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**Ethernet Ring
Protection Switching**

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> **WEBINARS**

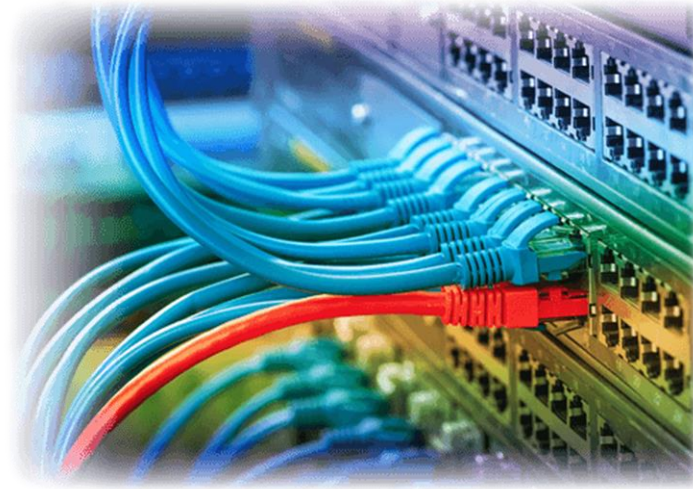


Alberto LM
Presales Engineer
D-Link Iberia

Agenda

ERPS – Ethernet Ring Protection Switching

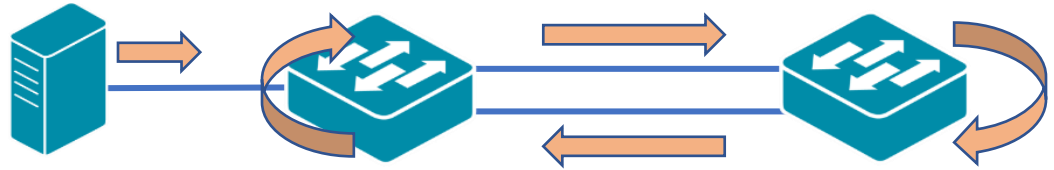
- ✓ Bucles en la Red
- ✓ Loopback Detection & STP
- ✓ ERPS (topologías en anillo)
- ✓ Hands-on



Bucles en la red... por qué suceden

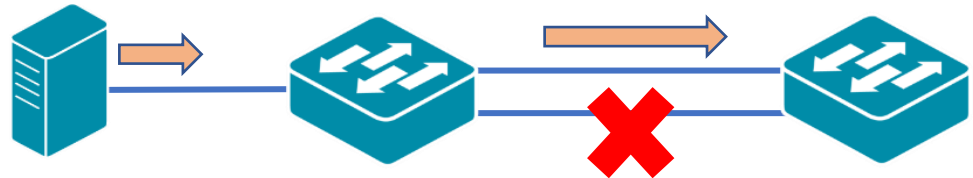
Loops indeseados pueden dejar inutilizada nuestra red

- ✓ Buscamos redundancia



- ✓ Bucles en capa 2

- ✓ Bloquear caminos



- ✓ Recuperaciones automáticas

Un problema, múltiples soluciones

Existen muchos protocolos para evitar bucles

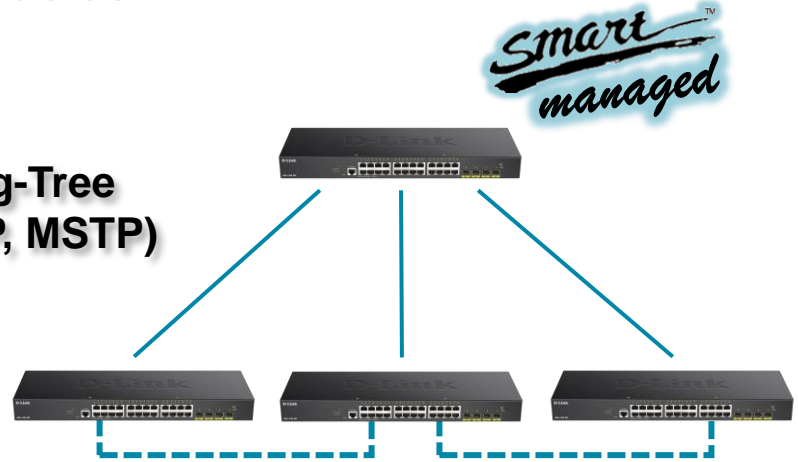
Loopback
Detection



*Smart*TM



Spanning-Tree
(STP, RSTP, MSTP)



*Smart*TM
managed

ERPS
Ring Protection



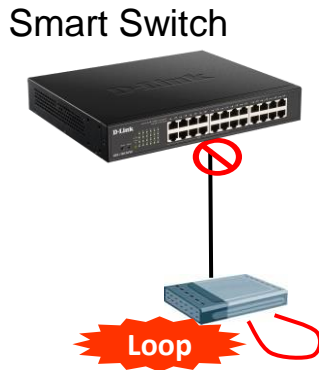
industrial

Loopback Detection (LBD)

Evitar bucles accidentales

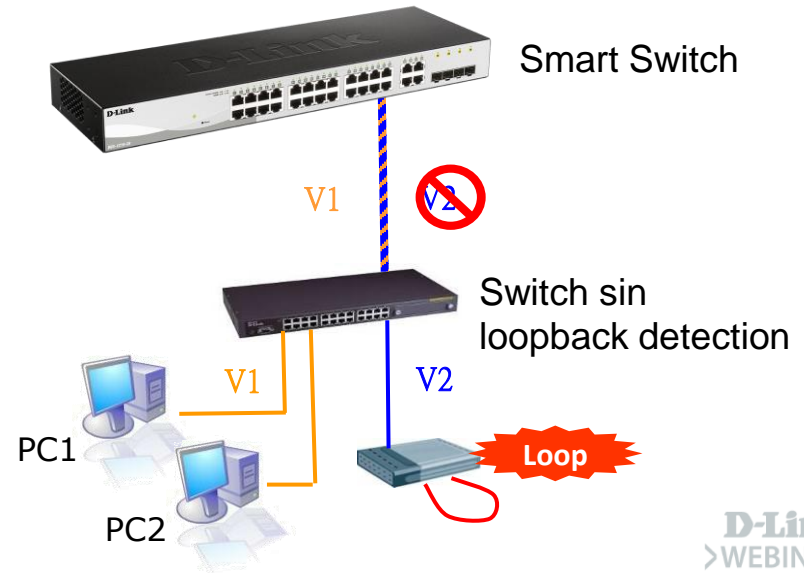
1. Port-based LBD

El puerto se bloquea completamente



2. VLAN-based LBD

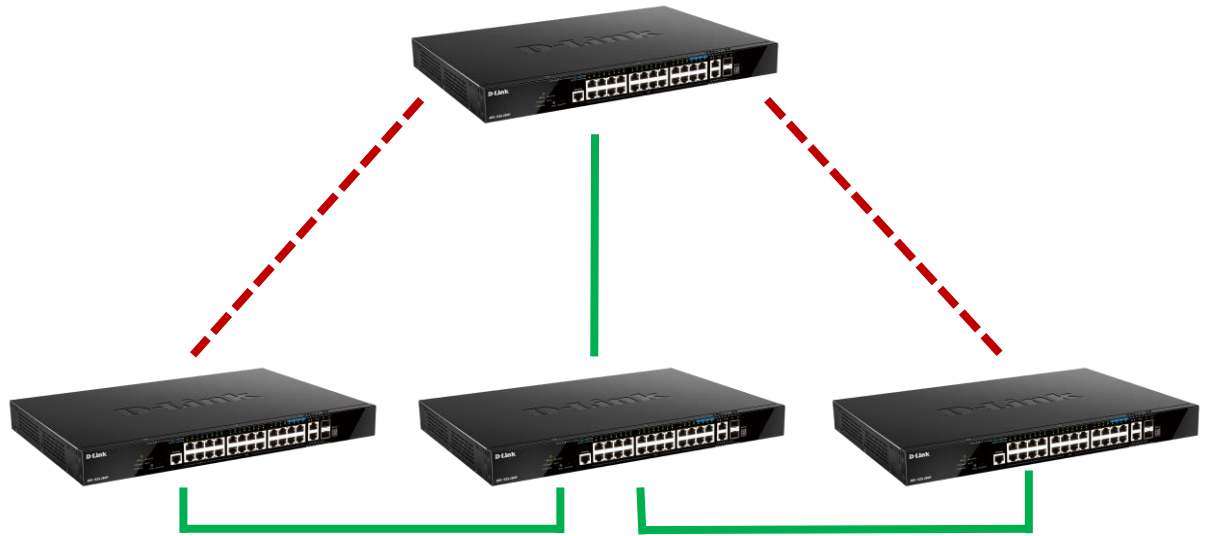
Bloquea el tráfico de la VLAN donde se ha producido el bucle en vez del puerto



Spanning-Tree (STP)

Un protocolo clásico para evitar bucles

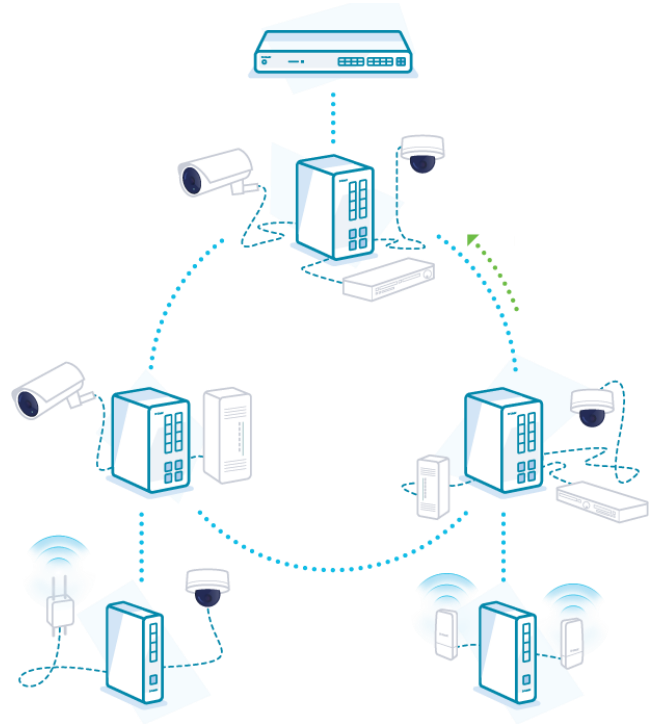
- ✓ IEEE 802.1D STP
- ✓ Bloquear caminos
- ✓ Dinámico
- ✓ IEEE 802.1S MSTP



ERPS – ITU-T G.8032

Ethernet Ring Protection Switching

- ✓ ITU-T G.8032
- ✓ Support 50ms recovery time
- ✓ 16-node ring
- ✓ Multiple ERPS Ring



D-Link Switches

Qué equipos soportan ERPS



DGS-1510

DGS-1520



2.5G



DMS-1100



DIS-200



10G



DXS-1210



DGS-3130



DGS-3630



DXS-3400

10G

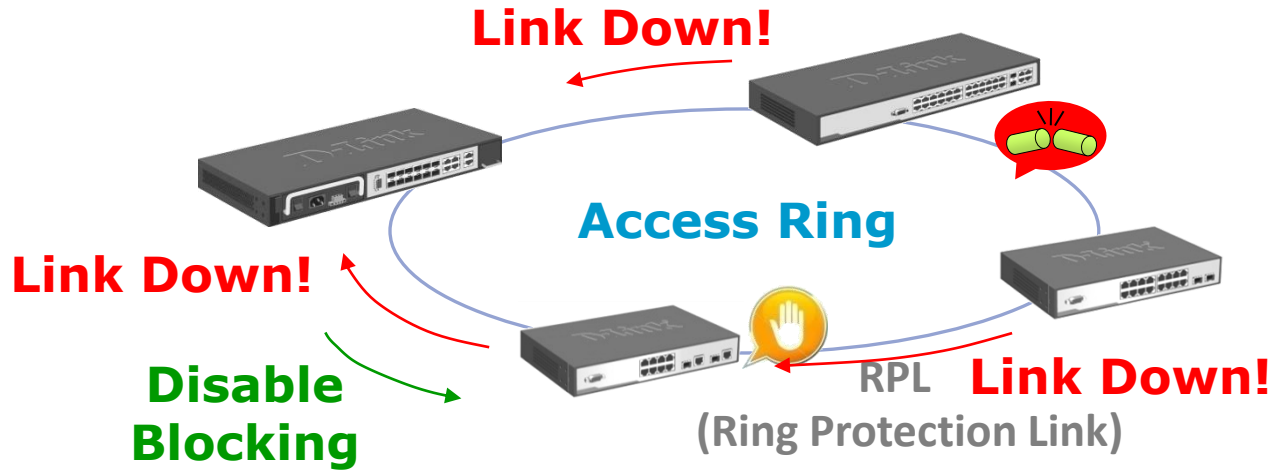


DXS-3610

10/100G

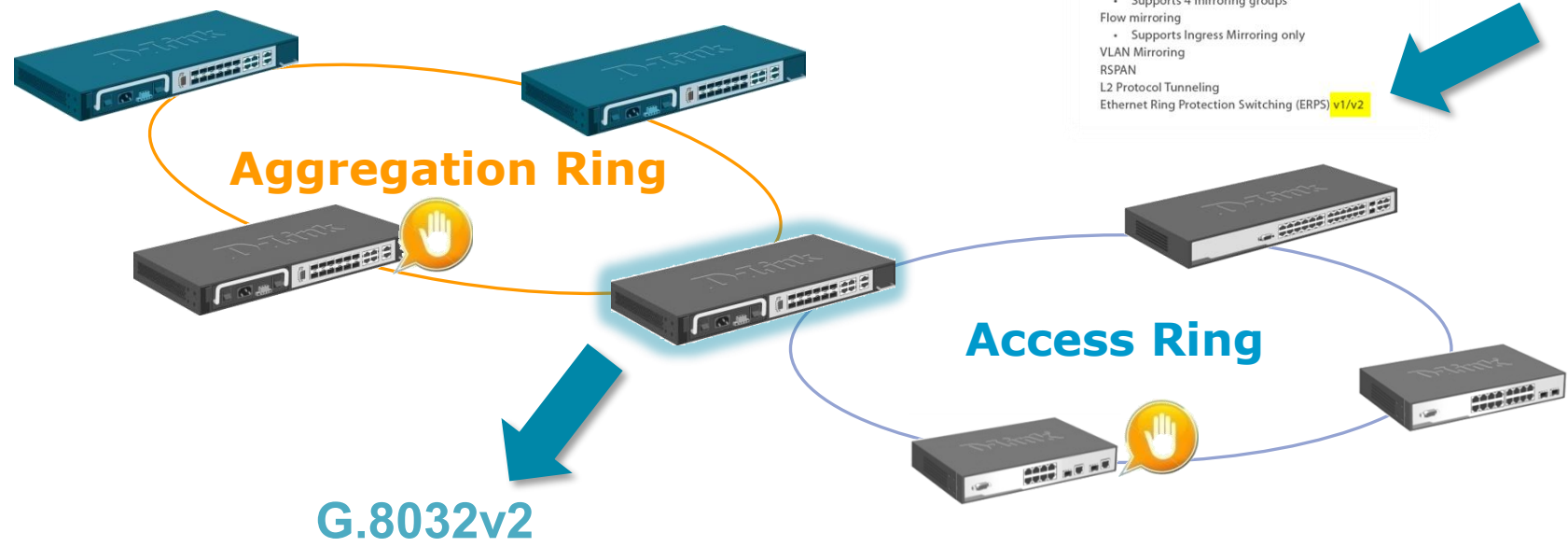
Funcionamiento ERPS

Evitar bucles en anillos



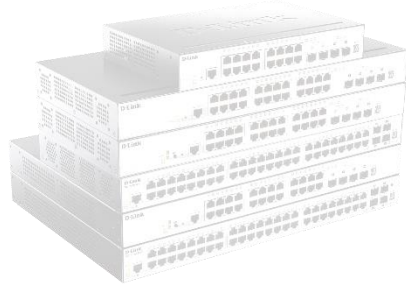
Funcionamiento ERPS

Evitar bucles en anillos



D-Link Switches

Qué equipos soportan ERPS v2



DGS-1510

DGS-1520



2.5G



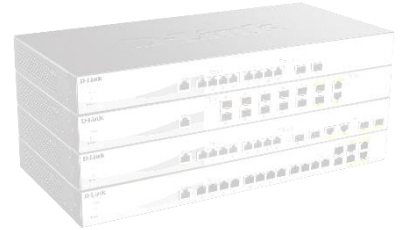
DMS-1100



DIS-200



10G



DXS-1210



DGS-3130



DGS-3630



DXS-3400

10G



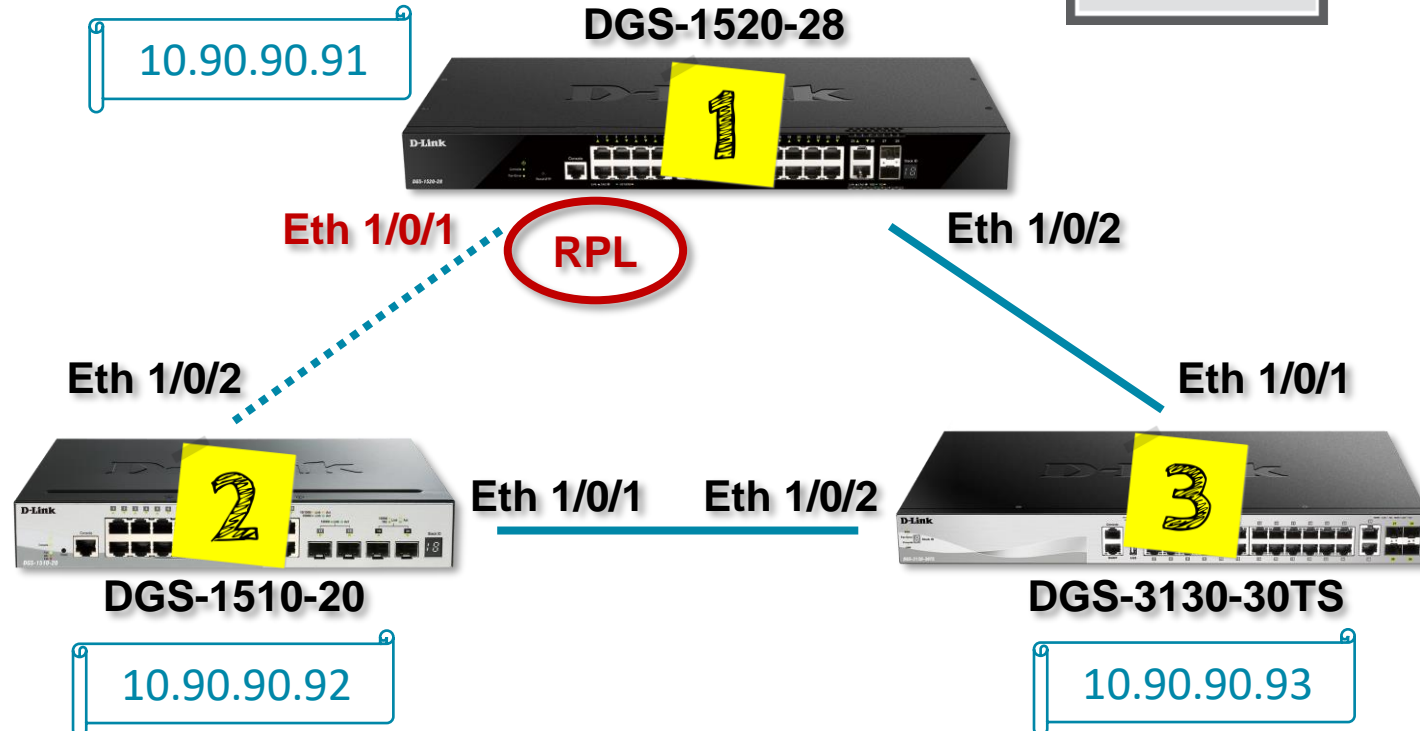
DXS-3610

Cómo se configura

Configuración manual, rendimiento óptimo



VLANs
1-8
VLAN ERPS
9



Configuración en DGS-1520-28

WEB UI



802.1Q VLAN

802.1Q VLAN

VID List Apply Delete

Find VLAN

VID (1-4094) Find Show All

Total Entries: 9

VID	VLAN Name	Description	Tagged Member Ports	Untagged Member Ports	VLAN Type		
1	default			1/0/1-1/0/28		Edit	Delete
2	VLAN0002					Edit	Delete
3	VLAN0003					Edit	Delete
4	VLAN0004					Edit	Delete
5	VLAN0005					Edit	Delete
6	VLAN0006					Edit	Delete
7	VLAN0007					Edit	Delete
8	VLAN0008					Edit	Delete
9	VLAN0009					Edit	Delete

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

Configuración en DGS-1520-28

WEB UI



Configure VLAN Interface

Configure VLAN Interface

Port

eth1/0/1

Clone

VLAN Mode

Trunk

From Port

To Port

Acceptable Frame

Admit All

eth1/0/2

eth1/0/2

Ingress Checking

Enabled Disabled

Native VLAN

Native VLAN
 Untagged Tagged

VID (1-4094)

1

Action

None

Allowed VLAN Range

Current Allowed VLAN Range

Back

Apply

Configuración en DGS-1520-28

WEB UI



ERPS

ERPS Status | **ERPS Brief**

ERPS Version Settings

ERPS Version:

Ethernet Ring G.8032

Ring Name:

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance			
Ring1	-	-	Major Ring	1		<input type="button" value="Edit Ring"/>	<input type="button" value="Show Detail"/>	<input type="button" value="Delete"/>

1/1 < < 1 > >

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance			
Ring1	-	-	Major Ring	1		<input type="button" value="Edit Ring"/>	<input type="button" value="Show Detail"/>	<input type="button" value="Delete"/>

1/1 < < 1 > >

Configuración en DGS-1520-28

WEB UI



Edit Ethernet Ring

Ethernet Ring Settings

Ethernet Ring Name Ring1

Instance ID (1-32) None Specify

Sub-Ring Name 32 chars None Specify

Port0 eth1/0/1 None Specify

Port1 eth1/0/2 None Specify

Ring ID None Specify

Ring Type Major Ring

Back

Apply

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance		
Ring1	eth1/0/1	eth1/0/2	Major Ring	1		Edit Ring	Show Detail

1/1 < < 1 > > Go

Configuración en DGS-1520-28

WEB UI



Edit Ethernet Ring

Ethernet Ring Settings

Ethernet Ring Name	Ring1
Instance ID (1-32)	<input type="text" value="1"/> <input checked="" type="radio"/> None <input checked="" type="radio"/> Specify
Sub-Ring Name	<input type="text" value="32 chars"/> <input type="radio"/> None <input checked="" type="radio"/> Specify
Port0	<input type="text" value="eth1/0/1"/> <input type="radio"/> None <input checked="" type="radio"/> Specify
Port1	<input type="text" value="None"/> <input type="radio"/> None <input checked="" type="radio"/> Specify
Ring ID	<input type="text"/> <input type="radio"/> None <input checked="" type="radio"/> Specify
Ring Type	<input type="text" value="Major Ring"/> <input type="checkbox"/>

Back

Apply

ERPS

ERPS Status

ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State	
Ring1	1	Deactivated	P0:eth1/0/1,Forwarding P1:eth1/0/2,Forwarding	Edit Instance

1/1



1



Go

Configuración en DGS-1520-28

WEB UI



Edit Ethernet Instance

Ethernet Instance Settings

Ethernet Ring Name	Ring1
Instance ID	1
Description	64 chars <input type="checkbox"/> None <input checked="" type="radio"/> Specify
R-APS Channel VLAN (1-4094)	9 <input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify
Inclusion VLAN List	1-8 <input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify
MEL (0-7)	1 <input type="checkbox"/> None <input checked="" type="radio"/> Specify
Profile Name	32 chars <input type="checkbox"/> None <input checked="" type="radio"/> Specify
RPL Port	Port0 <input type="checkbox"/>
RPL Role	Owner <input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify
Activate	Enabled <input checked="" type="checkbox"/>
Sub-Ring Instance (1-32)	<input type="checkbox"/> None <input checked="" type="radio"/> Specify
Force Ring Port Block	Port0 <input type="checkbox"/>
Manual Ring Port Block	Port0 <input type="checkbox"/>

Back

Apply

Clear

Configuración en DGS-1520-28

WEB UI



ERPS Status	
ERPS Status Information	
Ethernet Ring	Ring1
Admin Port0	eth1/0/1
Admin Port1	eth1/0/2
Ring Type	Major Ring
Ring ID	1
Instance ID	1
Instance Status	Protection
R-APS Channel	9
Protected VLANs	1-8
Port0	eth1/0/1, SF blocked
Port1	eth1/0/2, SF blocked
Profile	
Description	
Guard Timer	500 ms
Hold-Off Timer	0 ms
WTR Timer	5 min
Revertive	Disabled94.17 Enabled
MEL	1
RPL Role	Idle
RPL Port	Port0
Sub-Ring Instance	None

Configuración en DGS-1520-28



CLI

```
DGS-1520-28#configure terminal
DGS-1520-28(config)#vlan 2-9
DGS-1520-28(config-vlan)#interface range ethernet 1/0/1-2
DGS-1520-28(config-if-range)#switchport mode trunk
DGS-1520-28(config-if-range)#exit
DGS-1520-28(config)#ethernet ring g8032 Ring1
DGS-1520-28(config-erps-ring)#port0 interface eth 1/0/1
DGS-1520-28(config-erps-ring)#port1 interface eth 1/0/2
DGS-1520-28(config-erps-ring)#instance 1
DGS-1520-28(config-erps-ring-instance)#r-aps channel-vlan 9
DGS-1520-28(config-erps-ring-instance)#inclusion-list vlan-ids 1-8
DGS-1520-28(config-erps-ring-instance)#rpl port0 owner
DGS-1520-28(config-erps-ring-instance)#activate
DGS-1520-28(config-erps-ring-instance)#
```

Configuración en DGS-1510-20



WEB UI

ERPS

Ethernet Ring G.8032

Ring Name

Apply

Total Entries: 1

Ethernet Ring	Instance ID				
Ring1	0	Edit Ring	Edit Instance	Show Status	Delete

1/1 |< < 1 > >| Go

ERPS

Ethernet Ring G.8032

Ring Name

Apply

Total Entries: 1

Ethernet Ring	Instance ID				
Ring1	0	Edit Ring	Edit Instance	Show Status	Delete

1/1 |< < 1 > >| Go

Configuración en DGS-1510-20

WEB UI



Edit Ethernet Ring

Ethernet Ring Settings

Ethernet Ring Name	Ring1	
Instance ID (1-32)	<input type="text" value="1"/>	<input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify
Sub Ring Name	<input type="text" value="32 chars"/>	<input type="checkbox"/> None <input checked="" type="radio"/> Specify
Port0	<input type="text" value="eth1/0/1"/>	<input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify
Port1	<input type="text" value="eth1/0/2"/>	<input checked="" type="checkbox"/> None <input checked="" type="radio"/> Specify

Configuración en DGS-1510-20

WEB UI



ERPS

Ethernet Ring G.8032

Ring Name Apply

Total Entries: 1

Ethernet Ring	Instance ID				
Ring1	1	Edit Ring	Edit Instance	Show Status	Delete

1/1 < < 1 > > Go

Edit Ethernet Instance

Ethernet Instance Settings

Ethernet Ring Name	Ring1
Instance ID	1
Description	<input type="text" value="64 chars"/> <input type="checkbox"/> None <input checked="" type="radio"/> Specify
R-APS Channel VLAN (1-4094)	<input type="text" value="9"/> <input checked="" type="checkbox"/> None <input type="radio"/> Specify
Inclusion VLAN List	<input type="text" value="1-8"/> <input checked="" type="checkbox"/> None <input type="radio"/> Specify
MEL (0-7)	<input type="text" value="1"/> <input type="checkbox"/> None <input checked="" type="radio"/> Specify
Profile Name	<input type="text" value="32 chars"/> <input type="checkbox"/> None <input checked="" type="radio"/> Specify
RPL Port	<input type="text" value="Port0"/> <input type="checkbox"/>
RPL Owner	<input type="text" value="Disabled"/> <input type="checkbox"/>
Activate	<input type="text" value="Enabled"/> <input checked="" type="checkbox"/>

Back Apply

Configuración en DGS-1510-20

WEB UI



ERPS Status	
ERPS Status Information	
Ethernet Ring	Ring1
Admin Port0	eth1/0/1
Admin Port1	eth1/0/2
Ring Type	Major ring
Ring ID	1
Instance ID	1
Instance Status	Protection
R-APS Channel	9
Protected VLANs	1-8
Port0	eth1/0/1, Forwarding
Port1	eth1/0/2, Forwarding
Profile	
Description	
Guard Timer	500 ms
Hold-Off Timer	0 ms
WTR Timer	5 min
Revertive	Enabled
MEL	1
RPL Role	None
RPL Port	-
Sub Ring Instance	None

Configuración en DGS-1510-20



CLI

```
Switch#configure terminal
Switch(config)#vlan 2-9
Switch(config-vlan)#exit
Switch(config)#interface range ethernet 1/0/1-2
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#
```

```
Switch(config)#ethernet ring g8032 Ring1
Switch(config-erp)#port0 interface eth 1/0/1
Switch(config-erp)#port1 interface eth 1/0/2
Switch(config-erp)#instance 1
Switch(config-erp-instance)#r-aps channel-vlan 9
Switch(config-erp-instance)#inclusion-list vlan-ids 1-8
Switch(config-erp-instance)#activate
Switch(config-erp-instance)#
```

Configuración en DGS-1510-20



CLI

```
Switch#show ethernet ring g8032 brief
```

Profile	Inst .ID	Status	Port-State
-----	---	-----	-----
	1	Protection	p0:eth1/0/1, Forwarding p1:eth1/0/2, -

```
Total Entries: 1
```

Configuración en DGS-3130-30TS



WEB UI

D-Link
Building Networks for People

802.1Q VLAN

VID List:

Find VLAN

VID (1-4094):

Total Entries: 9

VID	VLAN Name	Tagged Member Ports	Untagged Member Ports	VLAN Type		
1	default		1/0/1-1/0/30		<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
2	VLAN0002				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
3	VLAN0003				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
4	VLAN0004				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
5	VLAN0005				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
6	VLAN0006				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
7	VLAN0007				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
8	VLAN0008				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>
9	VLAN0009				<input type="button" value="Edit"/>	<input type="button" value="Delete"/>

1/1 |< < 1 > >| Go

Configuración en DGS-3130-30TS

WEB UI



The screenshot displays the 'Configure VLAN Interface' page in the DGS-3130-30TS Web UI. On the left, a navigation tree shows the following structure:

- DGS-3130-30TS
 - System
 - Management
 - L2 Features
 - FDB
 - VLAN
 - VLAN Configuration Wizard
 - 802.1Q VLAN
 - VLAN Interface**
 - 802.1v Protocol VLAN
 - GVRP
 - Asymmetric VLAN
 - MAC VLAN
 - Super VLAN
 - Auto Surveillance VLAN
 - Voice VLAN
 - Private VLAN

The main configuration area is titled 'Configure VLAN Interface' and contains the following settings:

- Port: eth1/0/1
- Clone: Clone
- VLAN Mode: Trunk
- From Port: eth1/0/2
- To Port: eth1/0/2
- Acceptable Frame: Admit All
- Ingress Checking: Enabled Disabled
- Native VLAN: Native VLAN Untagged Tagged
- VID (1-4094): 1
- Action: None
- Allowed VLAN Range: (empty field)
- Current Allowed VLAN Range: (empty field)

At the bottom right of the configuration area, there are two buttons: 'Back' and 'Apply'.

Configuración en DGS-3130-30TS

WEB UI



Fuzzy Search

- DGS-3130-30TS
 - System
 - Management
 - L2 Features
 - FDB
 - VLAN
 - VLAN Tunnel
 - STP
 - ERPS (G.8032)
 - ERPS**
 - ERPS Profile
 - Loopback Detection
 - Link Aggregation
 - L2 Protocol Tunnel
 - L2 Multicast Control
 - LLDP
 - L3 Features
 - QoS
 - ACL
 - Security

ERPS

ERPS Status | **ERPS Brief**

ERPS Version Settings

ERPS Version: G.8032v2

ERPS Global Settings

ERPS Trap State: Enabled Disabled Apply

Ethernet Ring G.8032

Ring Name: Apply

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance		
Ring1	-	-	Major ring	1		Edit Ring	Show Detail Delete

1/1 < < 1 > > Go

Configuración en DGS-3130-30TS



WEB UI

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance		
Ring1	-	-	Major ring	1		Edit Ring	Show Detail

1/1 < < 1 > > Go

Edit Ethernet Ring

Ethernet Ring Settings

Ethernet Ring Name: Ring1

Instance ID (1-32): None Specify

Sub Ring Name: None Specify

Port0: None Specify

Port1: None Specify

Ring ID: None Specify

Ring Type:

Total Entries: 1

Ethernet Ring	Admin Port0	Admin Port1	Ring Type	Ring ID	Instance		
Ring1	eth1/0/1	eth1/0/2	Major ring	1	1	Edit Ring	Show Detail

1/1 < <

Configuración en DGS-3130-30TS



WEB UI

ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State	
Ring1	1	Deactivated	P0.eth1/0/1, Forwarding P1.eth1/0/2, Forwarding	Edit Instance

1/1 < < 1 > > Go

Edit Ethernet Instance

Ethernet Instance Settings

Ethernet Ring Name: Ring1
Instance ID: 1
Description: 84 chars None Specify
R-APS Channel VLAN (1-4094): 9 None Specify
Inclusion VLAN List: 1-8 None Specify
MEL (0-7): 1 None Specify
Profile Name: 32 chars None Specify
RPL Port: Port0
RPL Role: Owner None Specify
Activate: Enabled
Sub Ring Instance (1-32): None Specify
Force Ring Port Block: Port0
Manual Ring Port Block: Port0

Back Apply Clear

Configuración en DGS-3130-30TS

WEB UI



ERPS Status	
ERPS Status Information	
Ethernet Ring	Ring1
Admin Port0	eth1/0/1
Admin Port1	eth1/0/2
Ring Type	Major ring
Ring ID	1
Instance ID	1
Instance Status	Pending
R-APS Channel	9
Protected VLANs	1-8
Port0	eth1/0/1, Forwarding
Port1	eth1/0/2, Forwarding
Profile	
Description	
Guard Timer	500 ms
Hold-Off Timer	0 ms
WTR Timer	5 min
Revertive	Enabled
MEL	1
RPL Role	None
RPL Port	-
Sub Ring Instance	None

Configuración en DGS-3130-30TS



WEB UI

ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State	
Ring1	1	Pending	P0:eth1/0/1, Forwarding	Edit Instance
			P1:eth1/0/2, Forwarding	

1/1 < < 1 > > Go



ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State	
Ring1	1	Protection	P0:eth1/0/1, Forwarding	Edit Instance
			P1:eth1/0/2, Forwarding	

1/1 < < 1 > > Go

Configuración en DGS-3130-30TS

3

CLI

```
Switch#configure terminal
Switch(config)#vlan 2-9
Switch(config-vlan)#exit
Switch(config)#interface range ethernet 1/0/1-2
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#exit
Switch(config)#ethernet ring g8032 Ring1
Switch(config-erps-ring)#port0 interface ethernet 1/0/1
Switch(config-erps-ring)#port1 interface ethernet 1/0/2
Switch(config-erps-ring)#instance 1
Switch(config-erps-ring-instance)#r-aps channel-vlan 9
Switch(config-erps-ring-instance)#inclusion-list vlan-ids 1-8
Switch(config-erps-ring-instance)#activate
```

Resultados I

Sin conectarlos

ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State	
Ring1	1	Protection	P0:eth1/0/1,SF blocked(RPL) P1:eth1/0/2,SF blocked	<input type="button" value="Edit Instance"/>

1/1 < < 1 > >

Status	Port State
Protection	P0:eth1/0/1, SF Blocking
	P1:eth1/0/2, SF Blocking

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	-
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	-

Resultados II

Conectados pero anillo abierto

ERPS			
ERPS Status		ERPS Brief	
Total Entries: 1			
Ethernet Ring	Instance ID	Status	Port State
Ring1	1	Protection	P0:eth1/0/1,Forwarding(RPL)
			P1:eth1/0/2,Forwarding

Status	Port State
Protection	P0:eth1/0/1, Forwarding
	P1:eth1/0/2, SF Blocking

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	-
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	Forwarding

Resultados III

Cerramos el anillo

ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State
Ring1	1	pending	P0:eth1/0/1,Forwarding(RPL) P1:eth1/0/2,Forwarding



ERPS

ERPS Status | ERPS Brief

Total Entries: 1

Ethernet Ring	Instance ID	Status	Port State
Ring1	1	Idle	P0:eth1/0/1,Blocking(RPL) P1:eth1/0/2,Forwarding

Resultados III

Cerramos el anillo

ERPS			
ERPS Status		ERPS Brief	
Total Entries: 1			
Ethernet Ring	Instance ID	Status	Port State
Ring1	1	Idle	P0:eth1/0/1,Blocking(RPL)
			P1:eth1/0/2,Forwarding

Status	Port State
Idle	P0:eth1/0/1, Forwarding
	P1:eth1/0/2, Forwarding

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	Forwarding
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	Forwarding

Resultados IV

Tras quitar el cable

ERPS			
ERPS Status		ERPS Brief	
Total Entries: 1			
Ethernet Ring	Instance ID	Status	Port State
Ring1	1	Protection	P0:eth1/0/1,Forwarding(RPL)
			P1:eth1/0/2,Forwarding

Status	Port State
Protection	P0:eth1/0/1, Forwarding
	P1:eth1/0/2, SF Blocking

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	-
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	Forwarding

Resultados V

Tras volver a poner el cable

ERPS			
ERPS Status		ERPS Brief	
Total Entries: 1			
Ethernet Ring	Instance ID	Status	Port State
Ring1	1	pending	P0:eth1/0/1,Forwarding(RPL)
			P1:eth1/0/2,Forwarding

Status	Port State
Pending	P0:eth1/0/1, Forwarding
	P1:eth1/0/2, Blocking

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	Blocked
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	Forwarding

Resultados V

Al terminar de converger

ERPS			
ERPS Status		ERPS Brief	
Total Entries: 1			
Ethernet Ring	Instance ID	Status	Port State
Ring1	1	Idle	P0:eth1/0/1,Blocking(RPL) P1:eth1/0/2,Forwarding

Status	Port State
Idle	P0:eth1/0/1, Forwarding
	P1:eth1/0/2, Forwarding

Admin Port0	eth1/0/1
Operational Port0	eth1/0/1
Port0 State	Forwarding
Admin Port1	eth1/0/2
Operational Port1	eth1/0/2
Port1 State	Forwarding

Programa de Canal VIP+



Programa de Canal VIP+

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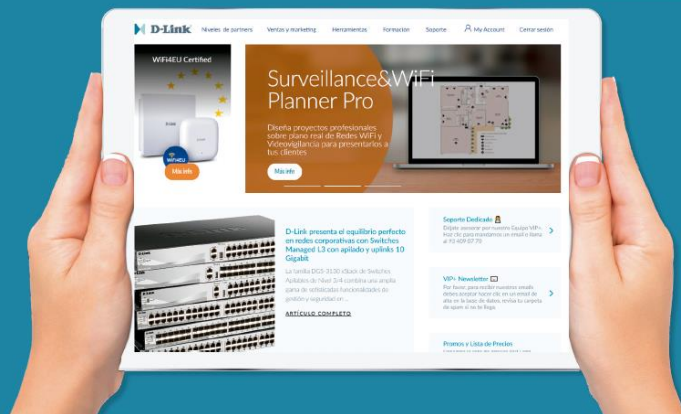
Surveillance Floor Planner Pro
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Bandwidth Calculator
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