Dell EMC OS10 FCoE with Redundant Links Configuration Cheat Sheet

Dell EMC and redundant FCoE links

Abstract

A short configuration document on how to enable and deploy FCoE over redundant links on the Dell EMC switches running OS10.

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Revisions

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1 Introduction

Dell EMC OS 10.4.2 introduces another storage solution enhancement – Fibre-Channel over Ethernet with VLT – This enhancement provides the necessary resilience needed for a robust storage over ethernet where traditional FCoE connectivity over redundant links was not possible.

1.1 Objective

This document provides a set of valid Dell EMC networking configurations that apply to a typical FCoE deployment scenario over redundant links providing storage connectivity resiliency.

1.2 Audience

The suggested audience for this document is a system administrator, network architect, system engineer, or data center architect.

2 Setup

Figure1 shows the reference setup used in the lab to demonstrate the FCoE port pinning over redundant Ethernet links.

Starting from the end host, two LAGs or port-channels have been created. Each LAG has two links from the end host (R720 server). LAG_1 connects to S4148U-02, and LAG_2 connects to S4148U-03.

At the top of rack (ToR), two S4148Us are deployed as a VLT domain creating a virtual switch, and thus providing the necessary link and device redundancy for both downstream and upstream connections. It is on the ToR switches where the dedicated or port-pinning configuration takes place. The ToRs are also acting as FSBs (FIP Snooping Bridge) whose functionality is:

- To act as a bridge between FCoE capable end-hosts and the Fibre-Channel switch.
- It monitors the connections between the end-hosts and configures reserved access lists to permit point-to-point traffic between end-hosts and target.

Three port-channels are configured on the ToRs switches, Po10 and Po20 are the downstream host connections and Po30 is the upstream FC (Fibre-Channel) switch connection where port-pinning is configured.

With port-pinning, a point-to-point link from host to target is established while providing redundant dedicated links from the ToRs switches. The redundant links at the ToRs are Ethernet links not Fibre-Channel links.

The final setup layer is the FC switch (S4148U-04) providing connection to the FC SAN targets as well as a simulated Ethernet or LAN environment. There are two SAN fabrics available providing storage redundancy.

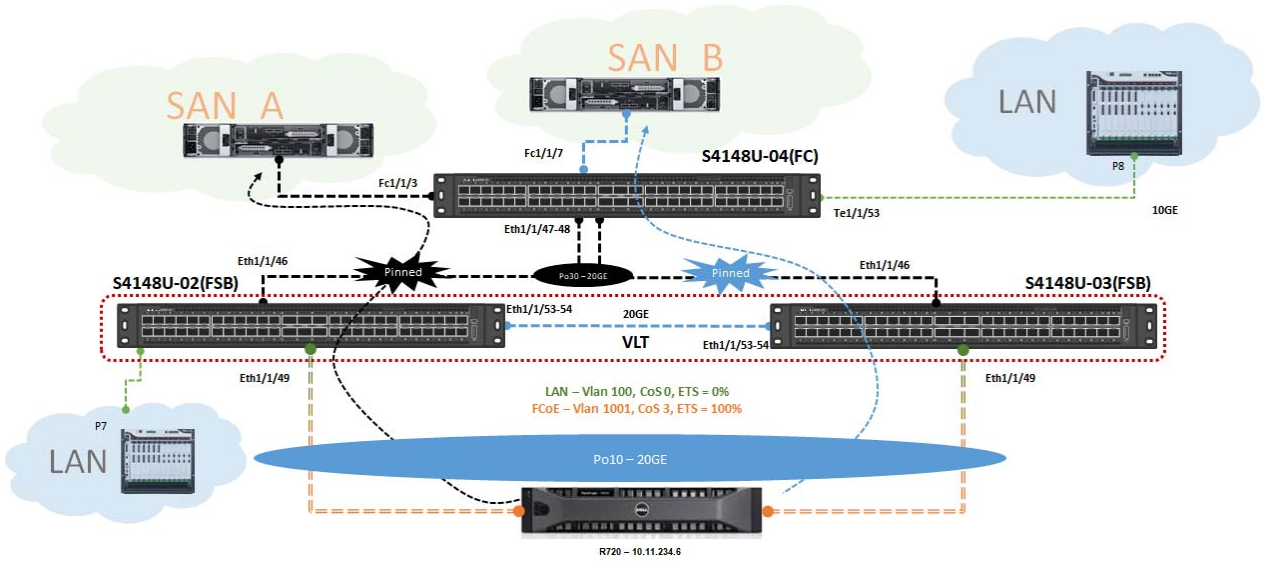

Figure 1 FoCE port-pinned over VLT deployment diagram

2.1 Deployment components

The setup consists of three devices:

- FC Switch (S4148U-04)
- ToR_1 (S4148U-02) – FSB (FIP Snooping Bridge)
- ToR_2 (S4148U-03) – FSB (FIP Snooping Bridge)

A Device Configuration Details

A.1 Configuration of S4148U-04 (FC and Ethernet Switch).

S4148U-04 is providing both Fibre-Channel and standard Ethernet services. Two vlans are configured on this switch (Vlan 1001, and 100).

1. Enable the fibre-channel feature on the switch and create a domain.

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# feature fc domain-id 1
mk-S4148U-04(config)# end
mk-S4148U-04#
```

2. Create the respective FC zones. These zones are statically configured between the end-hosts or initiators and target.

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# fc zone zoneA
mk-S4148U-04(config-fc-zone-zoneA)# member wwn 10:00:00:80:ff:b8:22:19
(initiator)
mk-S4148U-04(config-fc-zone-zoneA)# member wwn 22:00:00:24:ff:8f:f5:cc
(target)
mk-S4148U-04(config-fc-zone-zoneA)# exit

##### Zone B Configuration #####

mk-S4148U-04(config)# fc zone zoneB
mk-S4148U-04(config-fc-zone-zoneB)# member wwn 20:00:00:80:ff:b8:22:20
(initiator)
mk-S4148U-04(config-fc-zone-zoneB)# member wwn 22:00:00:24:ff:8f:f5:bb
(target)
mk-S4148U-04(config-fc-zone-zoneB)# end
mk-S4148U-04#
```

3. Configure the fibre-channel zoneset. This zoneset can be referred to as a virtual fabric. In our case, since we have two Fabrics (SAN_A & SAN_B), two zones will members of this “zoneset”, however, only one zone will be configured.

```
mk-S4148U-04# conf
mk-S4148U-04(config)# fc zoneset zonesetAB
mk-S4148U-04(config-fc-zoneset-zonesetAB)# member zoneA
mk-S4148U-04(config-fc-zoneset-zonesetAB)# member zoneB
mk-S4148U-04(config-fc-zoneset-zoneA)# end
mk-S4148U-04#
```

4. Configure the respective FCoE (1001) and LAN (100) vlans.

```
mk-S4148U-04# conf
```

```
mk-S4148U-04(config)# int vlan 1001
mk-S4148U-04(conf-if-vl-1001)# description FCoE_Vlan
mk-S4148U-04(conf-if-vl-1001)# exit
mk-S4148U-04(config)# int vlan 100
mk-S4148U-04(conf-if-vl-100)# description LAN_Vlan
mk-S4148U-04(conf-if-vl-100)# end
mk-S4148U-04#
```

5. Configure the vfabric and activate the FC zone. The vfabric construct is a virtual fabric for a specific zone. Vlan 1001 is the FCoE vlan and the fcoe map is a unique MAC address prefix used by the FC switch to identify FCoE traffic.

```
mk-S4148U-04# conf
mk-S4148U-04(config)# vfabric 1
mk-S4148U-04(conf-vfabric-1)# vlan 1001
mk-S4148U-04(conf-vfabric-1)# fcoe map 0xEFC00
mk-S4148U-04(conf-vfabric-1)# zoneset activate zonesetAB
mk-S4148U-04(conf-vfabri-1)# end
mk-S4148U-04#
```

6. Enable DCBx. This will allow the configuration of priority flow control (PFC)

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# dcbx enable
mk-S4148U-04(config)# end
mk-S4148U-04#
```

7. Apply the vfabric to the proper port-channels and physical interfaces that are part of the virtual fabric.

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# int port-channel 30
mk-S4148U-04(conf-if-po-30)# des PO_2_FC_SW
mk-S4148U-04(conf-if-po-30)# switchport mode trunk
mk-S4148U-04(conf-if-po-30)# switchport access vlan 1
mk-S4148U-04(conf-if-po-30)# switchport trunk allowed vlan 1001
mk-S4148U-04(conf-if-po-30)# vfabric 1
mk-S4148U-04(conf-if-po-30)# no shut
mk-S4148U-04(conf-if-po-30)# exit
mk-S4148U-04(config)# int fibrechannel 1/1/3
mk-S4148U-04(conf-if-fc1/1/3)# des Target_Connected_Port
mk-S4148U-04(conf-if-fc1/1/3)# no shut
mk-S4148U-04(conf-if-fc1/1/3)# vfabric 1
mk-S4148U-04(conf-if-fc1/1/3)# end
mk-S4148U-04#
```

8. Configure the respective PFC configurations applied on the FSB switches on the downlink interfaces connected to the FSB switches. One of the

interfaces or links towards the FSB switches will be configured as the pinned port or dedicated link towards the FC target.

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# int ethernet 1/1/45
mk-S4148U-04(conf-if-eth1/1/45)# channel-group 30 mode active
mk-S4148U-04(conf-if-eth1/1/45)# fcoe-pinned-port
mk-S4148U-04(conf-if-eth1/1/45)# no switchport
mk-S4148U-04(conf-if-eth1/1/45)# service-policy input type network-qos PFC
mk-S4148U-04(conf-if-eth1/1/45)# priority-flow-control mode on
mk-S4148U-04(conf-if-eth1/1/45)# exit
mk-S4148U-04(config)# int ethernet 1/1/46
mk-S4148U-04(conf-if-eth1/1/46)# channel-group 30 mode active
mk-S4148U-04(conf-if-eth1/1/45)# no switchport
mk-S4148U-04(conf-if-eth1/1/45)# service-policy input type network-qos PFC
mk-S4148U-04(conf-if-eth1/1/45)# priority-flow-control mode on
mk-S4148U-04(conf-if-eth1/1/45)# end
mk-S4148U-04#
```

9. Attach vlan 100 to respective interface.

```
mk-S4148U-04# conf t
mk-S4148U-04(config)# int eth1/1/53
mk-S4148U-04(conf-if-eth1/1/53)# des Link_2_Ethernet_Subnet
mk-S4148U-04(conf-if-eth1/1/53)# switchport access vlan 100
mk-S4148U-04(conf-if-eth1/1/53)# end
mk-S4148U-04#
```

A.2 Configuration of S4148U-02 (FSB)

1. Enable FIP snooping globally.

```
mk-S4148U-02# conf
mk-S4148U-02(config)# feature fip-snooping
mk-S4148U-02(config)# end
mk-S4148U-02#
```

2. Configure the FCoE (1001) and LAN (100) vlans

```
mk-S4148U-02# conf
mk-S4148U-02(config)# int vlan 1001
mk-S4148U-02(conf-if-vl-1001)# description FCoE_Vlan
mk-S4148U-02(conf-if-vl-1001)# fip-snooping enable
mk-S4148U-02(conf-if-vl-1001)# exit
mk-S4148U-02(config)# int vlan 100
mk-S4148U-02(conf-if-vl-100)# description LAN_Vlan
mk-S4148U-02(conf-if-vl-100)# end
mk-S4148U-02#
```

3. Configure VLT and the respective interfaces part of the VLT.

```
mk-S4148U-02# conf
mk-S4148U-02(config)# int range eth1/1/53-1/1/54
mk-S4148U-02(conf-eth1/1/53-1/1/54)# des VLTi_Members
mk-S4148U-02(conf-eth1/1/53-1/1/54)# no switchport
mk-S4148U-02(conf-eth1/1/53-1/1/54)# exit
mk-S4148U-02(config)#
mk-S4148U-02(config)# vlt-domain 1
mk-S4148U-02(conf-vlt-1)# discovery-interface eth1/1/53
mk-S4148U-02(conf-vlt-1)# discovery-interface eth1/1/54
mk-S4148U-02(conf-vlt-1)# end
mk-S4148U-02#
```

4. Configure DCBX

```
mk-S4148U-02# conf
mk-S4148U-02(config)# dcbx enable
mk-S4148U-02(config# end
mk-S4148U-02#
```

5. Configure PFC and relevant parameters to be used by FCoE traffic.

```
mk-S4148U-02# conf
mk-S4148U-02(config)# class-map type network-qos fcoematch
mk-S4148U-02(config-cmap-nqos)# match qos-group 3
mk-S4148U-02(config-cmap-nqos)# exit
mk-S4148U-02(config)# policy-map type network-qos PFC
mk-S4148U-02(config-pmap-c-nqos)# pause
mk-S4148U-02(config-pmap-c-nqos)# pfc-cos 3
mk-S4148U-02(config-pmap-c-nqos)# end
mk-S4148U-02#
```

6. Configure port-channels 30 and 50 and configure the FCF facing port. This is the interface connected to the FC switch.

```
mk-S4148U-02# conf
mk-S4148U-02(config)# int po30
mk-S4148U-02(conf-if-po-30)# des Upstream_PO30
mk-S4148U-02(conf-if-po-30)# switchport mode trunk
mk-S4148U-02(conf-if-po-30)# switchport access vlan 1
mk-S4148U-02(conf-if-po-30)# switchport trunk allowed vlan 1001,100
mk-S4148U-02(conf-if-po-30)# vlt-port-channel 30
mk-S4148U-02(conf-if-po-30)# fip-snooping port-mode fcf
mk-S4148U-02(conf-if-po-30)# exit
mk-S4148U-02(config)# int eth1/1/49
mk-S4148U-02(conf-if-eth1/1/49)#
```

7. Configure PFC and apply them on the proper interfaces. In this case both port-channels (30 and and physical interfaces in both directions (upstream and downstream)

```
mk-S4148U-02# conf
mk-S4148U-02(config)# interface eth1/1/46
```

```
mk-S4148U-02(conf-if-eth1/1/46)# des Po30_uplink_member
mk-S4148U-02(conf-if-eth1/1/46)# channel-group 30 mode active
mk-S4148U-02(conf-if-eth1/1/46)# fcoe-pinned-port
mk-S4148U-02(conf-if-eth1/1/46)# service-policy input type network-qos PFC
mk-S4148U-02(conf-if-eth1/1/46)# priority-flow-control mode on
mk-S4148U-02(conf-if-eth1/1/46)# end
mk-S4148U-02#
mk-S4148U-02# conf
mk-S4148U-02(config)# int eth1/1/49
mk-S4148U-02(conf-if-eth1/1/49)# des Po10_downstream_member
mk-S4148U-02(conf-if-eth1/1/49)# channel-group 10 mode active
mk-S4148U-02(conf-if-eth1/1/49)# fcoe-pinned-port
mk-S4148U-02(conf-if-eth1/1/49)# service-policy input type network-qos PFC
mk-S4148U-02(conf-if-eth1/1/49)# priority-flow-control mode on
mk-S4148U-02(conf-if-eth1/1/49)# end
mk-S4148U-02#
```

A.3 Configuration of S4148U-03 (FSB)

1. Enable FIP snooping globally.

```
mk-S4148U-03# conf
mk-S4148U-03(config)# feature fip-snooping
mk-S4148U-03(config)# end
mk-S4148U-03#
```

2. Configure the FCoE vlan

```
mk-S4148U-03# conf
mk-S4148U-03(config)# int vlan 1001
mk-S4148U-03(conf-if-vl-1001)# fip-snooping enable
mk-S4148U-03(conf-if-vl-1001)# end
mk-S4148U-03#
```

3. Configure VLT and the respective interfaces part of the VLT.

```
mk-S4148U-03# conf
mk-S4148U-03(config)# int range eth1/1/53-1/1/54
mk-S4148U-03(conf-eth1/1/53-1/1/54)# des VLTi_Members
mk-S4148U-03(conf-eth1/1/53-1/1/54)# no switchport
mk-S4148U-03(conf-eth1/1/53-1/1/54)# exit
mk-S4148U-03(config)#
mk-S4148U-03(config)# vlt-domain 1
mk-S4148U-03(conf-vlt-1)# discovery-interface eth1/1/53
mk-S4148U-03(conf-vlt-1)# discovery-interface eth1/1/54
mk-S4148U-03(conf-vlt-1)# end
mk-S4148U-03#
```

4. Configure DCBX

```
mk-S4148U-03# conf
```

```
mk-S4148U-03(config)# dcbx enable
mk-S4148U-03(config# end
mk-S4148U-03#
```

5. Configure PFC and relevant parameters to be used by FCoE traffic.

```
mk-S4148U-03# conf
mk-S4148U-03(config)# class-map type network-qos fcoematch
mk-S4148U-03(config-cmap-nqos)# match qos-group 3
mk-S4148U-03(config-cmap-nqos)# exit
mk-S4148U-03(config)# policy-map type network-qos PFC
mk-S4148U-03(config-pmap-c-nqos)# pause
mk-S4148U-03(config-pmap-c-nqos)# pfc-cos 3
mk-S4148U-03(config-pmap-c-nqos)# end
mk-S4148U-03#
```

6. Configure port-channels 30 and 50 and configure the FCF facing port. This is the interface connected to the FC switch.

```
mk-S4148U-03# conf
mk-S4148U-03(config)# int po30
mk-S4148U-03(conf-if-po-30)# des Upstream_PO30
mk-S4148U-03(conf-if-po-30)# switchport mode trunk
mk-S4148U-03(conf-if-po-30)# switchport access vlan 1
mk-S4148U-03(conf-if-po-30)# switchport trunk allowed vlan 1001,100
mk-S4148U-03(conf-if-po-30)# vlt-port-channel 30
mk-S4148U-03(conf-if-po-30)# fip-snooping port-mode fcf
mk-S4148U-03(conf-if-po-30)# exit
mk-S4148U-03(config)# int eth1/1/49
mk-S4148U-03(conf-if-eth1/1/49)#
```

7. Configure PFC and apply them on the proper interfaces. In this case both port-channels (30 and and physical interfaces in both directions (upstream and downstream)

```
mk-S4148U-03# conf
mk-S4148U-03(config)# interface eth1/1/46
mk-S4148U-03(conf-if-eth1/1/46)# des Po30_uplink_member
mk-S4148U-03(conf-if-eth1/1/46)# channel-group 30 mode active
mk-S4148U-03(conf-if-eth1/1/46)# fcoe-pinned-port
mk-S4148U-03(conf-if-eth1/1/46)# service-policy input type network-qos PFC
mk-S4148U-03(conf-if-eth1/1/46)# priority-flow-control mode on
mk-S4148U-03(conf-if-eth1/1/46)# end
mk-S4148U-03#
mk-S4148U-03# conf
mk-S4148U-03(config)# int eth1/1/49
mk-S4148U-03(conf-if-eth1/1/49)# des Po10_downstream_member
mk-S4148U-03(conf-if-eth1/1/49)# channel-group 10 mode active
mk-S4148U-03(conf-if-eth1/1/49)# fcoe-pinned-port
mk-S4148U-03(conf-if-eth1/1/49)# service-policy input type network-qos PFC
mk-S4148U-03(conf-if-eth1/1/49)# priority-flow-control mode on
```

```
mk-S4148U-03(conf-if-eth1/1/49)# end
mk-S4148U-03#
```