# ATP. Lecture 4









# **Spanning Tree**



### **Issues adding redundant links to the topology**





### **Issues adding redundant links to the topology**

# does not ensurecanuse those links correctly

### without a

### protocol to manage the links results in network loops

To function properly, an Ethernet network must have only one active pathway between any two devices

### **Issues adding redundant links to the topology**

#### Loops in Ethernet cause:



# **Overview of STP**

Several STP versions exist: • The original standard Spanning Tree Protocol (STP)

• Rapid Spanning Tree Protocol (RSTP)

• Multiple Spanning Tree Protocol (MSTP)

# **Spanning tree solution**

- One shortest path between each switch and the root (elected by BPDU)
- · Other paths blocked



# **Spanning tree solution**

# The spanning tree switches elect the rootBridgeProtocol Data Units (BPDUs)<br/>Comware-1 will be configured as the primary root

- One shortest path between each switch and the root (elected by BPDU)
- Other paths blocked



# **Spanning tree solution**

Every other spanning tree bridge has a lowest cost path to the root. The links in the lowest cost paths forward traffic.

Because links that are not part of this tree are blocked, the network has no loops.

- One shortest path between each switch and the root (elected by BPDU)
- Other paths blocked



### The original standard Spanning Tree Protocol (STP)

#### electing a root bridge calculating the best path to that bridge blocking alternate paths

However, STP was designed in a time when a minute or so for convergence was acceptable.

before the ports can

start forwarding.

### The original standard Spanning Tree Protocol (STP)

#### Summary of the port states in STP

Disabled	STP is disabled by default
Blocking	The port drops all the data and listens to BPDUs
Listening	The port drops all the data, listens to BPDUs and it will be used in the active topology
Learning	The port drops all the data, listens to BPDUs and it is learning MAC addresses
Forwarding	The port forwards data and it's learning MAC addresses



## **Rapid Spanning Tree Protocol (RSTP)**

#### **RSTP, 802.1**w

RSTP has better convergence than STP due to these factors:

- Direct and indirect failure detection and recovery
- Faster transition between port roles
- Point-to-point link designation
- Edge port designation

#### **Multiple Spanning Tree Protocol (MSTP)**

An extension to RSTP, known as Multiple Spanning Tree Protocol (MSTP), allows for a separate STP configuration for each VLAN group in the network

Multiple Spanning Tree Protocol (MSTP) is a protocol that allows groups of VLANs to have different spanning tree topologies within an Ethernet Network. MSTP was introduced in IEEE 802.1s to use multiple spanning trees, providing for traffic belonging to different VLANs to flow over potentially different paths within the virtual bridged LAN. This allows for better load balancing and more efficient use of available resources.

### **Multiple Spanning Tree Protocol (MSTP)**



# Rapid Spanning Tree Protocol (RSTP)

# **Spanning tree port roles and states**

#### RSTP provides rapid recovery by including port roles in the computation of port states

The port roles and states are summarized in Table on the next slides

# **Spanning tree port roles**

Root port	• This is the port closest to the root bridge			
Designated port	<ul> <li>It is designated if it can send the best BPDU on its segment</li> </ul>			
Alternate port	<ul> <li>Alternate path to a designated port. It is blocked</li> </ul>			
Backup port	<ul> <li>Alternative port to a bridge that is already connected</li> </ul>			
Disabled port	Blocked port			
Edge port	<ul> <li>Port not included in the topology</li> </ul>			

# **Spanning tree port states**

STATE	MEANING
DISABLED	STP operations are disabled on the port.
DISCARDING	The port does not participate in frame forwarding. The forwarding process discards received frames and does not submit forwarded frames for transmission.
LEARNING	The port is enabled for receiving frames only, and the learning process can add new source address information to the forwarding database. The port does not forward any frames.
FORWARDING	The normal state for a switch port. The forwarding process and the Spanning Tree entity are enabled for transmit and receive operations on the port.

# **Spanning tree port roles and states**



The port that is closer to the root switch is **Designated port**. The port on the other side of the link is the **Root port**.

A switch can only have one root port because it can have only one best path

designated and root ports

Because both the designated port and root port are in a forwarding state, the link is active

# **Spanning tree port roles and states**



# **Configuration example: RSTP**



# **Configuration example: RSTP**

#### Add redundant links



# **Configure Comware-1 as the root**



## Enable spanning tree on each switch



#### **Comware-1**

#### **Comware-1**

[Comware-1]display stp

-----[CIST Global Info][Mode MSTP]------

CIST Bridge :0.d07e-28ce-c94f

Bridge Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :0.d07e-28ce-c94f / 0

CIST RegRoot/IRPC :0.d07e-28ce-c94f / 0

CIST RootPortId :0.0

<-output omitted->

#### 0.d07e-28ce-c94f

#### **Comware-1**

[Comware-1] display stp root

MSTID Root Bridge ID ExtPathCost IntPathCost Root Port

0 0.d07e-28ce-c94f 0 0

#### **Comware-2**

[Comware-2] display stp root MSTID Root Bridge ID ExtPathCost IntPathCost Root Port 0 0.d07e-28ce-c94f 20 0 GigabitEthernet1/0/19

#### **ProVision-1**

ProVision-2(config) # show spanning-tree root-history cst
Status and Counters - CST Root Changes History
MST Instance ID : 0
Root Changes Counter : 2
Current Root Bridge ID : 0:d07e28-cec94f
Root Bridge ID Date Time

#### **ProVision-2**

ProVision-2(config) # show spanning-tree root-history cst Status and Counters - CST Root Changes History MST Instance ID : 0 Root Changes Counter : 2 Current Root Bridge ID : 0:d07e28-cec94f Root Bridge ID Date Time

#### **Comware-1**

```
[Comware-1] interface g1/0/23
[Comware-1-GigabitEthernet1/0/23] port link-type trunk
[Comware-1-GigabitEthernet1/0/23] port trunk permit vlan all
[Comware-1-GigabitEthernet1/0/23] undo shutdown
[Comware-1-GigabitEthernet1/0/23] quit
```

#### **Comware-2**

```
[Comware-2] interface g1/0/21
[Comware-2-GigabitEthernet1/0/21] port link-type trunk
[Comware-2-GigabitEthernet1/0/21] port trunk permit vlan all
[Comware-2-GigabitEthernet1/0/21] undo shutdown
[Comware-2-GigabitEthernet1/0/21] quit
```

**ProVision-1** 

ProVision-1(config) # vlan 11 tagged 21 ProVision-1(config) # vlan 12 tagged 21

ProVision-1(config) # interface 21 enable

```
ProVision-1(config) # show interface 21
Status and Counters - Port Counters for port 21
Name :
MAC Address : e4115b-cccc53
Link Status : Up
<-output omitted->
```

**ProVision-2** 

ProVision-2(config) # vlan 11 tagged 19 ProVision-2(config) # vlan 12 tagged 19 ProVision-2(config) # interface 19 enable

```
ProVision-2(config) # show interface 19
Status and Counters - Port Counters for port 19
Name :
MAC Address : e4115b-ccd215
Link Status :Up
<-output omitted->
```

[Comware-1] display lldp neighbor-information list

System Name	Local Interface	Chassis ID	Port ID
Comware-2	GE1/0/19	d07e-28ce-d31e	GigabitEthernet1/0/19
ProVision-1	GE1/0/21	d4c9-ef85-1680	19
ProVision-2	GE1/0/23	d4c9-ef84-fe80	19



[Comware-2] display lldp neighbor-information list

System Name Local Interface Chassis ID Port ID

Comware-1 GE1/0/19 d07e-28ce-c94f GigabitEthernet1/0/19

ProVision-1 GE1/0/21 d4c9-ef85-1680 21

ProVision-2 GE1/0/23

d4c9-ef84-fe80 21



### Verify the topology



## Verify the topology

#### [Comware-1] display stp brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/19	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE

#### [Comware-2] display stp brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/19	ROOT	FORWARDING	NONE
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE
#### Verify the topology

#### **ProVision-1**

ProVision-1(config) # show spanning-tree 1,19,21 instance ist <-output omitted-> Designated Port Type Cost Priority Role State Bridge 1 100/1000T 20000 128 Designated Forwarding d4c9ef-851680 19 100/1000T 20000 128 Root Forwarding d07e28-cec94f 21 100/1000T 20000 128 Alternate Blocking d07e28-ced3le

#### **ProVision-2**

Deed an etcad

ProVision-2(config) # show spanning-tree 1,19,21 instance ist
<-output omitted->

						Designated
Port	Туре	Cost	Priority	Role	State	Bridge
1	100/1000T	20000	128	Designated	Forwarding	d4c9ef-84fe80
19	100/1000T	20000	128	Root	Forwarding	d07e28-cec94f
21	100/1000T	20000	128	Alternate	Blocking	d07e28-ced31e

## Verify the topology





#### priority value to 0

A lower priority value gives a higher priority for being elected root

is actually difficult to predict which switch becomes root in this case



They actually use their bridge ID for the election.

#### **The bridge ID is:** | • Priority + system ID (MAC address)

Priority value	Step	Comware root command	<b>Priority value</b>	Step
0	0	root primary	32768	8
4096	1	root secondary	36864	9
8092	2		40960	10
12288	3		45056	11
16384	4		49152	12
20480	5		53248	13
24576	6		57344	14
28672	7		61440	15

is more signific	cant	
have the sa	ame priority	with the lowest MAC
addre	SS	

#### root and the desired backup (or secondary) root Bridge ID = Priority + system ID (MAC address) Root bridge = Lowest bridge ID Comware-1 Comware-2 stp rootprimary stp root secondary Default priority = priority 0 = priority 4096 32768 (4096 \*8) (4096 \* 1)Default Default priority priority 32768 32768 (4096 \* 8)(4096 \* 8)**ProVision-1** ProVision-2 Guideline: Set a lower priority to make a switch win the election Guideline: Always set a primary root (priority 0) and a secondary root (priority 1) for backup

Sometimes links have different bandwidth, so the ports have different costs. Sometimes switches are using different ways to set the port cost.

#### switches are using different path cost standards

- Path cost on a port = Cost advertised by upstream BPDU + Port cost
- Root path cost = Path cost through root port (lowest cost path)
- Port cost:
  - Determined based on bandwidth and path cost standard (default)
  - Can be adjusted manually



Guideline: Set a consistent path cost standard (802.1t standard) on every switch

The cost for reaching the root on any port is:

#### • The cost advertised in the BPDU + The port cost

#### **DEFAULT PORT COSTS**

Connection Type RSTP/MSTP		STP (802.1D Comware proprietary pre-2004) (default setting)		5	
10 Gbps	2000		2		
1 Gbps	20,000	4	20		
100 Mbps	200,000	10	200		
10 Mbps	2,000,000	100	2000		





ProVision-1's cost for reaching the root on its root port

#### 0 + 20,000 = 20,000



**ProVision-1's alternate port** 

Therefore, the path cost to the root is: 20 + 20,000 = 20,020.



# As a best practice, you should set consistent costs on all switches stp pathcost dot1t.





Therefore, the direct GbE link to Comware-1 actually becomes the alternate port, and the 10GbE link to Comware-2 becomes the root port

#### Failing over from a root to an alternate port



#### Failing over from a root to an alternate port





# complicatedmorecomplicatedmust transition one of itsdesignated ports to a root port.

Several events occur when Comware-2 detects that it has lost its root port:

that

**Comware-2 is now the root.** It has lost contact with the root, and it believes that it has the best priority





that Comware-1 has a better path to the root

The ProVision port asserts itself as now offering a better connection to the root.





then let their designated ports transition to forwarding



<Comware-2>display stp brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/19	ROOT	FORWARDING	NONE
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE

<Comware-2>

#Apr 27 04:13:59:596 2000 Comware-2 MSTP/1/PDISC: hwPortMstiStateDiscarding: Instance 0's Port 0.9437204 has been set to discarding state!

%Apr 27 04:13:59:767 2000 Comware-2 MSTP/6/MSTP\_DISCARDING: Instance 0's GigabitEthernet1/0/21 has been set to discarding state.

%Apr 27 04:13:59:927 2000 Comware-2 MSTP/6/MSTP\_NOTIFIED\_TC: Instance 0's GigabitEthernet1/0/23 was notified a topology change.

%Apr 27 04:14:00:088 2000 Comware-2 IFNET/3/LINK\_UPDOWN: GigabitEthernet 1/0/19 link status is DOWN.

%Apr 27 04:14:01:160 2000 Comware-2 MSTP/6/MSTP\_NOTIFIED\_TC: Instance 0's GigabitEthernet1/0/23 was notified a topology change.

<Comware-2>display stp brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/21	ROOT	DISCARDING	NONE
0	GigabitEthernet1/0/23	ALTE	FORWARDING	NONE

















#### **Spanning tree edge ports**

two ports that connect to

#### endpoints

#### they can never introduce loops

The edge ports have the designated role, and they are allowed to transition to forwarding immediately.

Connect to endpoints (one connection, no possibility of a loop)

Windows

- Transition directly to forwarding and stay forwarding during convergence
- Do not cause topology updates
- ProVision—Automatically detected by default
- Comware—Must be set manually



#### Spanning tree edge ports

If the port does not receive a BPDU within 3 seconds, the switch defines the port as an edge port.

**ProVision(config)# [no] spanning-tree <int-id-list> auto-edge-port** 

**ProVision(config)# [no] spanning-tree <int-id-list> admin-edge-port** 

#### **Spanning tree edge ports**



#### **Issues with RSTP**

Bandwidth is under-utilized ٠ Topology is not necessarily Root bridge Comware-2 Comware-1 optimized for all traffic - Example: Comware-2 is the default router for some VLANs But traffic must still pass through Comware-1 ProVision-1 ProVision-2 Windows Windows 7 PC 2008 Server





## **Spanning Tree**


## **MSTP** solution

MSTP allows switches to set up multiple spanning trees, called spanning tree instances

Different spanning tree instances can have different root bridges

## **MSTP** solution

- Multiple spanning tree instances
- A different root and topology for each instance (set of VLANs)
- · Load-sharing on redundant links (VLAN-based)



## **MSTP** solution

(	

Instance	VLANs	Root	Secondary root Comware-2	
0	1 (and all unused)	Comware-1		
1	11	Comware-1	Comware-2	
2	12	Comware-2	Comware-1	

## **MSTP** region



- Switches in an MSTP region must match region settings exactly
- Ports inside a region can use all instances

Parameter	Setting for example network
Name	hp
Revision number	1
Instance-to- VLAN mapping	0 = VLAN 1 and all unused VLANs 1 = VLAN 11 2 = VLAN 12



## **Example configuration: MSTP**





[Comware-1] stp region-configuration

[Comware-1-mst-region] region-name hp [Comware-1-mst-region] revision-level 1 [Comware-1-mst-region] instance 1 vlan 11 [Comware-1-mst-region] instance 2 vlan 12

[Comware-1-mst-region] instance 0 vlan 1

[Comware-1-m	st-region] check region-configuration
Admin config	iration
Format se	lector :0
Region na	ne :hp
Revision	level :1
Configuration	digest :0xbe0284d20f4d46a8da89c5d9b3b4f78a
Instance	Vlans Mapped
0	1 to 10, 13 to 4094
1	11
2	12

[Comware-1-mst-region] active region-configuration [Comware-1-mst-region] quit

[Comware-2] stp region-configuration [Comware-2-mst-region] region-name hp [Comware-2-mst-region] revision-level 1 [Comware-2-mst-region] instance 1 vlan 11 [Comware-2-mst-region] instance 2 vlan 12

```
[Comware-2-mst-region] check region-configuration
Admin configuration
Format selector :0
Region name :hp
Revision level :1
Configuration digest :0xbe0284d20f4d46a8da89c5d9b3b4f78a
Instance Vlans Mapped
0 1 to 10, 13 to 4094
1 11
2 12
```

```
[Comware-2-mst-region] active region-configuration
[Comware-2-mst-region] quit
```

![](_page_81_Picture_1.jpeg)

ProVision-1(config) # spanning-tree config-name hp ProVision-1(config) # spanning-tree config-revision 1 ProVision-1(config) # spanning-tree instance 1 vlan 11 ProVision-1(config) # spanning-tree instance 2 vlan 12

![](_page_83_Figure_1.jpeg)

ProVision-2(config) # spanning-tree config-name hp
ProVision-2(config) # spanning-tree config-revision 1
ProVision-2(config) # spanning-tree instance 1 vlan 11
ProVision-2(config) # spanning-tree instance 2 vlan 12

```
ProVision-2(config) # show spanning-tree mst-config

MST Configuration Identifier Information

MST Configuration Name : <u>hp</u>

MST Configuration Revision : <u>1</u>

MST Configuration Digest : <u>0xBE0284D20F4D46A8DA89C5D9B3B4F78A</u>

IST Mapped VLANs : <u>1-10,13-4094</u>

Instance ID Mapped VLANs

<u>1 11</u>

2 12
```

# **Configure the instance root settings and set standard costs for Comware switches**

Instance	VLANs	Root	Secondary root	
0	1 (and all unused)	Comware-1	Comware-2	
1	11	Comware-1	Comware-2	
2	12	Comware-2	Comware-1	

#### **Configure root settings and cost on Comware-1**

[Comware-1] stp instance 0 root primary [Comware-1] stp instance 1 root primary [Comware-1] stp instance 2 root secondary

```
[Comware-1] stp pathcost dotlt
Cost configuration of every port will be reset and auto-calculation is available after
changing current pathcost standard. Continue?[Y/N]:y
```

#### **Configure root settings and cost on Comware-2**

[Comware-2] stp instance 0 root secondary [Comware-2] stp instance 1 root secondary [Comware-2] stp instance 2 root primary

```
[Comware-2] stp pathcost dot1t
Cost configuration of every port will be reset and auto-calculation is available after
changing current pathcost standard. Continue?[Y/N]:y
```

Comware-1 in instance 0 and 1
Comware-2 in instance 2

[Comware-1] display stp root MSTID Root Bridge ID ExtPathCost IntPathCost Root Port 0 0.d07e-28ce-c94f 0 0 1 0.d07e-28ce-c94f 0 0 2 0.d07e-28ce-d31e 0 20000 GigabitEthernet1/0/19

#### [Comware-2] display stp root MSTID Root Bridge ID ExtPathCost IntPathCost Root Port

- 0 0.d07e-28ce-c94f 0 20000 GigabitEthernet1/0/19
- 1 0.d07e-28ce-c94f 0 20000 GigabitEthernet1/0/19
- 2 0.d07e-28ce-d31e 0 0

#### for each instance separately.

```
ProVision-1(config) # show spanning-tree root-history ist
Status and Counters - IST Regional Root Changes History
MST Instance ID : 0
Root Changes Counter : 2
Current Root Bridge ID : 0:d07e28-cec94f
<-output omitted->
```

```
ProVision-1(config)# show spanning-tree root-history msti 1
Status and Counters - MST Instance Regional Root Changes History
MST Instance ID : 1
Root Changes Counter : 3
Current Root Bridge ID : 0:d07e28-cec94f
<-output omitted->
```

```
ProVision-1(config) # show spanning-tree root-history msti 2
Status and Counters - MST Instance Regional Root Changes History
MST Instance ID : 2
Root Changes Counter : 4
Current Root Bridge ID : 0:d07e28-ced31e
<-output omitted->
```

ProVision-2(config) # show spanning-tree root-history ist
Status and Counters - IST Regional Root Changes History
MST Instance ID : 0
Root Changes Counter : 2
Current Root Bridge ID : 0:d07e28-cec94f
<-output omitted->

```
ProVision-2(config)# show spanning-tree root-history msti 1
Status and Counters - MST Instance Regional Root Changes History
MST Instance ID : 1
Root Changes Counter : 3
Current Root Bridge ID : 0:d07e28-cec94f
<-output omitted->
```

```
ProVision-2(config)# show spanning-tree root-history msti 2
Status and Counters - MST Instance Regional Root Changes History
MST Instance ID : 2
Root Changes Counter : 4
Current Root Bridge ID : 0:d07e28-ced31e
<-output omitted->
```

#### Map the topology. Instance 0 topology

[Comware-1] display stp instance 0 brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/19	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE

[Comware-2] display stp instance 0 brief

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet1/0/19	ROOT	FORWARDING	NONE
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE

#### Map the topology. Instance 0 topology

ProVision-1(config) # show spanning-tree 1,19,21 instance ist
<-output omitted->

						Designated
Port	Туре	Cost	Priority	Role	State	Bridge
1	100/1000T	Auto	128	Designated	Forwarding	d07e28-cec94f
19	100/1000T	20000	128	Root	Forwarding	d07e28-cec94f
21	100/1000T	20000	128	Alternate	Blocking	d07e28-cec94f

ProVision-2(config) # show spanning-tree 1,19,21 instance ist <-output omitted->

Designated

Port	Type	Cost	Priority	Role	State	Bridge
1	100/1000T	Auto	128	Designated	Forwarding	d07e28-cec94f
19	100/1000T	20000	128	Root	Forwarding	d07e28-cec94f
21	100/1000T	20000	128	Alternate	Blocking	d07e28-cec94f

## Map the topology. Instance 0 topology

![](_page_96_Figure_1.jpeg)

## Map the topology. Instance 1 topology

[Commence 1] disclose star instance 1 baise

[Comware-1] display stp instance 1 brief						
MSTID	Port	Role	STP State	Protection		
0	GigabitEthernet1/0/19	DESI	FORWARDING	NONE		
0	GigabitEthernet1/0/21	DESI	FORWARDING	NONE		
0	GigabitEthernet1/0/23	DESI	FORWARDING	NONE		

[Comwa:	re-2] display stp insta	nce 1	brief	
MSTID	Port	Role	STP State	Protection
1	GigabitEthernet1/0/19	ROOT	FORWARDING	NONE
1	GigabitEthernet1/0/21	DESI	FORWARDING	NONE
1	GigabitEthernet1/0/23	DESI	FORWARDING	NONE

#### Map the topology. Instance 1 topology

ProVision-1(config)# show spanning-tree 1,19,21 instance 1 <-output omitted->

DesignatedPort TypeCostPriority RoleStateBridge1100/1000T 20000128Designated Forwardingd4c9ef-85168019100/1000T 20000128RootForwardingd07e28-cec94f21100/1000T 20000128AlternateBlockingd07e28-ced3leProVision-2 (config) # show spanning-tree 1, 19, 21 instance 1<-output omitted->

						Designated
Port	Type	Cost	Priority	Role	State	Bridge
1	100/1000T	20000	128	Designated	Forwarding	d4c9ef-84fe80
19	100/1000T	20000	128	Root	Forwarding	d07e28-cec94f
21	100/1000T	20000	128	Alternate	Blocking	d07e28-ced31e

## Map the topology. Instance 1 topology

![](_page_99_Figure_1.jpeg)

## Map the topology. Instance 2 topology

[Comware-1] displ	lay stp ins	stance 2 brief
-------------------	-------------	----------------

MSTID	Port	Role	STP State	Protection			
2	GigabitEthernet1/0/19	ROOT	FORWARDING	NONE			
2	GigabitEthernet1/0/21	DESI	FORWARDING	NONE			
2	GigabitEthernet1/0/23	DESI	FORWARDING	NONE			
[Comware-2] display stp instance 2 brief							
MSTID	Port	Role	STP State	Protection			
2	GigabitEthernet1/0/19	DESI	FORWARDING	NONE			
2	GigabitEthernet1/0/21	DESI	FORWARDING	NONE			
2	GigabitEthernet1/0/23	DESI	FORWARDING	NONE			

#### Map the topology. Instance 2 topology

ProVision-1(config) # show spanning-tree 1,19,21 instance 2
<-output omitted->

Designated Port Type Cost Priority Role State Bridge 1 100/1000T 20000 128 Designated Forwarding d4c9ef-851680 19 100/1000T 20000 128 Alternate Blocking d07e28-cec94f 21 100/1000T 20000 128 Root Forwarding d07e28-ced31e ProVision-2(config) # show spanning-tree 1,19,21 instance 2 <-output omitted-> Designated Port Type Cost Priority Role State Bridge \_\_\_\_\_ \_\_ \_\_\_ 1 100/1000T 20000 128 Designated Forwarding d4c9ef-84fe80 19 100/1000T 20000 128 Alternate Blocking d07e28-cec94f 21 100/1000T 20000 128 Root Forwarding d07e28-ced31e

## Map the topology. Instance 2 topology

![](_page_102_Figure_1.jpeg)

**Consider what happens if you add a VLAN to a switch that is running MSTP.** 

#### [Comware-1] vlan 13 [Comware-1-vlan13] quit

[Comware-2] vlan 13 [Comware-2-vlan13] quit

ProVision-1# show spanning-tree

[Comware-1] stp region-configuration [Comware-1-mst-region] instance 1 vlan 13

[Comware-2] stp region-configuration [Comware-2-mst-region] instance 1 vlan 13

[Comware-1-mst-region] active region-configuration [Comware-2-mst-region] active region-configuration

Although you have not made any changes to the ProVision switches, you will see that this configuration has actually affected them.

ProVision-1(config) # show spanning-tree 19,21 instance ist

```
<-output omitted->
```

 Port Type
 Cost
 Priority Role
 State
 Bridge

 --- --- --- --- --- --- 

 19
 100/1000T
 20000
 128
 Root
 Forwarding
 d07e28-cec94f

 21
 100/1000T
 20000
 128
 Alternate
 Blocking
 d07e28-cec94f

ProVision-1(config) # show spanning-tree 19,21 instance 1 <-output omitted->

Port Type Cost Priority Role State Bridge 19 100/1000T 20000 128 Master Forwarding d4c9ef-851680 21 100/1000T 20000 128 Alternate Blocking d4c9ef-851680 ProVision-1(config)# show spanning-tree 19,21 instance 2 <-output omitted->

Designated

Port	Type	Cost	Priority	Role	State	Bridge
19	100/1000T	20000	128	Master	Forwarding	d4c9ef-851680
21	100/1000T	20000	128	Alternate	Blocking	d4c9ef-851680

Master Port is another name for a region's root port in the CIST; this is the port that offers the MSTP region its link to the rest of the CST.
<u></u>		

ProVision-1# show spanning-tree mst-config MST Configuration Identifier Information MST Configuration Name : hp MST Configuration Revision : 1 MST Configuration Digest : 0xBE0284D20F4D46A8DA89C5D9B3B4F78A IST Mapped VLANs : 1-10,13-4094 Instance ID Mapped VLANs 1 11 2 12

[Comware-1-mst-region] display stp region-configuration Oper configuration Format selector :0 Region name :hp Revision level :1 Configuration digest :0xf843355b493955bcd42bee4c4e2ffb00 Instance Vlans Mapped 1 to 10, 14 to 4094 0 11, 13 1 2 12 [Comware-2-mst-region] display stp region-configuration Oper configuration Format selector :0 Region name :hp Revision level :1 Configuration digest :0xf843355b493955bcd42bee4c4e2ffb00 Instance Vlans Mapped 0 1 to 10, 14 to 4094 11, 13 1 2 12

as if it was running RSTP

12. Why are ProVision-1's MST region settings now different from the Comware switches' settings?

when switches are in different regions, they interact using RSTP, and the boundary ports between regions are part of a CIST (Common and Internal Spanning Tree)



Therefore, adding a VLAN and moving that VLAN from instance 0 to another instance in an active network can cause disruptions and nonoptimal link utilization.

**Note!** Plan in advance and place all VLANs that might be used in the future in the desired instance on all switches.

# Спасибо за внимание!