



STP Bridge Assurance

« Multiple Spanning Tree (MST) Traffic Engineering | STP Edge Ports »

Last updated: January 18, 2017

STP Bridge Assurance



Note:

Configure the tasks "VLANs & Trunking" and "Port Channels" prior to beginning this lab.

Objective

- Configure STP Bridge Assurance and verify its VLAN pruning behavior.

Task

- Per the previous task the network should be configured as follows:
 - The first server's link to the first 5K is in VLAN 10 with address 10.0.0.1X/24, where X is the server number.
 - The first server's link to the second 5K is in VLAN 20 with address 20.0.0.1X/24, where X is the server number.
 - The second server's link to the first 5K is in VLAN 20 with address 20.0.0.1X/24, where X is the server number.
 - The second server's link to the second 5K is in VLAN 10 with address 10.0.0.1X/24, where X is the server number.
 - 5Ks and 7Ks have SVIs for VLANs 10 & 20 with IP addressing 10.0.0.X/24 and 20.0.0.X/24 respectively, where X is the device number.
 - 5Ks have access ports to the servers and trunk ports to the 7Ks, and the 7Ks have trunks to the 5Ks.
 - Port-Channel5 is configured between the 5Ks, Port-Channel7 is configured between the 7Ks, and both are trunks.
- Create VLANs 10, 20, 30, & 40 on your first 5K and 7K.
- Create VLANs 10, 20, 50, & 60 on your second 5K and 7K.
- Modify all trunk links to use STP Bridge Assurance.
- Verify that you have IP reachability between the servers in both VLANs 10 & 20.
- Verify STP Bridge Assurance as follows:
 - Your first 5K & 7K should be forwarding VLANs 10, 20, 30, & 40 to each other, but only 10 & 20 to the other two switches.
 - Your second 5K & 7K should be forwarding VLANs 10, 20, 50, & 60 to each other, but only 10 & 20 to the other two switches.

Configuration [Click to collapse](#)

```
N5K1:
vlan 10,20,30,40
!
interface Ethernet1/1
 switchport
 switchport mode access
 switchport access vlan 10
 no shutdown
!
interface Ethernet1/2
 switchport
 switchport mode access
 switchport access vlan 20
 no shutdown
!
interface Ethernet1/3 - 4
 switchport
 switchport mode trunk
 spanning-tree port type network
 channel-group 5
 no shutdown
!
interface port-channel5
 switchport mode trunk
 spanning-tree port type network
 speed 10000
!
interface Ethernet1/5 - 6
 switchport
 switchport mode trunk
 spanning-tree port type network
 no shutdown
```

```
N5K2:
vlan 10,20,50,60
!
interface Ethernet1/1
 switchport
 switchport mode access
 switchport access vlan 20
 no shutdown
!
interface Ethernet1/2
 switchport
 switchport mode access
 switchport access vlan 10
 no shutdown
!
interface Ethernet1/3 - 4
 switchport
 switchport mode trunk
 spanning-tree port type network
 channel-group 5
 no shutdown
!
interface port-channel5
```

```

switchport mode trunk
spanning-tree port type network
speed 10000
!
interface Ethernet1/5
switchport
switchport mode trunk
spanning-tree port type network
no shutdown
!
interface Ethernet1/6
switchport
switchport mode trunk
spanning-tree port type network
no shutdown

```

N7K1:

```

feature lacp
!
vlan 10,20,30,40
!
interface Ethernet1/1 - 2
lacp rate fast
switchport
switchport mode trunk
spanning-tree port type network
channel-group 7 mode active
no shutdown
!
interface port-channel7
switchport
switchport mode trunk
spanning-tree port type network
lacp min-links 2
!
interface Ethernet1/3
switchport
switchport mode trunk
spanning-tree port type network
no shutdown
!
interface Ethernet1/4
switchport
switchport mode trunk
spanning-tree port type network
no shutdown

```

N7K2:

```

feature lacp
!
vlan 10,20,50,60
!
interface Ethernet1/1 - 2
lacp rate fast
switchport
switchport mode trunk
spanning-tree port type network
channel-group 7 mode active
no shutdown
!
interface port-channel7
switchport
switchport mode trunk
spanning-tree port type network
lacp min-links 2
!
interface Ethernet1/3 - 4
switchport
switchport mode trunk
spanning-tree port type network
no shutdown

```

Verification

Spanning-tree Bridge Assurance is an STP enhancement to help prevent against unidirectional links, and to also automatically prune unneeded VLANs from trunk links. Like STP Loopguard or UDLD, STP Bridge Assurance uses a keepalive, the STP BPDU in this case, to make sure that both ends of the link can both send and receive packets. Unlike UDLD though, this keepalive is on a per-VLAN basis. The advantage of using this feature is that it not only prevents against unidirectional links, but has a behavior similar to VTP pruning, which means that you do not need to manually edit the trunking allowed list to remove unneeded VLANs off trunks. Bridge Assurance is configured by setting the `spanning-tree port type network` at the link level.

In the below output we see the effect of Bridge Assurance when a new trunk link comes up. Only VLANs in common with the other side will be forwarded. In this case VLANs 30 and 40 are pruned from N5K1 towards N7K2, since N7K2 does not have them configured.

```

N5K1# config t
Enter configuration commands, one per line. End with CNTL/Z.
N5K1(config)# int e1/6
N5K1(config-if)# shut
N5K1(config-if)#
2017 Jan 18 06:45:46 N5K1 %ETHPORT-5-IF_DOWN_CFG_CHANGE: Interface Ethernet1/6 is down(Config change)
2017 Jan 18 06:45:46 N5K1 %ETHPORT-5-IF_DOWN_CFG_CHANGE: Interface Ethernet1/6 is down(Config change)
2017 Jan 18 06:45:46 N5K1 %ETHPORT-5-IF_DOWN_ADMIN_DOWN: Interface Ethernet1/6 is down (Administratively down)

N5K1(config-if)# no shut
2017 Jan 18 06:45:59 N5K1 %ETHPORT-5-IF_ADMIN_UP: Interface Ethernet1/6 is admin up .
2017 Jan 18 06:45:59 N5K1 %VSHD-5-VSHD_SYSLOG_CONFIG_I: Configured from vty by cisco on 192.168.0.1@pts/0
2017 Jan 18 06:46:02 N5K1 %ETHPORT-5-SPEED: Interface Ethernet1/6, operational speed changed to 10 Gbps
2017 Jan 18 06:46:02 N5K1 %ETHPORT-5-IF_DUPLEX: Interface Ethernet1/6, operational duplex mode changed to Full
2017 Jan 18 06:46:02 N5K1 %ETHPORT-5-IF_RX_FLOW_CONTROL: Interface Ethernet1/6, operational Receive Flow Control state changed to off
2017 Jan 18 06:46:02 N5K1 %ETHPORT-5-IF_TX_FLOW_CONTROL: Interface Ethernet1/6, operational Transmit Flow Control state changed to off
2017 Jan 18 06:46:02 N5K1 %ETHPORT-5-IF_UP: Interface Ethernet1/6 is up in mode trunk

```

After the VLAN is configured on the other side of a trunk link, BA unblocks it.

```

N7K2# config t
Enter configuration commands, one per line. End with CNTL/Z.
N7K2(config)# vlan 30
N7K2(config-vlan)# end
N7K2#

N5K1# 2017 Jan 18 06:54:39 N5K1 %STP-2-BRIDGE_ASSURANCE_UNBLOCK: Bridge Assurance unblocking port Eth1/6 VLAN: 30.

```

This automatic pruning behavior can also be verified by checking the VLANs forwarding on the trunk links through the show interface trunk command, as shown below.

```

N5K1# show interface trunk
-----
Port          Native  Status      Port
              Vlan                Channel
-----
Eth1/3        1       trnk-bndl   Po5
Eth1/4        1       trnk-bndl   Po5
Eth1/5        1       trunking    --
Eth1/6        1       trunking    --
Po5           1       trunking    --

-----
Port          Vlans Allowed on Trunk
-----
Eth1/3        1-4094
Eth1/4        1-4094
Eth1/5        1-4094
Eth1/6        1-4094
Po5           1-4094

-----
Port          Vlans Err-disabled on Trunk
-----
Eth1/3        none
Eth1/4        none
Eth1/5        none
Eth1/6        none
Po5           none

-----
Port          STP Forwarding
-----
Eth1/3        20
Eth1/4        20
Eth1/5        10,20,30,40
Eth1/6        1,20
Po5           20

-----
Port          Vlans in spanning tree forwarding state and not pruned
-----
Eth1/3        20
Eth1/4        20
Eth1/5        10,20,30,40
Eth1/6        1,20
Po5           20

```

```

N7K2# show interface trunk
-----
Port          Native  Status      Port
              Vlan                Channel
-----
Eth1/1        1       trnk-bndl   Po7
Eth1/2        1       trnk-bndl   Po7
Eth1/3        1       trunking    --
Eth1/4        1       trunking    --
Po7           1       trunking    --

-----
Port          Vlans Allowed on Trunk
-----
Eth1/1        1-4094
Eth1/2        1-4094
Eth1/3        1-4094
Eth1/4        1-4094
Po7           1-4094

-----
Port          Vlans Err-disabled on Trunk
-----
Eth1/1        none
Eth1/2        none
Eth1/3        none
Eth1/4        none
Po7           none

-----
Port          STP Forwarding
-----

```

```

-----
Port          STP Forwarding
-----
Eth1/1        1,10,20
Eth1/2        1,10,20
Eth1/3        1,10,20
Eth1/4        1,10,50,60
Po7           1,10,20

-----
Port          Vlans in spanning tree forwarding state and not pruned
-----
Eth1/1        1,10,20
Eth1/2        1,10,20
Eth1/3        1,10,20
Eth1/4        1,10,50,60
Po7           1,10,20

-----
Port          Vlans Forwarding on FabricPath
-----
Eth1/1        none
Eth1/2        none
Eth1/3        none
Eth1/4        none
Po7           none

```

VLANs that are pruned are marked as *BA_Inc*, or Bridge Assurance Inconsistent, in the `show spanning-tree` output. This essentially means that when the local switch sent a BPDU keepalive for the VLAN out the port, it did not receive a response back in. The end result is that the VLAN is blocked, and hence pruned.

```

N5K1# show spanning-tree vlan 30

VLAN0030
  Spanning tree enabled protocol rstp
  Root ID    Priority    32798
            Address    00de.fb12.1a7c
            This bridge is the root
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32798 (priority 32768 sys-id-ext 30)
            Address    00de.fb12.1a7c
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po5          Desg BKN*1000  128.4100 P2p *BA_Inc
Eth1/5       Desg FWD 2000    128.133  P2p
Eth1/6       Desg BKN*2000  128.134  P2p *BA_Inc

N7K2# show spanning-tree vlan 50

VLAN0050
  Spanning tree enabled protocol rstp
  Root ID    Priority    32818
            Address    0026.980c.2142
            This bridge is the root
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32818 (priority 32768 sys-id-ext 50)
            Address    0026.980c.2142
            Hello Time 2 sec  Max Age 20 sec  Forward Delay 15 sec

Interface    Role Sts Cost      Prio.Nbr Type
-----
Po7          Desg BKN*1000  128.4102 Network P2p *BA_Inc
Eth1/3       Desg BKN*2000  128.131  Network P2p *BA_Inc
Eth1/4       Desg FWD 2000    128.132  Network P2p

N7K2# show spanning-tree interface po7

Vlan        Role Sts Cost      Prio.Nbr Type
-----
VLAN0001    Desg FWD 1000    128.4102 Network P2p
VLAN0010    Root FWD 1000    128.4102 Network P2p
VLAN0020    Desg FWD 1000    128.4102 Network P2p
VLAN0050    Desg BKN*1000  128.4102 Network P2p *BA_Inc
VLAN0060    Desg BKN*1000  128.4102 Network P2p *BA_Inc

```

