

PIN Groups in Cisco UCS Demystified

In last couple of years we have seen a growing market for Cisco UCS Servers. With the changing technology of Software Defined Datacenter, we are moving towards a dimension where lot of Physical design are not taken care properly. Well, we all know that without Physical servers, we can't run a SDDC.

In that same context I have seen many a times people are not aware of how the Pinning work in Cisco UCS environment and that is the background of this post.

PIN Groups

In End Host Mode, Fabric Interconnect does not work as a traditional layer 2 switch. In this mode, UCS Fabric Interconnect is presented to the northbound LAN switch as an end host with many adapters. Traffic from individual server's vNICs is mapped to a specific Fabric Interconnect uplink port or port channel. This mapping of Ethernet traffic is known as LAN pin groups.

Pin groups can be configured as a static or dynamic pin group. The default configuration is dynamic pin groups.

Dynamic Pinning

This is the default pin group setting. In dynamic pinning, Fabric Interconnect automatically binds server vNICs to uplink FI ports. The mapping of server vNICs to uplink FI ports depends upon the total number of active uplinks configured, which could be either 1, 2, 4, or 8 (for older 6100 series FIs, uplinks could only be 1, 2, and 4).

Failure Response in Dynamic Pinning

Both Fabric Interconnects are in Active/Active mode with respect to Ethernet data traffic movement. Each server is pinned to a single Fabric Interconnect uplink port or port channel. This means that the data traffic from some servers will move using Fabric Interconnect A and for other servers using Fabric Interconnect B.

In case of a northbound uplink or port channel failure where a server is currently pinned to, the server connection will be automatically pinned to another port or port channel on the same Fabric Interconnect. In case of a complete Fabric Interconnect failure, the server will be automatically pinned to any uplink port or port channel on the second Fabric Interconnect provided that the Fabric failover is configured for the vNIC. The Fabric Interconnect will update the northbound switch about this change using **Gratuitous Address Resolution Protocol (GARP)**.

The dynamically pinned server vNIC uplinks are automatically rebalanced after **300 seconds** to distribute the data traffic load on both Fabric Interconnects.

No user configuration is required for dynamic pinning. If no static pin groups are configured, dynamic pinning will be automatically used. Dynamic pinning is the recommended configuration and static pinning should only be used for business use cases.

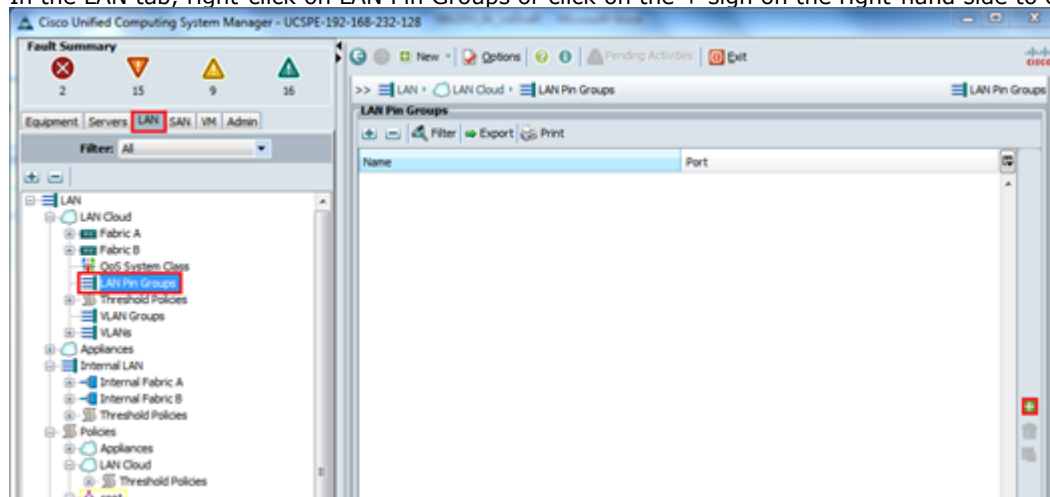
Static Pinning

In static pinning, LAN pin groups are defined by the administrator on Fabric Interconnects using UCSM, which can be assigned to vNICs or vNIC templates. Static pin groups are defined under the LAN tab of the UCSM Navigation pane.

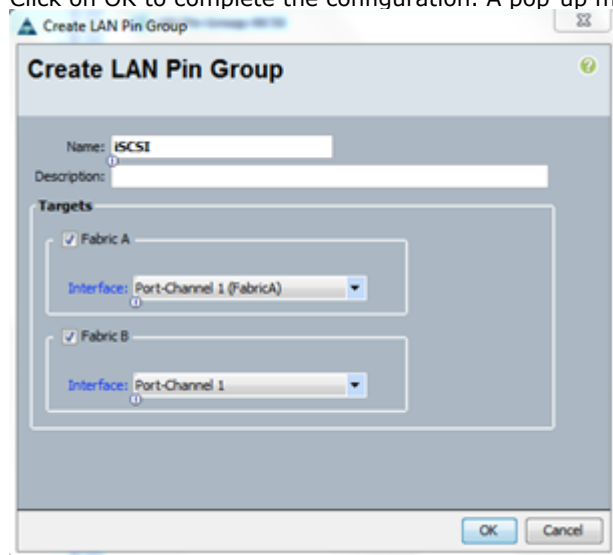
The steps for creating a static pin group and assigning to a vNIC are as follows:

1. Log in to UCS Manager.
2. Click on the LAN tab in the Navigation pane.

3. In the LAN tab, right-click on LAN Pin Groups or click on the + sign on the right-hand side to create a new global LAN pin group



4. In the pop-up window, provide a name for the LAN pin group and bind interfaces (uplink ports or port channel)
 5. Click on OK to complete the configuration. A pop-up message will inform to make sure that the selected uplinks are in the same layer 2 network.



6.

Failure Response re-pinning in Static PIN Groups

Each server is statically pinned to a single Fabric Interconnect uplink port or port channel using manual configuration. The administrator will have to make sure the data traffic from servers is equally distributed among Fabric Interconnects.

In case of a northbound uplink, port channel, or Fabric Interconnect failure where a server is statically pinned to, the server connection will be transferred to other Fabric Interconnects where the server will be dynamically pinned to available uplink ports or port channels, provided the Fabric failover is configured for the vNIC.

For more clarity on Fabric Failover trade off I would suggest to read [this article](#).

If you would like to get a full hands on Cisco UCS in step by step hand holding approach, I suggest to look at my recent published book [Implementing Cisco UCS Solutions](#).