

# Utilizing Force10 S6000 Switches in the Dell Red Hat OpenStack Cloud Solution



# Contents

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Trademarks.....	3
Notes, Cautions, and Warnings.....	4
Executive Summary.....	5
Intended Audience.....	5
Adding the S6000 to the Solution.....	6
Splitting Ports.....	7
Example S6000 Configurations.....	9
Switch 1 Configuration.....	9
Switch 2 Configuration.....	21
Getting Help.....	33
Contacting Dell.....	33
References.....	33
To Learn More.....	33

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## Notes, Cautions, and Warnings

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-  A **Note** indicates important information that helps you make better use of your system.
-  A **Caution** indicates potential damage to hardware or loss of data if instructions are not followed.
-  A **Warning** indicates a potential for property damage, personal injury, or death.

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## Executive Summary

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The *Dell Red Hat OpenStack Cloud Solution Reference Architecture* is prescriptive in its hardware, software, networking, and installation definitions. This ensures a consistent experience when you create your OpenStack environment.

The Reference Architecture uses Dell Force10™ S4810 switches. However, when the solution is expanded, or initially built beyond ten (10) systems, it can benefit from using Dell's newest aggregation and Top-of-Rack (TOR) switches - the Dell Force10 S6000 switches. The S6000 provides the following benefits:

- Leverages a non-blocking switching architecture
- Delivers line-rate L2 and L3 forwarding capacity
- Provides up to 96 ports of 10Gbe, and eight (8) additional ports of 40Gbe

This white paper presents configurations required to utilize S6000s as TOR switches in the Dell Red Hat OpenStack Cloud Solution.

## Intended Audience

This white paper is written for OpenStack administrators or deployment engineers who are responsible for installation and ongoing operation of OpenStack clusters.

## Adding the S6000 to the Solution

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When there is a desire to expand beyond ten (10) systems in multiple racks, adding a pair of Dell™ Force10™ S6000s becomes an effective alternative to S4810s. Doing so allows:

- Up to forty (40) servers with four (4) 10 Gb NICs each
- Multiple 40Gb uplinks between the switches, and up to the core

Utilizing the S6000 provides the solution simpler management capabilities and better utilization of the network infrastructure for multiple-rack solutions.

To add to the solution:

1. Replace up to four S4810 with two S6000s.
2. Mount the two switches in separate racks, so that they draw power from different Power Distribution Units (PDUs).
3. Using the 40G to 10G splitter cables, wire the servers so that each of the two 10Gb ports is connected to a port on a separate switch (e.g., no single NIC has both ports connected to the same switch).

*Figure 1: S6000 Switches with Controllers in Two Racks* on page 7 represents S6000 switches added to two racks, with Controller nodes split across the racks.

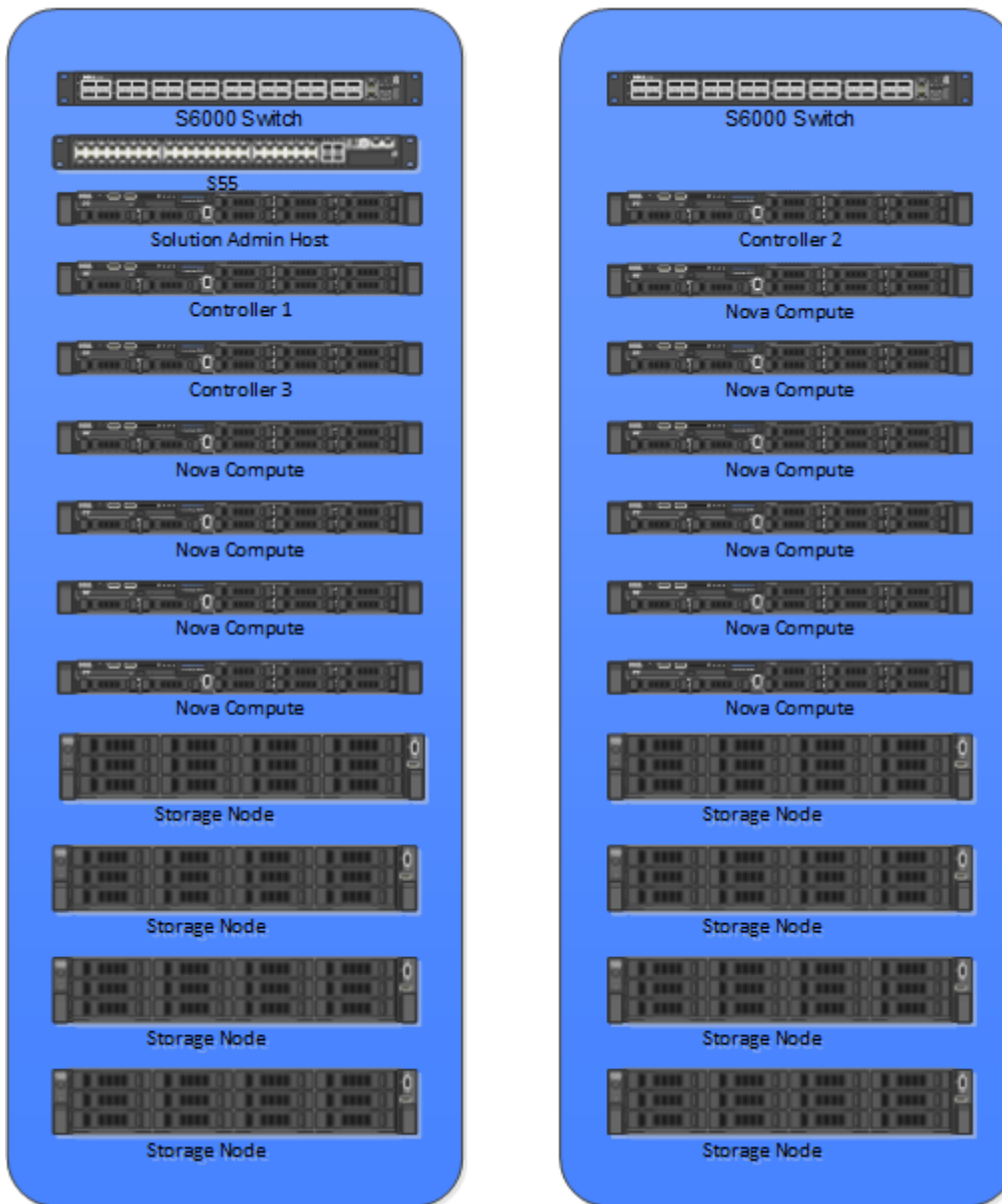


Figure 1: S6000 Switches with Controllers in Two Racks

## Splitting Ports

There are several considerations you must take into account when splitting ports on Dell™ Force10™ S6000 switches:

- Splitting a single 40G port into four 10G ports is supported only on a standalone unit.
- Split ports cannot be used as stack-link to stack an S6000.
- Split ports cannot be a part of any stacked system.
- Some of the ports on an S6000 are fixed 40G ports. Therefore, splitting those ports is not allowed.
  - Fixed ports include ports 4, 12, 20, 28, 100, 108, 116, and 124.
- Reload is mandatory when:
  - QSFP ports are converted into 4x 10G SFP+ ports using the `portmode quad` CLI command

- Converting quad ports back to a QSFP port

To split a port:

1. Log onto the switch.
2. Execute the following command:

```
stack-unit 0 port 48 portmode quad
```



## Example S6000 Configurations

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The following example configurations enable Dell™ Force10™ S6000 switches to act as TOR switches for the Dell Red Hat OpenStack Cloud Solution:

- [Switch 1 Configuration](#) on page 9
- [Switch 2 Configuration](#) on page 21

### Switch 1 Configuration

```
! Version 9.0(2.0P1)
! Last configuration change at Tue May 12 00:22:43 2015
! Startup-config last updated at Sat May 30 04:19:18 2015
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary system: B:
boot system stack-unit 0 default system: A:
!
redundancy auto-synchronize full
!
hardware watchdog stack-unit 0
hardware watchdog stack-unit 1
hardware watchdog stack-unit 2
hardware watchdog stack-unit 3
hardware watchdog stack-unit 4
hardware watchdog stack-unit 5
!
hostname MHT1R1L_SW02
!

!
protocol spanning-tree rstp
  no disable
!
vlt domain 11
  peer-link port-channel 11
  back-up destination 192.168.253.130
  primary-priority 8192
  unit-id 1
!
stack-unit 0 provision S6000
!
stack-unit 0 port 0 portmode quad
!
stack-unit 0 port 8 portmode quad
!
stack-unit 0 port 16 portmode quad
!
stack-unit 0 port 24 portmode quad
!
stack-unit 0 port 36 portmode quad
!
stack-unit 0 port 44 portmode quad
!
stack-unit 0 port 52 portmode quad
!
stack-unit 0 port 60 portmode quad
```

```
!  
stack-unit 0 port 76 portmode quad  
!  
interface TenGigabitEthernet 0/0  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 20 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/1  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/2  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/3  
  no ip address  
  no shutdown  
!  
interface fortyGigE 0/4  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/8  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 24 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/9  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 25 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/10  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 26 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/11  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 27 mode active  
  no shutdown  
!  
interface fortyGigE 0/12  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/16  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 28 mode active  
  no shutdown
```

```
!  
interface TenGigabitEthernet 0/17  
no ip address  
!  
port-channel-protocol LACP  
port-channel 29 mode active  
no shutdown  
!  
interface TenGigabitEthernet 0/18  
no ip address  
!  
port-channel-protocol LACP  
port-channel 30 mode active  
no shutdown  
!  
interface TenGigabitEthernet 0/19  
no ip address  
!  
port-channel-protocol LACP  
port-channel 31 mode active  
no shutdown  
!  
interface fortyGigE 0/20  
no ip address  
no shutdown  
!  
interface TenGigabitEthernet 0/24  
no ip address  
!  
port-channel-protocol LACP  
port-channel 32 mode active  
no shutdown  
!  
interface TenGigabitEthernet 0/25  
no ip address  
portmode hybrid  
switchport  
spanning-tree rstp edge-port  
no shutdown  
!  
interface TenGigabitEthernet 0/26  
no ip address  
portmode hybrid  
switchport  
spanning-tree rstp edge-port  
no shutdown  
!  
interface TenGigabitEthernet 0/27  
no ip address  
portmode hybrid  
switchport  
spanning-tree rstp edge-port  
no shutdown  
!  
interface fortyGigE 0/28  
no ip address  
no shutdown  
!  
interface fortyGigE 0/32  
no ip address  
no shutdown  
!  
interface TenGigabitEthernet 0/36  
no ip address
```

```

!
port-channel-protocol LACP
port-channel 40 mode active
no shutdown
!
interface TenGigabitEthernet 0/37
no ip address
no shutdown
!
interface TenGigabitEthernet 0/38
no ip address
no shutdown
!
interface TenGigabitEthernet 0/39
no ip address
no shutdown
!
interface fortyGigE 0/40
no ip address
no shutdown
!
interface TenGigabitEthernet 0/44
no ip address
!
port-channel-protocol LACP
port-channel 44 mode active
no shutdown
!
interface TenGigabitEthernet 0/45
no ip address
!
port-channel-protocol LACP
port-channel 45 mode active
no shutdown
!
interface TenGigabitEthernet 0/46
no ip address
!
port-channel-protocol LACP
port-channel 46 mode active
no shutdown
!
interface TenGigabitEthernet 0/47
no ip address
!
port-channel-protocol LACP
port-channel 47 mode active
no shutdown
!
interface fortyGigE 0/48
no ip address
no shutdown
!
interface TenGigabitEthernet 0/52
no ip address
!
port-channel-protocol LACP
port-channel 48 mode active
no shutdown
!
interface TenGigabitEthernet 0/53
no ip address
!
port-channel-protocol LACP

```

```

    port-channel 49 mode active
    no shutdown
    !
interface TenGigabitEthernet 0/54
    no ip address
    !
    port-channel-protocol LACP
    port-channel 50 mode active
    no shutdown
    !
interface TenGigabitEthernet 0/55
    no ip address
    !
    port-channel-protocol LACP
    port-channel 51 mode active
    no shutdown
    !
interface fortyGigE 0/56
    no ip address
    no shutdown
    !
interface TenGigabitEthernet 0/60
    no ip address
    !
    port-channel-protocol LACP
    port-channel 52 mode active
    no shutdown
    !
interface TenGigabitEthernet 0/61
    no ip address
    portmode hybrid
    switchport
    spanning-tree rstp edge-port
    no shutdown
    !
interface TenGigabitEthernet 0/62
    no ip address
    portmode hybrid
    switchport
    spanning-tree rstp edge-port
    no shutdown
    !
interface TenGigabitEthernet 0/63
    no ip address
    portmode hybrid
    switchport
    spanning-tree rstp edge-port
    no shutdown
    !
interface fortyGigE 0/64
    no ip address
    no shutdown
    !
interface fortyGigE 0/68
    no ip address
    no shutdown
    !
interface fortyGigE 0/72
    no ip address
    no shutdown
    !
interface TenGigabitEthernet 0/76
    description "Uplink from s55 Switch P0/50"
    no ip address

```

```
!  
port-channel-protocol LACP  
port-channel 1 mode active  
no shutdown  
!  
interface TenGigabitEthernet 0/77  
no ip address  
shutdown  
!  
interface TenGigabitEthernet 0/78  
no ip address  
shutdown  
!  
interface TenGigabitEthernet 0/79  
no ip address  
shutdown  
!  
interface fortyGigE 0/80  
no ip address  
no shutdown  
!  
interface fortyGigE 0/84  
no ip address  
no shutdown  
!  
interface fortyGigE 0/88  
no ip address  
no shutdown  
!  
interface fortyGigE 0/92  
no ip address  
no shutdown  
!  
interface fortyGigE 0/96  
no ip address  
no shutdown  
!  
interface fortyGigE 0/100  
no ip address  
no shutdown  
!  
interface fortyGigE 0/104  
no ip address  
no shutdown  
!  
interface fortyGigE 0/108  
no ip address  
no shutdown  
!  
interface fortyGigE 0/112  
no ip address  
no shutdown  
!  
interface fortyGigE 0/116  
no ip address  
no shutdown  
!  
interface fortyGigE 0/120  
no ip address  
shutdown  
!  
interface fortyGigE 0/124  
no ip address  
shutdown
```

```

!
interface ManagementEthernet 0/0
 ip address 192.168.253.131/24
 no shutdown
!
interface ManagementEthernet 1/0
 no shutdown
!
interface ManagementEthernet 2/0
 no shutdown
!
interface ManagementEthernet 3/0
 no shutdown
!
interface ManagementEthernet 4/0
 no shutdown
!
interface ManagementEthernet 5/0
 no shutdown
!
interface Port-channel 1
 description "Uplink from s55 Switch"
 no ip address
 switchport
 vlt-peer-lag port-channel 1
 no shutdown
!
interface Port-channel 11
 description "VLT_to_Switch 1"
 no ip address
 channel-member fortyGigE 0/116,124
 no shutdown
!
interface Port-channel 20
 no ip address
 portmode hybrid
 switchport
 no spanning-tree
 spanning-tree rstp edge-port
 vlt-peer-lag port-channel 20
 no shutdown
!
interface Port-channel 21
 no ip address
 portmode hybrid
 switchport
 spanning-tree rstp edge-port
 channel-member TenGigabitEthernet 0/1
 vlt-peer-lag port-channel 21
 no shutdown
!
interface Port-channel 22
 no ip address
 portmode hybrid
 switchport
 spanning-tree rstp edge-port
 channel-member TenGigabitEthernet 0/2
 vlt-peer-lag port-channel 22
 no shutdown
!
interface Port-channel 23
 no ip address
 portmode hybrid
 switchport

```

```
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/3
vlt-peer-lag port-channel 23
no shutdown
!
interface Port-channel 24
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 24
no shutdown
!
interface Port-channel 25
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 25
no shutdown
!
interface Port-channel 26
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 26
no shutdown
!
interface Port-channel 27
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 27
no shutdown
!
interface Port-channel 28
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 28
no shutdown
!
interface Port-channel 29
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 29
no shutdown
!
interface Port-channel 30
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 30
no shutdown
!
interface Port-channel 31
no ip address
portmode hybrid
```



```

switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 31
no shutdown
!
interface Port-channel 32
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 32
no shutdown
!
interface Port-channel 40
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 40
no shutdown
!
interface Port-channel 41
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/37
vlt-peer-lag port-channel 41
no shutdown
!
interface Port-channel 42
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/38
vlt-peer-lag port-channel 42
no shutdown
!
interface Port-channel 43
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/39
vlt-peer-lag port-channel 43
no shutdown
!
interface Port-channel 44
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 44
no shutdown
!
interface Port-channel 45
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 45
no shutdown
!

```

```

interface Port-channel 46
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 46
  no shutdown
!
interface Port-channel 47
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 47
  no shutdown
!
interface Port-channel 48
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 48
  no shutdown
!
interface Port-channel 49
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 49
  no shutdown
!
interface Port-channel 50
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 50
  no shutdown
!
interface Port-channel 51
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 51
  no shutdown
!
interface Port-channel 52
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  vlt-peer-lag port-channel 52
  no shutdown
!
interface Vlan 1
!untagged TenGigabitEthernet 0/25-27,61-63
!untagged Port-channel 11,20-28
!
interface Vlan 110
  description "iDrac Network"
  no ip address
  shutdown

```

```
!  
interface Vlan 120  
  description "Provisioner Network"  
  no ip address  
  tagged Port-channel 1,20  
  shutdown  
!  
interface Vlan 140  
  description "Private API Network"  
  no ip address  
  tagged Port-channel 1,20-28  
  shutdown  
!  
interface Vlan 170  
  description "Storage Network"  
  no ip address  
  tagged Port-channel 1,20-23  
  untagged Port-channel 29-32,44-48  
  no shutdown  
!  
interface Vlan 180  
  description "Storage (Ceph) Network"  
  no ip address  
  tagged Port-channel 21-23  
  untagged Port-channel 49-52  
  shutdown  
!  
interface Vlan 190  
  description "Nova-Network Public"  
  no ip address  
  tagged Port-channel 1,20  
  untagged Port-channel 41-43  
  no shutdown  
!  
interface Vlan 201  
  description "Nova-Network Private"  
  no ip address  
  tagged Port-channel 21-28  
  shutdown  
!  
interface Vlan 202  
  description "Nova-Network Private"  
  no ip address  
  tagged Port-channel 21-28  
  shutdown  
!  
interface Vlan 203  
  description "Nova-Network Private"  
  no ip address  
  tagged Port-channel 21-28  
  shutdown  
!  
interface Vlan 204  
  description "Nova-Network Private"  
  no ip address  
  tagged Port-channel 21-28  
  shutdown  
!  
interface Vlan 205  
  description "Nova-Network Private"  
  no ip address  
  tagged Port-channel 21-28  
  shutdown  
!
```

```

interface Vlan 206
  description "Nova-Network Private"
  no ip address
  tagged Port-channel 21-28
  shutdown
!
interface Vlan 207
  description "Nova-Network Private"
  no ip address
  tagged Port-channel 21-28
  shutdown
!
interface Vlan 208
  description "Nova-Network Private"
  no ip address
  tagged Port-channel 21-28
  shutdown
!
interface Vlan 209
  description "Nova-Network Private"
  no ip address
  tagged Port-channel 21-28
  shutdown
!
interface Vlan 210
  description "Nova-Network Private"
  no ip address
  tagged Port-channel 21-28
  shutdown
!
interface Vlan 2251
  description "Public Network"
  no ip address
  tagged Port-channel 1
  untagged Port-channel 40
  shutdown
!
snmp-server community password ro
no ip telnet server enable
!
arp learn-enable
!
ip ssh server enable
!
protocol lldp
  advertise dot1-tlv port-protocol-vlan-id
  advertise dot3-tlv max-frame-size
  advertise management-tlv system-description system-name
  advertise med
!
line console 0
line vty 0
line vty 1
line vty 2
line vty 3
line vty 4
line vty 5
line vty 6
line vty 7
line vty 8
line vty 9
!
end
! Version 9.0(2.0P1)

```

```
! Last configuration change at Tue May 12 00:22:43 2015
```

## Switch 2 Configuration

```
! Version 9.0(2.0P1)
! Last configuration change at Tue May 12 00:22:43 2015
! Startup-config last updated at Sat May 30 04:19:18 2015
!
boot system stack-unit 0 primary system: A:
boot system stack-unit 0 secondary system: B:
boot system stack-unit 0 default system: A:
!
redundancy auto-synchronize full
!
hardware watchdog stack-unit 0
hardware watchdog stack-unit 1
hardware watchdog stack-unit 2
hardware watchdog stack-unit 3
hardware watchdog stack-unit 4
hardware watchdog stack-unit 5
!
hostname MHT1R1L_SW02
!
!
protocol spanning-tree rstp
  no disable
!
vlt domain 11
  peer-link port-channel 11
  back-up destination 192.168.253.130
  primary-priority 8192
  unit-id 1
!
stack-unit 0 provision S6000
!
stack-unit 0 port 0 portmode quad
!
stack-unit 0 port 8 portmode quad
!
stack-unit 0 port 16 portmode quad
!
stack-unit 0 port 24 portmode quad
!
stack-unit 0 port 36 portmode quad
!
stack-unit 0 port 44 portmode quad
!
stack-unit 0 port 52 portmode quad
!
stack-unit 0 port 60 portmode quad
!
stack-unit 0 port 76 portmode quad
!
interface TenGigabitEthernet 0/0
  no ip address
!
  port-channel-protocol LACP
  port-channel 20 mode active
  no shutdown
```

```
!  
interface TenGigabitEthernet 0/1  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/2  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/3  
  no ip address  
  no shutdown  
!  
interface fortyGigE 0/4  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/8  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 24 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/9  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 25 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/10  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 26 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/11  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 27 mode active  
  no shutdown  
!  
interface fortyGigE 0/12  
  no ip address  
  no shutdown  
!  
interface TenGigabitEthernet 0/16  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 28 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/17  
  no ip address  
!  
  port-channel-protocol LACP  
  port-channel 29 mode active  
  no shutdown  
!  
interface TenGigabitEthernet 0/18
```

```

no ip address
!
port-channel-protocol LACP
  port-channel 30 mode active
no shutdown
!
interface TenGigabitEthernet 0/19
no ip address
!
port-channel-protocol LACP
  port-channel 31 mode active
no shutdown
!
interface fortyGigE 0/20
no ip address
no shutdown
!
interface TenGigabitEthernet 0/24
no ip address
!
port-channel-protocol LACP
  port-channel 32 mode active
no shutdown
!
interface TenGigabitEthernet 0/25
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
no shutdown
!
interface TenGigabitEthernet 0/26
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
no shutdown
!
interface TenGigabitEthernet 0/27
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
no shutdown
!
interface fortyGigE 0/28
no ip address
no shutdown
!
interface fortyGigE 0/32
no ip address
no shutdown
!
interface TenGigabitEthernet 0/36
no ip address
!
port-channel-protocol LACP
  port-channel 40 mode active
no shutdown
!
interface TenGigabitEthernet 0/37
no ip address
no shutdown
!

```

```
interface TenGigabitEthernet 0/38
  no ip address
  no shutdown
!
interface TenGigabitEthernet 0/39
  no ip address
  no shutdown
!
interface fortyGigE 0/40
  no ip address
  no shutdown
!
interface TenGigabitEthernet 0/44
  no ip address
!
  port-channel-protocol LACP
  port-channel 44 mode active
  no shutdown
!
interface TenGigabitEthernet 0/45
  no ip address
!
  port-channel-protocol LACP
  port-channel 45 mode active
  no shutdown
!
interface TenGigabitEthernet 0/46
  no ip address
!
  port-channel-protocol LACP
  port-channel 46 mode active
  no shutdown
!
interface TenGigabitEthernet 0/47
  no ip address
!
  port-channel-protocol LACP
  port-channel 47 mode active
  no shutdown
!
interface fortyGigE 0/48
  no ip address
  no shutdown
!
interface TenGigabitEthernet 0/52
  no ip address
!
  port-channel-protocol LACP
  port-channel 48 mode active
  no shutdown
!
interface TenGigabitEthernet 0/53
  no ip address
!
  port-channel-protocol LACP
  port-channel 49 mode active
  no shutdown
!
interface TenGigabitEthernet 0/54
  no ip address
!
  port-channel-protocol LACP
  port-channel 50 mode active
  no shutdown
```



```

!
interface TenGigabitEthernet 0/55
  no ip address
!
  port-channel-protocol LACP
  port-channel 51 mode active
  no shutdown
!
interface fortyGigE 0/56
  no ip address
  no shutdown
!
interface TenGigabitEthernet 0/60
  no ip address
!
  port-channel-protocol LACP
  port-channel 52 mode active
  no shutdown
!
interface TenGigabitEthernet 0/61
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  no shutdown
!
interface TenGigabitEthernet 0/62
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  no shutdown
!
interface TenGigabitEthernet 0/63
  no ip address
  portmode hybrid
  switchport
  spanning-tree rstp edge-port
  no shutdown
!
interface fortyGigE 0/64
  no ip address
  no shutdown
!
interface fortyGigE 0/68
  no ip address
  no shutdown
!
interface fortyGigE 0/72
  no ip address
  no shutdown
!
interface TenGigabitEthernet 0/76
  description "Uplink from s55 Switch P0/50"
  no ip address
!
  port-channel-protocol LACP
  port-channel 1 mode active
  no shutdown
!
interface TenGigabitEthernet 0/77
  no ip address
  shutdown
!

```

```
interface TenGigabitEthernet 0/78
  no ip address
  shutdown
!
interface TenGigabitEthernet 0/79
  no ip address
  shutdown
!
interface fortyGigE 0/80
  no ip address
  no shutdown
!
interface fortyGigE 0/84
  no ip address
  no shutdown
!
interface fortyGigE 0/88
  no ip address
  no shutdown
!
interface fortyGigE 0/92
  no ip address
  no shutdown
!
interface fortyGigE 0/96
  no ip address
  no shutdown
!
interface fortyGigE 0/100
  no ip address
  no shutdown
!
interface fortyGigE 0/104
  no ip address
  no shutdown
!
interface fortyGigE 0/108
  no ip address
  no shutdown
!
interface fortyGigE 0/112
  no ip address
  no shutdown
!
interface fortyGigE 0/116
  no ip address
  no shutdown
!
interface fortyGigE 0/120
  no ip address
  shutdown
!
interface fortyGigE 0/124
  no ip address
  shutdown
!
interface ManagementEthernet 0/0
  ip address 192.168.253.131/24
  no shutdown
!
interface ManagementEthernet 1/0
  no shutdown
!
interface ManagementEthernet 2/0
```

```

no shutdown
!
interface ManagementEthernet 3/0
no shutdown
!
interface ManagementEthernet 4/0
no shutdown
!
interface ManagementEthernet 5/0
no shutdown
!
interface Port-channel 1
description "Uplink from s55 Switch"
no ip address
switchport
vlt-peer-lag port-channel 1
no shutdown
!
interface Port-channel 11
description "VLT_to_Switch 1"
no ip address
channel-member fortyGigE 0/116,124
no shutdown
!
interface Port-channel 20
no ip address
portmode hybrid
switchport
no spanning-tree
spanning-tree rstp edge-port
vlt-peer-lag port-channel 20
no shutdown
!
interface Port-channel 21
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/1
vlt-peer-lag port-channel 21
no shutdown
!
interface Port-channel 22
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/2
vlt-peer-lag port-channel 22
no shutdown
!
interface Port-channel 23
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/3
vlt-peer-lag port-channel 23
no shutdown
!
interface Port-channel 24
no ip address
portmode hybrid
switchport

```

```
spanning-tree rstp edge-port
vlt-peer-lag port-channel 24
no shutdown
!
interface Port-channel 25
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 25
no shutdown
!
interface Port-channel 26
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 26
no shutdown
!
interface Port-channel 27
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 27
no shutdown
!
interface Port-channel 28
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 28
no shutdown
!
interface Port-channel 29
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 29
no shutdown
!
interface Port-channel 30
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 30
no shutdown
!
interface Port-channel 31
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 31
no shutdown
!
interface Port-channel 32
no ip address
portmode hybrid
switchport
```

```
spanning-tree rstp edge-port
vlt-peer-lag port-channel 32
no shutdown
!
interface Port-channel 40
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 40
no shutdown
!
interface Port-channel 41
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/37
vlt-peer-lag port-channel 41
no shutdown
!
interface Port-channel 42
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/38
vlt-peer-lag port-channel 42
no shutdown
!
interface Port-channel 43
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
channel-member TenGigabitEthernet 0/39
vlt-peer-lag port-channel 43
no shutdown
!
interface Port-channel 44
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 44
no shutdown
!
interface Port-channel 45
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 45
no shutdown
!
interface Port-channel 46
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 46
no shutdown
!
interface Port-channel 47
```

```

no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 47
no shutdown
!
interface Port-channel 48
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 48
no shutdown
!
interface Port-channel 49
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 49
no shutdown
!
interface Port-channel 50
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 50
no shutdown
!
interface Port-channel 51
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 51
no shutdown
!
interface Port-channel 52
no ip address
portmode hybrid
switchport
spanning-tree rstp edge-port
vlt-peer-lag port-channel 52
no shutdown
!
interface Vlan 1
!untagged TenGigabitEthernet 0/25-27,61-63
!untagged Port-channel 11,20-28
!
interface Vlan 110
description "iDrac Network"
no ip address
shutdown
!
interface Vlan 120
description "Provisioner Network"
no ip address
tagged Port-channel 1,20
shutdown
!
interface Vlan 140
description "Private API Network"

```

```
no ip address
tagged Port-channel 1,20-28
shutdown
!
interface Vlan 170
description "Storage Network"
no ip address
tagged Port-channel 1,20-23
untagged Port-channel 29-32,44-48
no shutdown
!
interface Vlan 180
description "Storage (Ceph) Network"
no ip address
tagged Port-channel 21-23
untagged Port-channel 49-52
shutdown
!
interface Vlan 190
description "Nova-Network Public"
no ip address
tagged Port-channel 1,20
untagged Port-channel 41-43
no shutdown
!
interface Vlan 201
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 202
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 203
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 204
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 205
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 206
description "Nova-Network Private"
no ip address
tagged Port-channel 21-28
shutdown
!
interface Vlan 207
description "Nova-Network Private"
no ip address
```

```
    tagged Port-channel 21-28
    shutdown
    !
interface Vlan 208
    description "Nova-Network Private"
    no ip address
    tagged Port-channel 21-28
    shutdown
    !
interface Vlan 209
    description "Nova-Network Private"
    no ip address
    tagged Port-channel 21-28
    shutdown
    !
interface Vlan 210
    description "Nova-Network Private"
    no ip address
    tagged Port-channel 21-28
    shutdown
    !
interface Vlan 2251
    description "Public Network"
    no ip address
    tagged Port-channel 1
    untagged Port-channel 40
    shutdown
    !
snmp-server community password ro
no ip telnet server enable
    !
arp learn-enable
    !
ip ssh server enable
    !
protocol lldp
    advertise dot1-tlv port-protocol-vlan-id
    advertise dot3-tlv max-frame-size
    advertise management-tlv system-description system-name
    advertise med
    !
line console 0
line vty 0
line vty 1
line vty 2
line vty 3
line vty 4
line vty 5
line vty 6
line vty 7
line vty 8
line vty 9
    !
end
! Version 9.0(2.0P1)
! Last configuration change at Tue May 12 00:22:43 2015
```




## Getting Help

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This appendix details contact and reference information for the Dell™ Red Hat® Cloud Solutions with Red Hat Enterprise Linux® OpenStack Platform.

### Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

 **Note:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit [dell.com/support](http://dell.com/support).
2. Click your country/region at the bottom of the page. For a full listing of country/region, click **All**.
3. Click **All Support** from the **Support** menu.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.

### References

Additional information can be obtained at <http://www.dell.com/openstack> or by e-mailing [openstack@dell.com](mailto:openstack@dell.com).

If you need additional services or implementation help, please contact your Dell sales representative.

### To Learn More

For more information on the Dell Red Hat OpenStack Cloud Solution with Red Hat Enterprise Linux™ OpenStack Platform visit <http://www.dell.com/openstack>.

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