Dell EMC Networking – Deploying S4148U-ON as NPG (NPIV Proxy Gateway)

Short deployment guide of S4148U as NPG and S4048 as FSB

Abstract

A short configuration guide on the S4148U-ON as an NPG (NPIV Proxy Gateway) and S4048-ON as an FSB (FIP Snooping Bridge)

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Author: Mario Chow

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Other:

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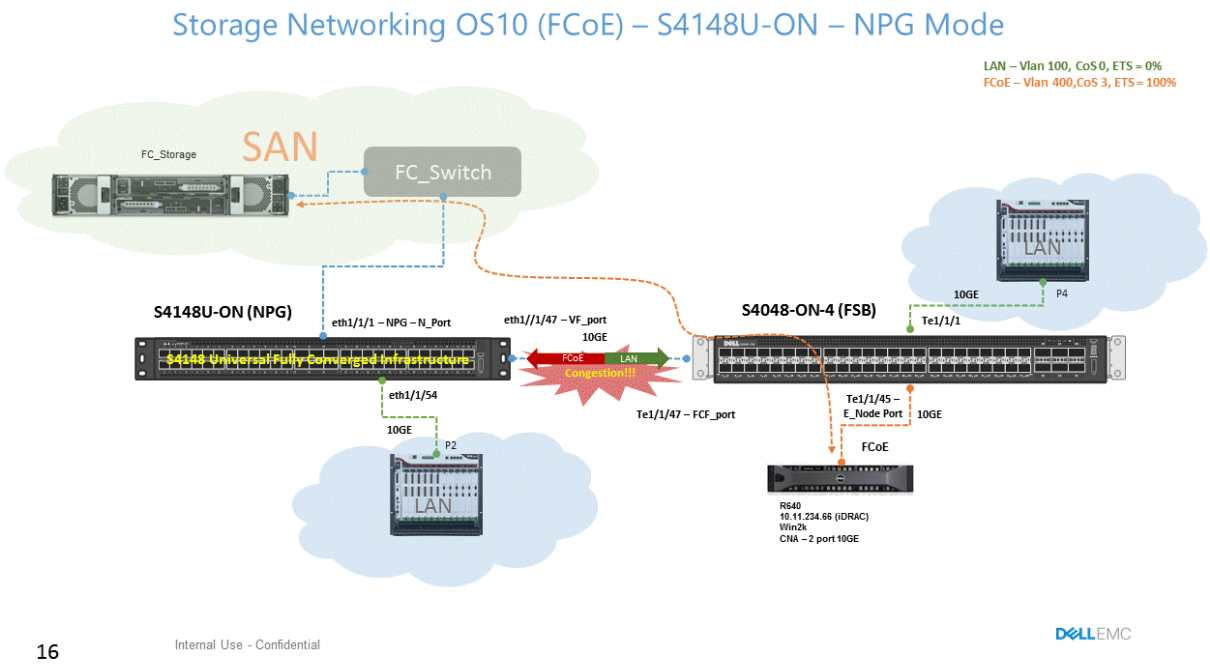
Test Set Up

Figure 1 shows the setup used to test FCoE (Fibre-Channel over Ethernet) deployment on the Dell EMC S4148U acting as an NPIV Proxy Gateway or NPG connected to an FSB (FIP Snooping Bridge). The following list defines the setup:

- Traffic is uni-directional
- Storage (Fibre-Channel over Ethernet) traffic is generated by the server
- The S4148U-ON (NPG) is running OS10 (10.4.0E(X2))
- The S4048-ON (FSB) is running OS10 (10.4.0E(X2))
- The target storage device is an emulated target – SAN Blaze
- Connection speed is at 16Gbps

Figure 1 Dell EMC S4148U-ON as NPG and S4048-ON as FSB Test Setup



In this setup, FCoE traffic is generated by the enode server connected to the FSB swich (s4048-ON). The FSB switch creates a set of internal access lists not visble nor configurable by the user to ensure point-to-point connectivity between the enode and fibre-channel target. The S4148U-ON acting as an NPG, strips all Ethernet encapsulation from the FCoE packet and forwards native fibre-channel frames to the target.

Configuration Details

A.1 S4148U-ON as NPG (NPIV Proxy Gateway)

1. Enable DCBx system wide
    a. **Switch#** conf t
    b. **Switch(config)#** dcbx enable

2. Enable NPG feature
    a. **Switch#** conf t
    b. **Switch(config)#** feature fc npg

3. Configure the Ethernet interface as fibre-channel interface
    a. **Switch#** conf t
    b. **Switch(config)#** port-group 1/1/1
    c. **Switch(conf-pg-1/1/1)#** mode fc <16g-2x or 8g-4x> , depending on the port-group, the speed range can be up to 32gbps.
    d. **Switch(conf-pg-1/1/1)#** end
    e. **Switch#**

4. Create FCoE vlan
    a. **Switch#** conf t
    b. **Switch(config)#** int vlan 400
    c. **Switch(config-if-vl-400)#** desc FCoE_traffic
    d. **Switch(config-if-vl-400)#** end
    e. **Switch#**

5. Create the vfabric. This is the storage fabric on which specific zones are attached.
    a. **Switch#** conf t
    b. **Switch(config)#** vfabric <id>
    c. **Switch(config-vfabric-<id>)#** vlan <vlan_id>
    d. **Switch(config-vfabric-<id>)#** fcoe fcmap <0xefc00 – 0xefcff>
    e. **Switch(config-vfabric-<id>)#** end
    f. **Switch#**

6. Attach vfabric to the proper interfaces
    a. **Switch#** conf t
    b. **Switch(config)#** int fibrechannel 1/1/1
    c. **Switch(config-if-fc1/1/3)#** vfabric <id>
    d. **Switch(config-if-fc1/1/3)#** exit
    e. **Switch(config)#** int eth1/1/47
    f. **Switch(config-if-eth1/1/47)#** vfabric <id>
    g. **Switch(config-if-eth1/1/47)#** end
    h. **Switch#**

7. Create class maps and service policies. Configue the policy map and applicable class map to trust system dot1p settings. This policy map and class map indicates to trust the Class of Service (CoS) values of the incoming packet when it hits the switch.

a. **Switch#** conf t
b. **Switch(config)#** policy-map type qos test1
c. **Switch(config-pmap-qos)#** class class-trust
d. **Switch(config-pmap-qos)#** trust dot1p

8. Create and apply system wide policy map in step 7 and turn on ETS.
    a. **Switch#** conf t
    b. **Switch(config)#** system qos
    c. **Switch(config-sys-qos)#** ets mode on
    d. **Switch(config-sys-qos)#** service-policy input type qos test1
    e. **Switch(config-sys-qos)#** end
    f. **Switch#**

9. Configure qos map to that matches FCoE 802.1p to respective queue. Matching LAN (queue 1), and FCoE (queue 3). The service policies and class maps are required in order to preserve the integrity of the respective type of traffic (LAN and FCoE)
    a. **Switch#** conf t
    b. **Switch(config)#** qos-map traffic-class TC-2-Q
    c. **Switch(config-qos-map)#** queue 1 qos-group 0-2,4-7
    d. **Switch(config-qos-map)#** queue 3 qos-group 3
    e. **Switch(config-qos-map)#** exit
    f. **Switch(config)#**

10. Create queueing class maps that uses the qos-map defined in step 9.
    a. **Switch#** config t
    b. **Switch(config)#** class-map type queueing LAN
    c. **Switch(config-cmap-queuing)#** match queue 1
    d. **Switch(config-cmap-queuing)#** exit
    e. **Switch(config)#** class-map type queueing FCoE
    f. **Switch(config-cmap-queuing)#** match queue 3
    g. **Switch(config-cmap-queuing)#** end
    h. **Switch#**

11. Create policy map ETS that uses class maps defined in step 8. Allocate certain percentage to each traffic class
    a. **Switch#** conf t
    b. **Switch(config)#** policy-map type queuing ETS_new
    c. **Switch(config-pmap-queuing)#** class LAN
    d. **Switch(config-pmap-c-que)#** bandwidth percent 10
    e. **Switch(config-pmap-c-que)#** exit
    f. **Switch(config-pmap-queuing)#** class FCoE
    g. **Switch(config-pmap-c-que)#** bandwidth percent 90
    h. **Switch(config-pmap-c-que)#** end
    i. **Switch#pause**

12. Class map that matches qos-group 3 or queue 3 or FCoE traffic 802.1p value
    a. **Switch#** conf t
    b. **Switch(config)#** class-map type network-qos fcoe_match

c. **Switch(config-cmap-nqos)#** match qos-group 3
d. **Switch(config-cmap-nqos)#** end
e. **Switch#**

13. Pollicy map that uses class map in step 10 and enables priority flow control on FCoE
    a. **Switch#** conf t
    b. **Switch(config)#** policy-map type network-qos fcoe_pfc
    c. **Switch(config-pmap-network-qos)#** class fcoe_match
    d. **Switch(config-pmap-c-nqos)#** pause
    e. **Switch(config-pmap-c-nqos)#** pfc-cos 3
    f. **Switch(config-pmap-c-nqos)#** end
    g. **Switch#**

14. Apply all relevant configs on participating interfaces
    a. **Switch#** conf t
    b. **Switch(config)#** int fc1/1/1
    c. **Switch(config-if-fc1/1/1)#** des Link_2_FC_Sw
    d. **Switch(config-if-fc1/1/1)#** vfabric 1
    e. **Switch(config-if-fc1/1/1)#** exit
    f. **Switch(config)#** int eth1/1/47
    g. **Switch(config-if-eth1/1/47)#** des Link_2_FS4048
    h. **Switch(config-if-eth1/1/47)#** switch mode trunk
    i. **Switch(config-if-eth1/1/47)#** switch acc vlan 1
    j. **Switch(config-if-eth1/1/47)#** service-policy input type network-qos fcoe_pfc
    k. **Switch(config-if-eth1/1/47)#** service-policy output type queuing ETS_new
    l. **Switch(config-if-eth1/1/47)#** ets mode on
    m. **Switch(config-if-eth1/1/47)#** qos-map traffic-class TC-2-Q
    n. **Switch(config-if-eth1/1/47)#** vfabric 1
    o. **Switch(config-if-eth1/1/47)#** priority-flow-control mode on
    p. **Switch(config-if-eth1/1/47)#** end
    q. **Switch#**

A.2 S4048-ON as FIP Snooping Bridge (FSB)

1. Enable DCBx system wide
    a. **Switch#** conf t
    b. **Switch(config)#** dcbx enable

2. Enable FSB
    a. **Switch#** conf t
    b. **Switch(config)#** feature fip-snooping
    c. **Switch(config)#** end
    d. **Switch#**

3. Create FCoE Vlan and enable FSB (FIP Snooping) on this VLAN
    a. **Switch#** conf t
    b. **Switch(config)#** int vlan 400
    c. **Switch(config-if-vl-400)#** description FCoE VLAN
    d. **Switch(config-if-vl-400)#** fip-snooping enable

e. **Switch(config-if-vl-400)#** exit
f. **Switch(confg)#**

4. Create class maps and service policies. Configue the policy map and applicable class map to trust system dot1p settings. This policy map and class map indicates to trust the Class of Service (CoS) values of the incoming packet when it hits the switch.
    a. **Switch#** conf t
    b. **Switch(config)#** policy-map type qos test1
    c. **Switch(config-pmap-qos)#** class class-trust
    d. **Switch(config-pmap-qos)#** trust dot1p

5. Create and apply system wide policy map in step 4 and turn on ETS.
    a. **Switch#** conf t
    b. **Switch(config)#** system qos
    c. **Switch(config-sys-qos)#** ets mode on
    d. **Switch(config-sys-qos)#** service-policy input type qos test1
    e. **Switch(config-sys-qos)#** end
    f. **Switch#**

6. Assign FCoE Class of Service (CoS) value 3 to proper egress queue.
    a. **Switch#** conf t
    b. **Switch(config)#** qos-map traffic-class TC-2-Q
    c. **Switch(config-qos-map)#** queue 1 qos-group 0-2,4-7
    d. **Switch(config-qos-map)#** queue 3 qos-group 3
    e. **Switch(config-qos-map)#** end
    f. **Switch#**

7. Create class map that matches queue 3 and will be used in a network qos policy map to turn on priority flow control on this queue.
    a. **Switch#** conf f
    b. **Switch(config)#** class-map type network-qos fcoe_match
    c. **Switch(config-cmap-nqos)#** match qos-group 3
    d. **Switch(config-cmap-nqos)#** end
    e. **Switch#**

8. Using class map defined in step 7, create a new class and enable pfc (priority flow control) on Class of Service (CoS) 3, i.e. FCoE
    a. **Switch#** conf t
    b. **Switch(config)#** policy-map type network-qos fcoe_pfc
    c. **Switch(config-pmap-network-qos)#** class fcoe_match
    d. **Switch(config-pmap-c-nqos)#** pause
    e. **Switch(config-pmap-c-nqos)#** pfc-cos 3
    f. **Switch(config-pmap-c-nqos)#** end
    g. **Switch#**

9. Create class type queueing to be used by policy map queueing and enable ETS on these class maps.
    a. **Switch#** conf t
    b. **Switch(config)#** class-map type queuing LAN
    c. **Switch(config-cmap-queuing)#** match queue 1

d. **Switch(config-cmap-queuing)#** exit
e. **Switch(config)#** class-map type queuing FCoE
f. **Switch(config-cmap-queuing)#** match queue 3
g. **Switch(config-cmap-queuing)#** end
h. **Switch#**

10. Create policy map that uses the class maps in step 9 and turn on ETS.
    a. **Switch#** conf t
    b. **Switch(config)#** policy-map type queuing ETS_new
    c. **Switch(config-pmap-queuing)#** class LAN
    d. **Switch(config-pmap-c-que)#** bandwidth percent 10
    e. **Switch(config-pmap-c-que)#** exit
    f. **Switch(config-pmap-queuing)#** class FCoE
    g. **Switch(config-pmap-c-que)#** bandwidth percent 90
    h. **Switch(config-pmap-c-que)#** end
    i. **Switch#**

11. Apply and configure relevant service policy input, output, and additional configurations. Apply configurations on 1/1/45 and 1/1/47 (see figure 1).
    a. **Switch#** conf t
    b. **Switch(config)#** int range int1/1/45, 1/1/47
    c. **Switch(conf-range-eth1/1/45, 1/1/47)#** switchport mode trunk
    d. **Switch(conf-range-eth1/1/45, 1/1/47)#** switchport trunk allowed vlan 400 – FcoE vlan
    e. **Switch(conf-range-eth1/1/45, 1/1/47)#** service-policy input type network-qos fcoe_pfc
    f. **Switch(conf-range-eth1/1/45, 1/1/47)#** service-policy output type queuing ETS_new
    g. **Switch(conf-range-eth1/1/45, 1/1/47)#** ets mode on
    h. **Switch(conf-range-eth1/1/45, 1/1/47)#** qos-map traffic-class TC-2-Q
    i. **Switch(conf-range-eth1/1/45, 1/1/47)#** priority-flow-control mode on
    j. **Switch(conf-range-eth1/1/45, 1/1/47)#** end
    k. **Switch#**