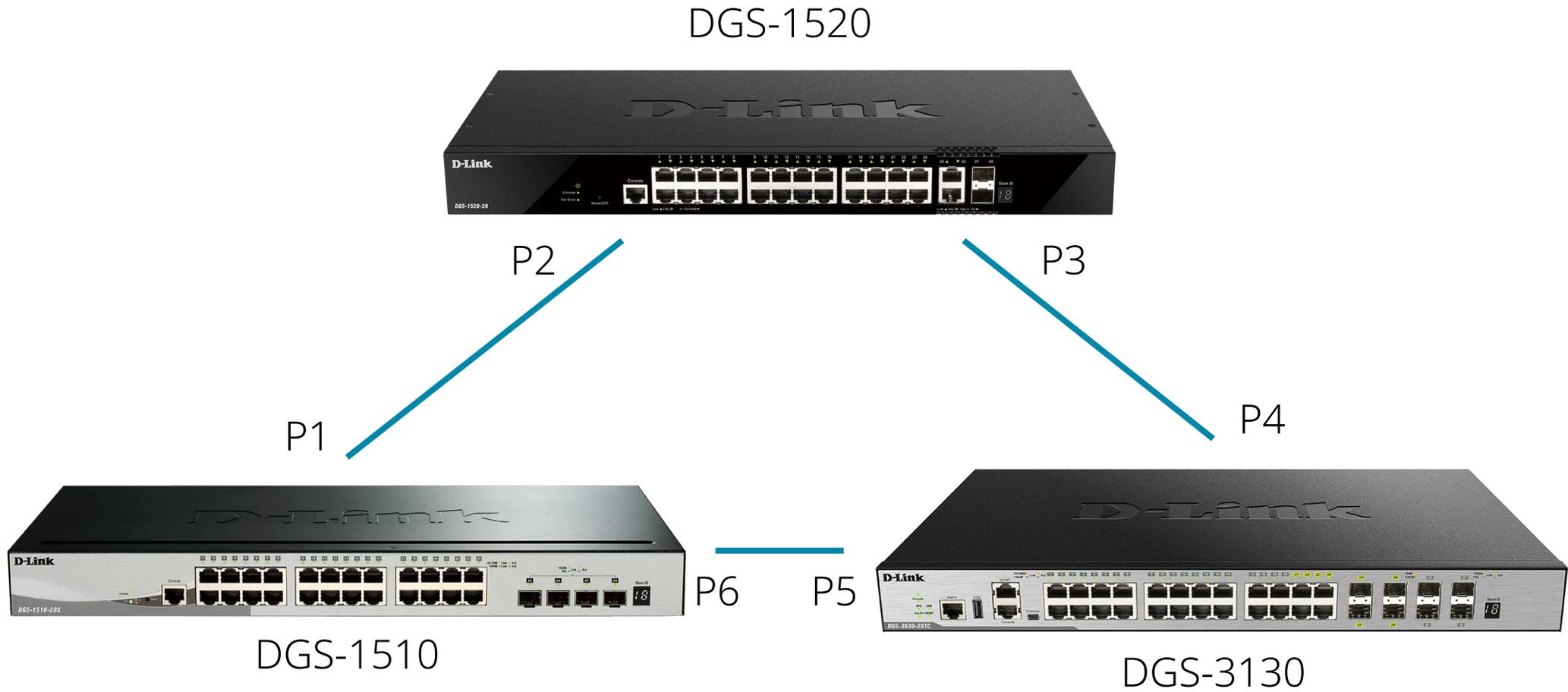
Action

VID List

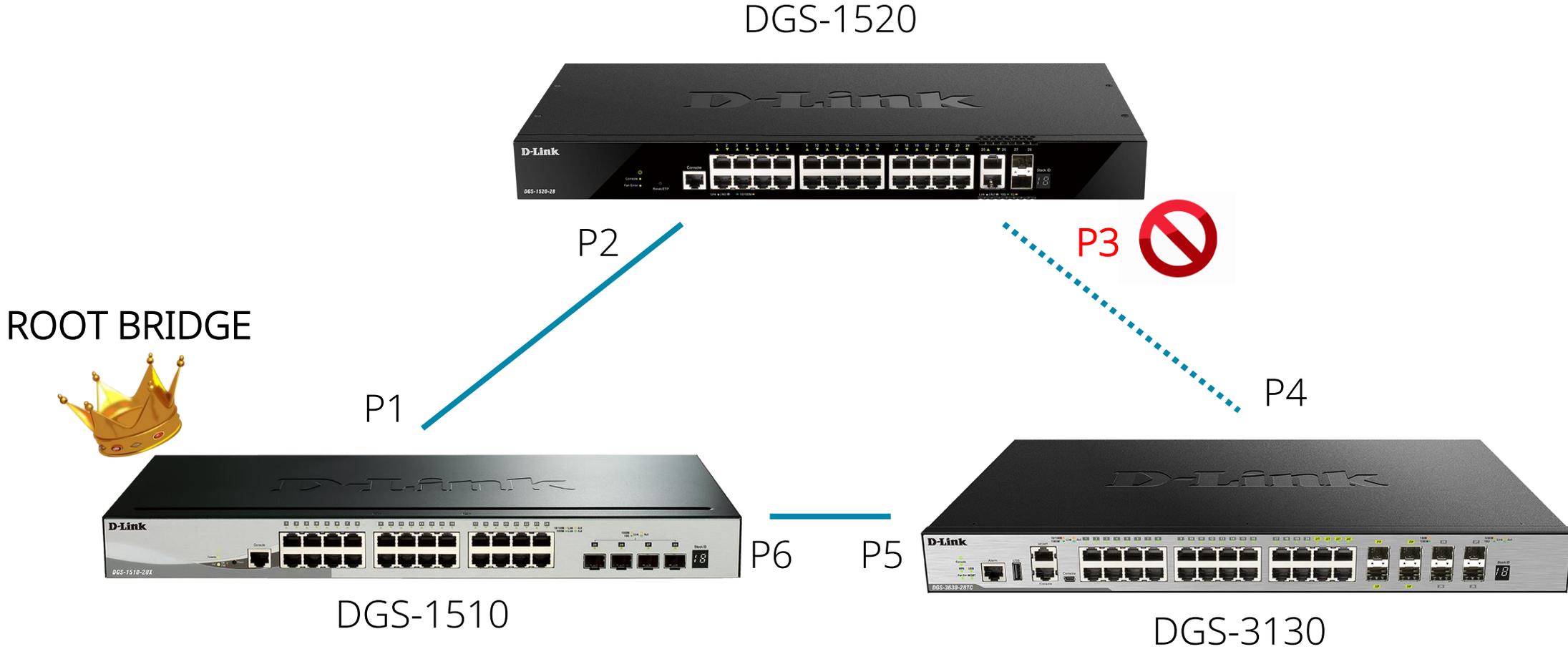
Total Entries: 4

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

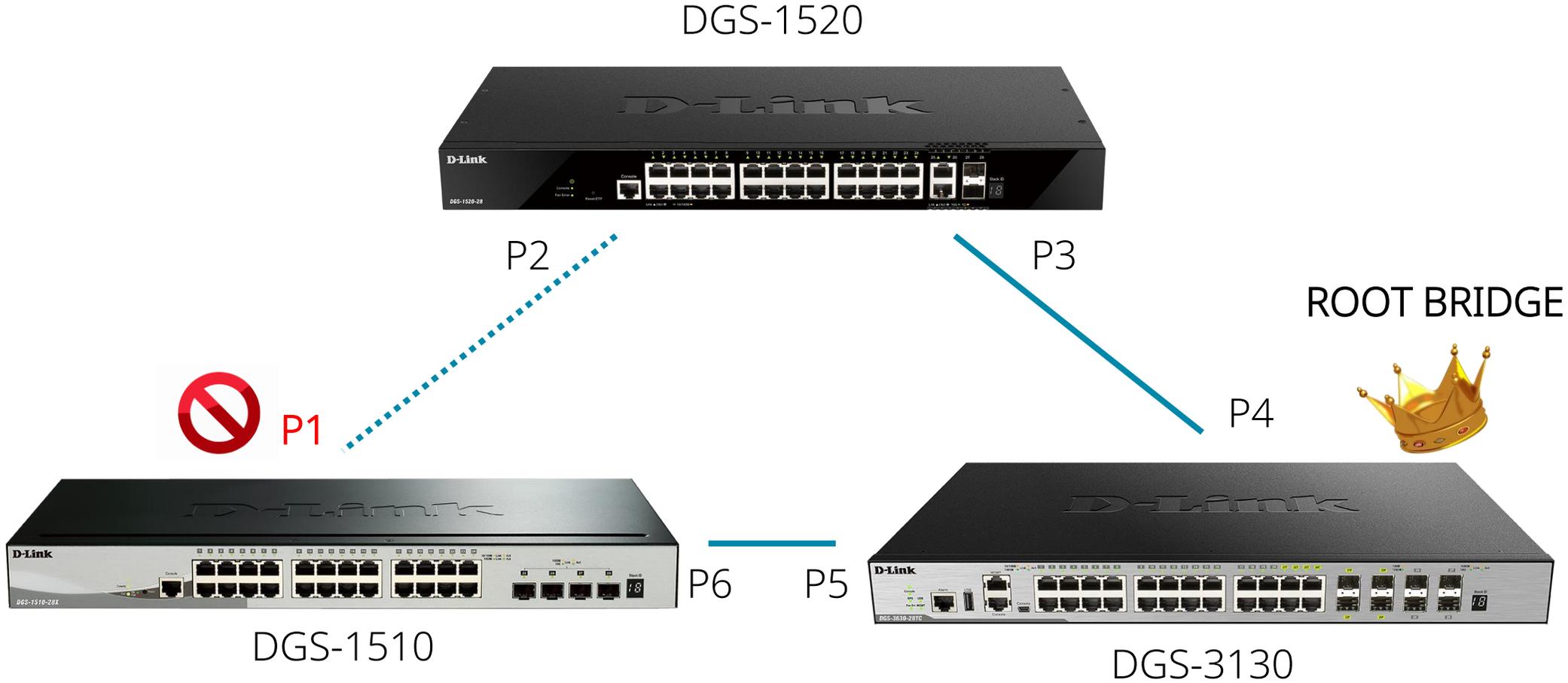


P5



DGS-3130

Resultado – Instancia 3 (VLANs 21-30)



Configuración de MSTP (WEB UI)

- Creamos las VLANs

802.1Q VLAN

802.1Q VLAN

VID List Apply Delete

Find VLAN

VID (1-4094) Find Show All

Total Entries: 1

VID	VLAN Name	Description	Tagged Member Ports	Untagged Member Ports	VLAN Type	
1	default			1/0/1-1/0/52		Edit 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)

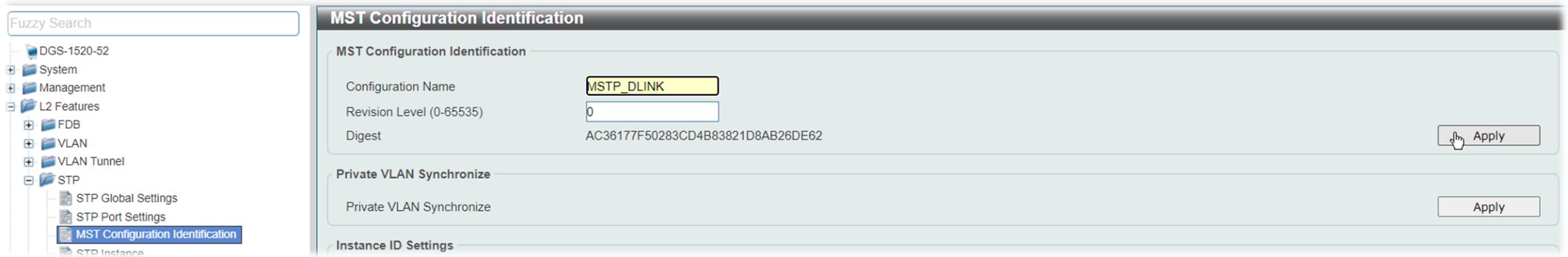
- Seleccionamos el modo MSTP

The screenshot shows the 'STP Global Settings' configuration page. It is divided into several sections:

- STP State:** STP State is set to Disabled and Enabled. An 'Apply' button is on the right.
- STP Traps:** STP New Root Trap is Disabled and Enabled. STP Topology Change Trap is Disabled and Enabled. An 'Apply' button is on the right.
- STP Mode:** STP Mode is set to 'MSTP' in a dropdown menu. An 'Apply' button is on the right.
- STP Priority:** Priority (0-61440) is set to '32768' in a dropdown menu. An 'Apply' button is on the right.
- 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 (dropdown)An 'Apply' button is on the right.

Configuración de MSTP (WEB UI)

- Introducimos un nombre de configuración para nuestro MSTP



The screenshot displays the D-Link Web UI configuration page for MST Configuration Identification. On the left, a navigation tree shows the following structure:

- DGS-1520-52
 - System
 - Management
 - L2 Features
 - FDB
 - VLAN
 - VLAN Tunnel
 - STP
 - STP Global Settings
 - STP Port Settings
 - MST Configuration Identification**
 - STP Instance

The main configuration area is titled "MST Configuration Identification" and contains the following fields:

- MST Configuration Identification**
 - Configuration Name:
 - Revision Level (0-65535):
 - Digest: AC36177F50283CD4B83821D8AB26DE62
- Private VLAN Synchronize**
 - Private VLAN Synchronize:
- Instance ID Settings**

Buttons for "Apply" are visible at the end of each 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 .Port#
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**

