Troubleshoot ACI Fabric Discovery Initial Fabric Setup

Contents

Introduction

This document describes the steps to understand and troubleshoot the initial fabric discovery process, including example issue scenarios.

Background Information

The material from this document was extracted from the Troubleshooting Cisco Application Centric Infrastructure, Second Edition book, specifically the *Fabric Discovery - Initial fabric setup* chapter.

Fabric Discovery Workflow

The ACI fabric discovery process follows a specific sequence of events. These are the basic steps:

1. Connect to the **KVM console** of the first APIC and complete the **setup script** by inputting values such as fabric name, APIC cluster size, and tunnel endpoint (TEP) address pool.
2. Once completed, the APIC1 begins sending **LLDP** via its fabric ports. The LLDP packets contain special TLVs with information such as the **infra VLAN** and its role as an APIC (also referred to as the controller).
3. On reception of these LLDP packets from APIC1 the leaf programs the infra VLAN on all ports where an APIC is detected.

4. The leaf begins sending DHCP Discovers on the now-known infra VLAN.
5. The user logs into the **OOB IP** of APIC1 via HTTPS and registers the first leaf node in the **Fabric Membership** submenu.
6. Once the leaf is given a **Node ID**, APIC1 responds with an IP address from the configured **TEP address pool** and the DHCP process completes.
7. The registered leaf relays DHCP Discovers from other directly connected spines which were discovered via LLDP to the APIC1.
8. The user sees those dynamically discovered spines appear in the Fabric Membership submenu and can register them.
9. Once the spines are registered, the APIC1 responds with an IP address from the TEP pool and DHCP completes for those nodes.
10. The spines relay DHCP Discovers from all other nodes of pod1. (This is assuming there is a full-mesh between spines and leaf switches as is advised and is the typical architecture).
11. Once the leaf nodes connected to the other APICs are registered, the APIC cluster can be established via TCP communication amongst themselves. Make sure to complete the setup dialog on APIC2 and APIC3.
12. Confirm all APICs have formed a cluster and are fully fit. If this is the case, fabric discovery is complete.

Beginning in 4.2, a new CLI command is available on fabric nodes to assist in the diagnosis of common discovery issues. These sections cover the checks performed and provide additional validation commands to assist in troubleshooting failures.

<#root>

```
leaf101#
```

```
show discoveryissues
```

```
Checking the platform type.................LEAF!
Check01 - System state - in-service [ok]
Check02 - DHCP status [ok]
TEP IP: 10.0.72.67 Node Id: 101 Name: leaf101
Check03 - AV details check [ok]
Check04 - IP rechability to apic [ok]
Ping from switch to 10.0.0.1 passed
Check05 - infra VLAN received [ok]
infra vLAN:3967
Check06 - LLDP Adjacency [ok]
Found adjacency with SPINE
Found adjacency with APIC
Check07 - Switch version [ok]
version: n9000-14.2(1j) and apic version: 4.2(1j)
Check08 - FPGA/BIOS out of sync test [ok]
Check09 - SSL check [check]
SSL certificate details are valid
Check10 - Downloading policies [ok]
Check11 - Checking time [ok]
2019-09-11 07:15:53
Check12 - Checking modules, power and fans [ok]
```

Check01 — System State

When the leaf has been allocated a Node ID and registered to the fabric, it begins to download its bootstrap

and then transition to an **in-service** state.

```
Check01 - System state - out-of-service [FAIL]

Check01 - System state - downloading-boot-script [FAIL]
```

To validate the current state of the leaf, the user can run the **moquery -c topSystem** command:

```
leaf101# moquery -c topSystem
Total Objects shown: 1

# top.System
address                  : 10.0.72.67
bootstrapState           : done
...
serial                   : FDO20160TPS
serverType               : unspecified
siteId                   : 1
state                    : in-service
status                   :
systemUpTime             : 00:18:17:41.000
tepPool                  : 10.0.0.0/16
unicastXrEpLearnDisable  : no
version                  : n9000-14.2(1j)
virtualMode              : no
```

Check02 — DHCP Status

```
Check02 - DHCP status [FAIL]
ERROR: node Id not configured
ERROR: Ip not assigned by dhcp server
ERROR: Address assigner's IP not populated
TEP IP: unknown Node Id: unknown Name: unknown
```

The leaf needs to receive a TEP address via DHCP from the APIC1 and then establish IP connectivity to the other APICs. The **Physical TEP** (PTEP) of the leaf is assigned to loopback0. If no address is assigned, the user can validate the leaf is sending a DHCP Discover with **tpcdump** utility. Notice for this, the kpm_inb interface is used, which allows you to see all CPU inband control plane network traffic.

<#root>

```
(none)#
```

tcpdump -ni kpm_inb port 67 or 68

```
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on kpm_inb, link-type EN10MB (Ethernet), capture size 65535 bytes
```

```
16:40:11.041148 IP 0.0.0.0.68 > 255.255.255.255.67: BOOTP/DHCP, Request from a0:36:9f:c7:a1:0c, length
^C
1 packets captured
1 packets received by filter
0 packets dropped by kernel
```

The user can also validate **dhcpd** is running on the APIC and listening on the bond0 sub-interface. The bond interface represents the fabric facing APIC ports. Use the format bond0.<infra VLAN>.

<#root>

apic1#

ps aux | grep dhcp

```
root     18929  1.3  0.2 818552 288504 ?       Ssl  Sep26  87:19 /mgmt//bin/dhcpd.bin -f -4 -cf /data//
admin   22770  0.0  0.0   9108   868 pts/0    S+   19:42   0:00 grep dhcp
```

Check03 — AV Details

```
Check03 - AV details check [ok]
```

The leaf validates if the registered APIC has an IP in a valid range for the TEP pool. If no APIC information has been recorded yet, this check passes. The user can see the current APIC information from the leaf node perspective via the **acidiag avread** command. Notice in this example that when the leaf/spine prompt is showing (none)#, this is an indication the leaf/spine is not yet a member of the fabric.

<#root>

(none)#

acidiag avread

```
Cluster of 0 lm(t):0(zeroTime) appliances (out of targeted 0 lm(t):0(zeroTime)) with FABRIC_DOMAIN name
--------------------------------------------
clusterTime=<diff=0 common=2019-10-01T18:51:50.315+00:00 local=2019-10-01T18:51:50.315+00:00 pF=<displF
--------------------------------------------

leaf101# acidiag avread
Cluster of 3 lm(t):0(2019-09-30T18:45:10.320-04:00) appliances (out of targeted 3 lm(t):0(2019-10-01T14
       appliance id=1  address=10.0.0.1 lm(t):2(2019-09-27T17:32:08.669-04:00) tep address=10.0.0.0/16
       appliance id=2  address=10.0.0.2 lm(t):2(2019-09-26T09:47:34.709-04:00) tep address=10.0.0.0/16
       appliance id=3  address=10.0.0.3 lm(t):3(2019-09-26T10:12:34.114-04:00) tep address=10.0.0.0/16
--------------------------------------------
clusterTime=<diff=15584 common=2019-10-01T14:53:01.648-04:00 local=2019-10-01T14:52:46.064-04:00 pF=<di
--------------------------------------------
```

Check04 — IP Reachability to APIC

When the leaf has received an IP address, it attempts to establish TCP sessions with the APIC and begin the process of downloading its configuration. The user can validate IP connectivity to the APIC using the **iping** utility.

```
<#root>

leaf101#

iping -V overlay-1 10.0.0.1


PING 10.0.0.1 (10.0.0.1) from 10.0.0.30: 56 data bytes
64 bytes from 10.0.0.1: icmp_seq=0 ttl=64 time=0.651 ms
64 bytes from 10.0.0.1: icmp_seq=1 ttl=64 time=0.474 ms
64 bytes from 10.0.0.1: icmp_seq=2 ttl=64 time=0.477 ms
64 bytes from 10.0.0.1: icmp_seq=3 ttl=64 time=0.54 ms
64 bytes from 10.0.0.1: icmp_seq=4 ttl=64 time=0.5 ms

--- 10.0.0.1 ping statistics ---  5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 0.474/0.528/0.651 ms
```

Check05 — Infra VLAN

```
Check05 - infra VLAN received [ok]
```

The infra VLAN check is only successful if the node is connected to a Pod where an APIC exists. If this is not the case, the user can ignore the message because the check is expected to fail.

The leaf determines the infra VLAN based on LLDP packets received from other ACI nodes. The first one it receives is accepted when the switch is in discovery.

```
<#root>

(none)#

moquery -c lldpInst


Total Objects shown: 1

# lldp.Inst
adminSt        : enabled
childAction    :
ctrl           :
dn             : sys/lldp/inst
holdTime       : 120
infraVlan      : 3967
initDelayTime  : 2
lcOwn          : local
modTs          : 2019-09-12T07:25:33.194+00:00
monPolDn       : uni/fabric/monfab-default
```

```
name           :
operErr        :
optTlvSel      : mgmt-addr,port-desc,port-vlan,sys-cap,sys-desc,sys-name
rn             : inst
status         :
sysDesc        : topology/pod-1/node-101
txFreq         : 30

(none)#
```

show vlan encap-id 3967

```
 VLAN Name                             Status    Ports
 ---- -------------------------------- --------- -------------------------------
 8    infra:default                    active    Eth1/1

  VLAN Type  Vlan-mode
 ---- ----- ----------
 8    enet  CE
```

If the infra VLAN has not been programmed on the switchport interfaces connected to the APICs, check for wiring issues detected by the leaf.

<#root>

```
(none)#
```

moquery -c lldpIf -f 'lldp.If.wiringIssues!=""'

```
Total Objects shown: 1

# lldp.If
id           : eth1/1
adminRxSt    : enabled
adminSt      : enabled
adminTxSt    : enabled
childAction  :
descr        :
dn           : sys/lldp/inst/if-[eth1/1]
lcOwn        : local
mac          : E0:0E:DA:A2:F2:83
modTs        : 2019-09-30T18:45:22.323+00:00
monPolDn     : uni/fabric/monfab-default
name         :
operRxSt     : enabled
operTxSt     : enabled
portDesc     :
portMode     : normal
portVlan     : unspecified
rn           : if-[eth1/1]
status       :
sysDesc      :
wiringIssues :
```

infra-vlan-mismatch

Check06 — LLDP Adjacency

```
Check06 - LLDP Adjacency [FAIL]
Error: leaf not connected to any spine
```

In order to determine which ports connect to other ACI devices, the leaf must receive LLDP from the other fabric nodes. To validate LLDP has been received, the user can check with the **show lldp neighbors** command:

```
<#root>

(none)#

show lldp neighbors


Capability codes:
 (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
 (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Device ID            Local Intf      Hold-time  Capability  Port ID
apic1                 Eth1/1          120                    eth2-1
apic2                 Eth1/2          120                    eth2-1
switch                Eth1/51         120        BR          Eth2/32
switch                Eth1/54         120        BR          Eth1/25
Total entries displayed: 4
```

Check07 — Switch Version

```
Check07 - Switch version [ok]
version: n9000-14.2(1j) and apic version: 4.2(1j)
```

If the APIC and leaf versions are not the same, fabric discovery could fail. To validate the version running on the leaf, use the **show version** or the **vsh -c 'show version'** command:

```
<#root>

(none)#

show version


Cisco Nexus Operating System (NX-OS) Software
TAC support: https://www.cisco.com/tac
Documents: https://www.cisco.com/en/US/products/ps9372/tsd_products_support_series_home.htmlCopyright (
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of each
```

```
such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
http://www.opensource.org/licenses/lgpl-2.1.php

Software
 BIOS:      version 07.66
 kickstart: version 14.2(1j) [build 14.2(1j)]
    system:    version 14.2(1j) [build 14.2(1j)]
    PE:        version 4.2(1j)
 BIOS compile time:       06/11/2019
 kickstart image file is: /bootflash/aci-n9000-dk9.14.2.1j.bin
 kickstart compile time:  09/19/2019 07:57:41 [09/19/2019 07:57:41]
 system image file is:    /bootflash/auto-s
 system compile time:     09/19/2019 07:57:41 [09/19/2019 07:57:41]
...
```

The same command also works on the APICs.

<#root>

```
apic1#
```

show version

```
Role        Pod         Node        Name                    Version
----------  ----------  ----------  ----------------------  --------------------
controller  1           1           apic1                   4.2(1j)
controller  1           2           apic2                   4.2(1j)
controller  2           3           apic3                   4.2(1j)
leaf        1           101         leaf101                 n9000-14.2(1j)
leaf        1           102         leaf102                 n9000-14.2(1j)
leaf        1           103         leaf103                 n9000-14.2(1j)
spine       1           1001        spine1                  n9000-14.2(1j)
spine       1           1002        spine2                  n9000-14.2(1j)
```

Check08 — FPGA/EPLD/BIOS Out of Sync

The FPGA, EPLD and BIOS versions could affect the ability of the leaf node to bring up the modules as expected. If these are too far out of date, the interfaces of the switch could fail to come up. The user can validate the running and expected versions of FPGA, EPLD, and BIOS with these **moquery** commands.

<#root>

```
(none)#
```

moquery -c firmwareCardRunning

```
Total Objects shown: 2

# firmware.CardRunning
biosVer        : v07.66(06/11/2019)
childAction    :
descr          :
dn             : sys/ch/supslot-1/sup/running
```

```
expectedVer    : v07.65(09/04/2018)  interimVer     : 14.2(1j)
internalLabel  :
modTs          : never
mode           : normal
monPolDn       : uni/fabric/monfab-default
operSt         : ok
rn             : running
status         :
ts             : 1970-01-01T00:00:00.000+00:00
type           : switch
version        : 14.2(1j)

# firmware.CardRunning
biosVer        : v07.66(06/11/2019)
childAction    :
descr          :
dn             : sys/ch/lcslot-1/lc/running
expectedVer    : v07.65(09/04/2018)  interimVer     : 14.2(1j)
internalLabel  :
modTs          : never
mode           : normal
monPolDn       : uni/fabric/monfab-default
operSt         : ok
rn             : running
status         :
ts             : 1970-01-01T00:00:00.000+00:00
type           : switch
version        : 14.2(1j)


(none)#
```

moquery -c firmwareCompRunning

```
Total Objects shown: 2

# firmware.CompRunning
childAction    :
descr          :
dn             : sys/ch/supslot-1/sup/fpga-1/running
expectedVer    : 0x14  internalLabel  :
modTs          : never
mode           : normal
monPolDn       : uni/fabric/monfab-default
operSt         : ok
rn             : running
status         :
ts             : 1970-01-01T00:00:00.000+00:00
type           : controller
version        : 0x14

# firmware.CompRunning
childAction    :
descr          :
dn             : sys/ch/supslot-1/sup/fpga-2/runnin
expectedVer    : 0x4
internalLabel  :
modTs          : never
mode           : normal
monPolDn       : uni/fabric/monfab-default
operSt         : ok
rn             : running
```

```
status         :
ts             : 1970-01-01T00:00:00.000+00:00
type           : controller
version        : 0x4
```

If the running FPGA version does not match the expected FPGA version, it can be updated with the steps found in the chapter *Fabric discovery* chapter, section *Device replacement* under the scenario *Leaf/Spine EPLD/FPGA not correct, F1582.*

Check09 — SSL Check

```
Check09 - SSL check [check]
SSL certificate details are valid
```

SSL communication is used between all fabric nodes to ensure encryption of control plane traffic. The SSL certificate used is installed during manufacturing and is generated based on the serial number of the chassis. This is the ideal format of the subject:

subject= /serialNumber=PID:N9K-C93xxxxx SN:FDOxxxxxxxx/CN=FDOxxxxxxxx

To validate SSL certificate during the discovery of a switch, use this command.

<#root>

```
(none)#
```

cd /securedata/ssl && openssl x509 -noout -subject -in server.crt

```
subject= /serialNumber=PID:N9K-C93180YC-EX SN:FDO20432LH1/CN=FDO20432LH1
```

Note that it only works as non-root user if the switch node is still in discovery.

The chassis serial number can be found with this command.

<#root>

```
(none)#
```

show inventory

```
NAME: "Chassis",  DESCR: "Nexus C93180YC-EX Chassis"
PID: N9K-C93180YC-EX     ,  VID: V00  ,  SN: FDO20160TPS
...
```

Additionally, the certificate must be valid at the current time. To view the valid dates of the certificate, use the **-dates** flag in the **openssl** command.

<#root>

(none)#

cd /securedata/ssl && openssl x509 -noout -dates -in server.crt

notBefore=Nov 28 17:17:05 2016 GMT
notAfter=Nov 28 17:27:05 2026 GMT

Check10 — Download Policy

Check10 - Downloading policies [FAIL]
Registration to all PM shards is not complete
Policy download is not complete

Once the leaf has IP reachability to the APIC, it downloads its configuration from the APIC and the APIC acknowledges that the download is complete. The status of this process can be viewed with this command.

<#root>

(none)#

moquery -c pconsBootStrap

Total Objects shown: 1

```
# pcons.BootStrap
allLeaderAcked         : no
allPortsInService      : yes
allResponsesFromLeader : yes
canBringPortInService  : no
childAction            :
completedPolRes        : no
dn                     : rescont/bootstrap
lcOwn                  : local
modTs                  : 2019-09-27T22:52:48.729+00:00
rn                     : bootstrap
state                  : completed
status                 :
timerTicks             : 360
try                    : 0
worstCaseTaskTry       : 0
```

Check11 — Time

Check11 - Checking time [ok]
2019-10-01 17:02:34

This check shows the user the current time. If there is too much delta between APIC and switch time, discovery could fail. On the APIC, the time can be checked with the date command.

```
<#root>

apic1#

date

Tue Oct  1 14:35:38 UTC 2019
```

Check12 — Module, PSU, Fan Check

For the switch to have connectivity to other devices, the modules need to be up and online. This can be validated via the **show module** and **show environment** commands.

```
<#root>

(none)#

show module


Mod  Ports  Module-Type                          Model              Status
---  -----  ----------------------------------- ------------------ ----------
1    54     48x10/25G+6x40/100G Switch          N9K-C93180YC-EX    ok

Mod  Sw              Hw
---  --------------  ------
1    14.2(1j)        0.3050

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
1    e0-0e-da-a2-f2-83 to e0-0e-da-a2-f2-cb  FDO20160TPS

Mod  Online Diag Status
---  ------------------
1    pass

(none)#

 show environment


Power Supply:
Voltage: 12.0 Volts

Power                              Actual        Total
Supply    Model                    Output     Capacity    Status
                                 (Watts )     (Watts )
-------  ------------------  -----------  -----------  --------------
1        NXA-PAC-650W-PI              0 W        650 W       shut
2        NXA-PAC-650W-PI            171 W        650 W        ok
                                   Actual        Power
Module     Model                     Draw    Allocated    Status
                                 (Watts )     (Watts )
```

```
--------  ------------------  -----------  -----------  --------------
1         N9K-C93180YC-EX            171 W        492 W    Powered-Up
fan1      NXA-FAN-30CFM-B              N/A          N/A    Powered-Up
fan2      NXA-FAN-30CFM-B              N/A          N/A    Powered-Up
fan3      NXA-FAN-30CFM-B              N/A          N/A    Powered-Up
fan4      NXA-FAN-30CFM-B              N/A          N/A    Powered-Up

N/A - Per module power not available

Power Usage Summary:
--------------------
Power Supply redundancy mode (configured)                Non-Redundant(combined)
Power Supply redundancy mode (operational)               Non-Redundant(combined)

Total Power Capacity (based on configured mode)               650  W
Total Power of all Inputs (cumulative)                        650  W
Total Power Output (actual draw)                              171  W
Total Power Allocated (budget)                                N/A
Total Power Available for additional modules                  N/A

Fan:
------------------------------------------------------
Fan             Model                Hw         Status
------------------------------------------------------
Fan1(sys_fan1)  NXA-FAN-30CFM-B      --         ok
Fan2(sys_fan2)  NXA-FAN-30CFM-B      --         ok
Fan3(sys_fan3)  NXA-FAN-30CFM-B      --         ok
Fan4(sys_fan4)  NXA-FAN-30CFM-B      --         ok
Fan_in_PS1      --                   --         unknown
Fan_in_PS2      --                   --         ok
Fan Speed: Zone 1:  0x7f
Fan Air Filter : Absent

Temperature:
---------------------------------------------------------------------------------
Module   Sensor                        MajorThresh   MinorThres   CurTemp     Status
                                       (Celsius)     (Celsius)    (Celsius)
---------------------------------------------------------------------------------
1        Inlet(1)                        70            42           35         normal
1        outlet(2)                       80            70           37         normal
1        x86 processor(3)                90            80           38         normal
1        Sugarbowl(4)                    110           90           60         normal
1        Sugarbowl vrm(5)                120           110          50         normal
```

If a module is not coming online, reseat the module and check for FPGA, EPLD, or BIOS mismatches.

Example Broken Scenarios

Scenario 1 - First Leaf Does Not Appear in Fabric Membership

In this scenario, the user logs into APIC1 after completing the setup script and no switches have appeared in Fabric Membership. For the discovery of first leaf to occur successfully, the APIC should receive a DHCP Discover from the leaf in discovery phase.

Check that APIC1 is sending LLDP TLVs matching the parameters set in the setup script.

```
apic1#
```

acidiag run lldptool out eth2-1

```
Chassis ID TLV
       MAC: e8:65:49:54:88:a1
Port ID TLV
       MAC: e8:65:49:54:88:a1
Time to Live TLV
       120
Port Description TLV
       eth2-1
System Name TLV
       apic1
System Description TLV
       topology/pod-1/node-1
Management Address TLV
       IPv4: 10.0.0.1
       Ifindex: 4
Cisco Port State TLV
       1
Cisco Node Role TLV
       0
Cisco Node ID TLV
       1
Cisco POD ID TLV
       1
Cisco Fabric Name TLV
       ACIFabric1
Cisco Appliance Vector TLV
       Id: 1
       IPv4: 10.0.0.1
       UUID: c67d1076-a2a2-11e9-874e-a390922be712
Cisco Node IP TLV
       IPv4:10.0.0.1
Cisco Port Role TLV
       2
Cisco Infra VLAN TLV
       3967
Cisco Serial Number TLV
       FCH1929V153
Cisco Authentication Cookie TLV
       1372058352
Cisco Standby APIC TLV
       0
End of LLDPDU TLV
```

Also validate that APIC1 is receiving LLDP from the directly connected leaf node.

<#root>

```
apic1#
```

acidiag run lldptool in eth2-1

```
Chassis ID TLV
       MAC: e0:0e:da:a2:f2:83
Port ID TLV
```

```
       Local: Eth1/1
Time to Live TLV
       120
Port Description TLV
       Ethernet1/1
System Name TLV
       switch
System Description TLV
       Cisco Nexus Operating System (NX-OS) Software 14.2(1j)
TAC support: http://www.cisco.com/tacCopyright (c) 2002-2020, Cisco Systems, Inc. All rights reserved.
System Capabilities TLV
       System capabilities:  Bridge, Router
       Enabled capabilities: Bridge, Router
Management Address TLV
       MAC: e0:0e:da:a2:f2:83
       Ifindex: 83886080
Cisco 4-wire Power-via-MDI TLV
       4-Pair PoE supported
       Spare pair Detection/Classification not required
       PD Spare pair Desired State: Disabled
       PSE Spare pair Operational State: Disabled
Cisco Port Mode TLV
       0
Cisco Port State TLV
       1
Cisco Serial Number TLV
       FDO20160TPS
Cisco Model TLV
       N9K-C93180YC-EX
Cisco Firmware Version TLV
       n9000-14.2(1j)
Cisco Node Role TLV
       1
Cisco Infra VLAN TLV
       3967
Cisco Node ID TLV
       0
End of LLDPDU TLV
```

If APIC1 is receiving LLDP from the directly connected leaf node, the leaf programs the infra VLAN on the ports connected to the APIC. This VLAN programming can be validated via the **show vlan encap-id <x>** command where **x** is the configured infra VLAN.

<#root>

```
(none)#
```

show vlan encap-id 3967

```
VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
8    infra:default                    active    Eth1/1

VLAN Type  Vlan-mode
---- ----- ----------
8    enet  CE
```

If the infra VLAN has not been programmed, check for wiring issues detected by the leaf node.

<#root>

(none)#

moquery -c lldpIf -f 'lldp.If.wiringIssues!=""'

```
Total Objects shown: 1

# lldp.If
id           : eth1/1
adminRxSt    : enabled
adminSt      : enabled
adminTxSt    : enabled
childAction  :
descr        :
dn           : sys/lldp/inst/if-[eth1/1]
lcOwn        : local
mac          : E0:0E:DA:A2:F2:83
modTs        : 2019-09-30T18:45:22.323+00:00
monPolDn     : uni/fabric/monfab-default
name         :
operRxSt     : enabled
operTxSt     : enabled
portDesc     :
portMode     : normal
portVlan     : unspecified
rn           : if-[eth1/1]
status       :
sysDesc      :
wiringIssues :
```

infra-vlan-mismatch

When wiring issues attribute is set to **infra-vlan-mismatch**, the indication is that the leaf has learned of a different infra VLAN than the value which the APIC is sending (the APIC sent value can be verified using the **moquery -c lldpInst** command). This scenario can occur if the leaf receives LLDP from a node that was once a part of another fabric. Essentially, a node in discovery accepts the first infra VLAN received via LLDP. To resolve this, remove the connections between this leaf and the other ACI nodes, except for the APIC, then clean reload the switch with **acidiag touch clean** and **reload** commands. Once the switch has booted, verify the correct infra VLAN is programmed. If this is true, connections can be restored to the other nodes and the user can proceed further with the ACI fabric set up.

Scenario 2 - Other APICs Do Not Join the Cluster

In this scenario, all fabric nodes have been discovered but APIC2 and 3 have not yet joined the APIC cluster.

Validate the setup script values across APICs. Values that must match are:

- Fabric domain
- Fabric ID
- TEP pool
- Infra VLAN

- GIPo
- Cluster size
- Firmware version

<#root>

apic1#

cat /data/data_admin/sam_exported.config

```
Setup for Active and Standby APIC

fabricDomain = ACIFabric1
fabricID = 1
systemName =apic1
controllerID = 1
tepPool = 10.0.0.0/16
infraVlan = 3967
GIPo = 225.0.0.0/15
clusterSize = 3
standbyApic = NO
enableIPv4 = Y
enableIPv6 = N
firmwareVersion = 4.2(1j)
ifcIpAddr = 10.0.0.1
apicX = NO
podId = 1
oobIpAddr = 10.48.22.69/24
```

Verify common issues with the **acidiag cluster** command on all 3 APICs.

<#root>

apic1#

acidiag cluster

```
Admin password:

Product-name = APIC-SERVER-M1
Serial-number = FCH1906V1XV
Running...

Checking Core Generation: OK
Checking Wiring and UUID: OK
Checking AD Processes: Running
Checking All Apics in Commission State: OK
Checking All Apics in Active State: OK
Checking Fabric Nodes: OK
Checking Apic Fully-Fit: OK
Checking Shard Convergence: OK
Checking Leadership Degration: Optimal leader for all shards
Ping OOB IPs:
APIC-1: 10.48.22.69 - OK
APIC-2: 10.48.22.70 - OK
APIC-3: 10.48.22.71 - OK
```

```
Ping Infra IPs:
APIC-1: 10.0.0.1 - OK
APIC-2: 10.0.0.2 - OK
APIC-3: 10.0.0.3 - OK
Checking APIC Versions: Same (4.2(1j))
Checking SSL: OK

Done!
```

Finally, use **avread** to validate if these settings match across all APICs. Note that this is a different command from the typical **acidiag avread** which shows similar output, but is parsed for easier consumption.

<#root>

apic1#

avread

```
Cluster:
-------------------------------------------------------------------------
fabricDomainName        ACIFabric1
discoveryMode           PERMISSIVE
clusterSize             3
version                 4.2(1j)
drrMode                 OFF
operSize                3

APICs:
-------------------------------------------------------------------------
                APIC 1                  APIC 2                  APIC 3
version          4.2(1j)                 4.2(1j)                 4.2(1j)
address          10.0.0.1                10.0.0.2                10.0.0.3
oobAddress       10.48.22.69/24          10.48.22.70/24          10.48.22.71/24
routableAddress  0.0.0.0                 0.0.0.0                 0.0.0.0
tepAddress       10.0.0.0/16             10.0.0.0/16             10.0.0.0/16
podId            1                       1                       1
chassisId        3c9e5024-.-5a78727f     573e12c0-.-6b8da0e5     44c4bf18-.-20b4f52&    cntrlSbst_seri
active           YES                     YES                     YES
flags            cra-                    cra-                    cra-
health           255                     255                     255
apic1#
```

Scenario 3 - Spine Does Not Appear in Fabric Membership

In this scenario, the first leaf has been discovered in the fabric but no spines have appeared for discovery under the Fabric Membership submenu.

Validate physical connectivity from leaf to spine. In this example, the leaf switch is connected to a spine via interface e1/49.

<#root>

leaf101#

show int eth1/49

```
Ethernet1/49 is up
admin state is up, Dedicated Interface
 Hardware: 1000/10000/100000/40000 Ethernet, address: 0000.0000.0000 (bia e00e.daa2.f3f3)
 MTU 9366 bytes, BW 100000000 Kbit, DLY 1 usec
 reliability 255/255, txload 1/255, rxload 1/255
 Encapsulation ARPA, medium is broadcast
 Port mode is routed
 full-duplex, 100 Gb/s
...
```

If the port is in an "out-of-service" status, check on the spine that LLDP has been received from the directly connected leaf.

<#root>

(none)#

show lldp

```
 neighbors
Capability codes:
 (R) Router, (B) Bridge, (T) Telephone, (C) DOCSIS Cable Device
 (W) WLAN Access Point, (P) Repeater, (S) Station, (O) Other
Device ID            Local Intf      Hold-time  Capability  Port ID
leaf102               Eth2/27         120        BR          Eth1/53
leaf103               Eth2/29         120        BR          Eth1/49
leaf101               Eth2/32         120        BR          Eth1/51
Total entries displayed: 3
```

Another validation is to verify that there is no version difference between leaf and spine. If there is, remediate the situation by copying the newer version to /bootflash of the spine. Then, configure the switch to boot to the software with these commands:

<#root>

(none)#

ls -alh /bootflash

```
total 3.0G
drwxrwxr-x  3 root admin 4.0K Oct  1 20:21 .
drwxr-xr-x 50 root root  1.3K Oct  1 00:22 ..
-rw-r--r--  1 root root  3.5M Sep 30 21:24 CpuUsage.Log
-rw-rw-rw-  1 root root  1.7G Sep 27 14:50 aci-n9000-dk9.14.2.1j.bin
-rw-r--r--  1 root root  1.4G Sep 27 21:20 auto-s
-rw-rw-rw-  1 root root     2 Sep 27 21:25 diag_bootup
-rw-r--r--  1 root root    54 Oct  1 20:20 disk_log.txt
-rw-rw-rw-  1 root root   693 Sep 27 21:23 libmon.logs
drwxr-xr-x  4 root root  4.0K Sep 26 15:24 lxc
-rw-r--r--  1 root root  384K Oct  1 20:20 mem_log.txt
-rw-r--r--  1 root root  915K Sep 27 21:10 mem_log.txt.old.gz
-rw-rw-rw-  1 root root   12K Sep 27 21:17 urib_api_log.txt
```

(none)#

```
setup-bootvars.sh aci-n9000-dk9.14.2.1j.bin


In progress
In progress
In progress
In progress
Done
```

If the new image is continuously removed from bootflash, ensure that the folder is less than half full by removing older images or auto-s file; check the space utilization by using 'df -h' on the switch.

After setting the boot variable, reload the switch and it boots to the new version.

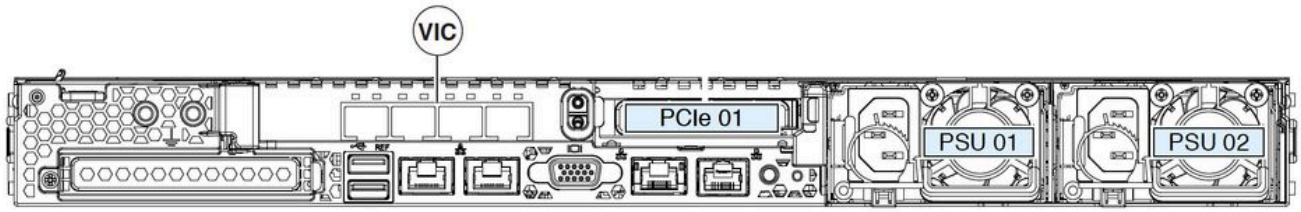
FPGA, EPLD, and BIOS validation is possibly required after reload. Please refer to the sub-section *Leaf/Spine EPLD/FPGA not correct, F1582* for further troubleshooting on this matter.

Scenario 4 - After Initial Fabric Discovery, Cluster Flaps Between Fully Fit and Degraded

If this is happening after a new fabric setup, it can be caused by incorrect cabling of the APIC-M3 or APIC-L3 connecting into the fabric. You can confirm such incorrect cabling by executing **show lldp neighbors** on both leaf switches connected to the APIC. Notice after executing this multiple times that both leaf switches are seeing the same APIC interface.

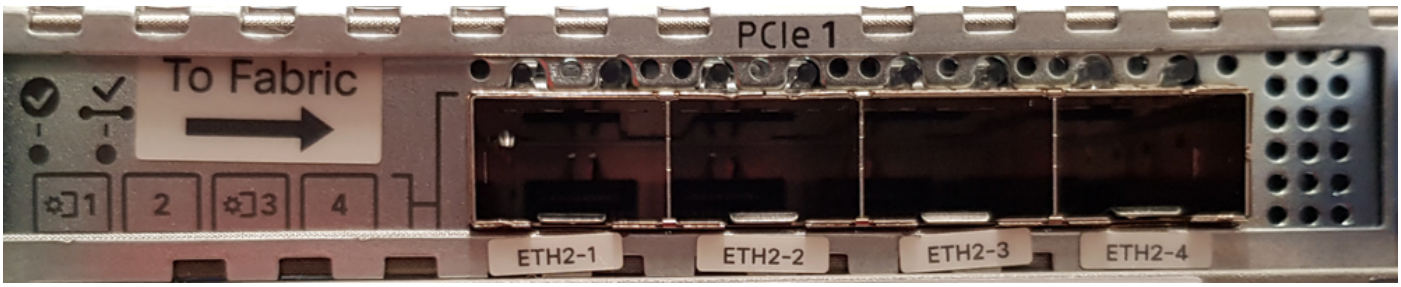
The back of an APIC-M3/L3 server looks like this.

Rear-view of APIC-M3/L3 server:



Note that for an APIC-M3/L3, the VIC card has 4 ports: ETH2-1, ETH2-2, ETH2-3, and ETH2-4, as seen here.

View of APIC VIC 1455 with labels:



The rules to connect the APIC server to leaf switches are:

- All ports must have the same speed, either 10-Gigabit or 25-Gigabit.
- ETH2-1 and ETH2-2 is one port-channel pair, corresponding to eth2-1 ('ifconfig' output) from the APIC OS.
- ETH2-3 and ETH2-4 is the other port-channel pair, corresponding to eth2-2 ('ifconfig' output) on APIC OS.
- Only one connection is allowed per port-channel pair. For example, connect one cable to either ETH2-1 or ETH2-2, and connect another cable to either ETH2-3 or ETH2-4. (**Never connect both ETHs in a port channel pair. This leads to fabric discovery issues.**).

For further understanding, this graph represents the VIC port mapping to APIC bond:

VIC 1455 ports — APIC redundant fabric port: