

CISCO APPLICATION CENTRIC INFRASTRUCTURE

BuzzfeedNEWS



Date & Time Policy by Tomas de Leon

Table of Contents

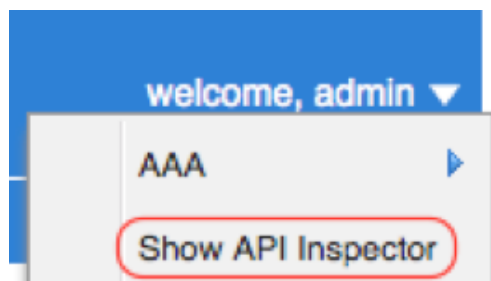
Introduction	3
Preparing the ACI Fabric for Date & Time Policy	4
Configuring a Date & Time Policy using Network Time Protocol (NTP)	11
Verify Date & Time Policy using Network Time Protocol (NTP) is Applied and Operational on APICs and Switches	20
Additional information for Troubleshooting Date & Time Policy using Network Time Protocol (NTP) on APICs and Switches	27

Introduction

The **ACI BuzzfeedNEWS** Technote will introduce you to configuring Date & Time Policy for Controllers and LeafSpine Switches in the ACI fabric. The Date & Time Policy for the Cisco ACI system is a crucial component to successful management and fabric operations. Date & Time synchronization plays a key role in the ACI Fabric Discovery and continued communications between the Controllers and Nodes in the ACI Fabric. The material in this Technote should provide some guidance on configuration and troubleshooting the Date & Time Policy in the ACI Fabric.

This Technote will show examples of configuring Date & Time Policy using the APIC Admin GUI, APIC CLI, and REST API (using POSTMAN).

In regards to the REST API examples listed in this Technote, there is an assumption made that you have a REST CLIENT (like POSTMAN) installed on your workstation. POSTMAN can be used for executing REST API requests to an APIC Controller. Also, while executing listed configuration tasks, you may want to open the API inspector console from the APIC GUI. The API inspector displays the API POST requests used for the tasks performed. The Post Requests in the API inspector can be used for sending requests to APIC controllers.



Note: This Technote example will show you how to configure the Date & Time Policy for Controllers and LeafSpine Switches in the ACI fabric.

Key objectives for this Technote:

- Prepare the ACI Fabric for a Date and Policy
- Configure a Date and Time Policy using Network Time Protocol (NTP)
- Verify Date and Time policy is Applied and Operational on APICs and Switches

For this Technote example, refer to the following information about the ACI Fabric topology and the Application Server. The sample set of parameters were used to demonstrate configuring Date & Time Policy in an ACI Pod.

Device\Entity	NodeID	Fabric - OOB Mgmt Address
APIC 1	1	10.122.254.141
APIC 2	2	10.122.254.142
APIC 3	3	10.122.254.143
Spine 1	201	10.122.254.130
Spine 2	202	10.122.254.131
Leaf 1	101	10.122.254.128
Leaf 2	102	10.122.254.135
Leaf 3	103	10.122.254.136
Leaf 4	104	10.122.254.137
Default Gateway for Nodes		10.122.254.1 / 24
NTP Server 1	Preferred	172.18.108.15
NTP Server 2		10.81.254.202
NTP Server 3		171.68.38.66
NTP Server 4		10.81.254.131

Preparing the ACI Fabric for Date & Time Policy

Preface: *The INSBU has stated that the recommended way to change the APIC time is to change the System Date/Time via CIMC BIOS (F2). The reasons given by the BU is that "losing CMOS time is rare and we don't want to add more steps to the APIC setup script screen to initialize the date/time."*

As we have seen in past Service Requests and email inquiries, Date and Time inconsistencies have caused operational issues in the ACI Fabric. A Date and Time Policy with NTP Services is a "Best Practice" and is required for some ACI features (like Atomic Counters). But in the event that NTP Services is **NOT** configured or connectivity is lost, Date and Time synchronization is crucial to the successful operations of the ACI Fabric.

This section will show you some ways to help alleviate some Date and Time inconsistencies by setting the Date and Time manually on all the Nodes in the ACI Fabric. This section may also be necessary in resolving Fabric Discovery issues during the initial setup. Since Members of the Fabric are not yet registered, a Date and Time Policy cannot be configured and pushed to the Nodes in the Fabric. Therefore, Manual configuration of Date and Time will be necessary.

Some Requirements that are needed to successfully perform the steps in this section:

- Console Access to all of the NODE Switches in the Fabric
- CIMC Access to all of the APIC Controllers in the Fabric
- Access to the "APIC Temporary Root Password Generator" tool
<http://git.insieme.local/cgi-bin/generateRootPassword.py>

Root Access will be necessary to change the Date\Time on APIC Controllers and Node Switches and then to synchronize to the "Hardware" Clock.

Perform the following tasks on each APIC Controller and NODE Switch in your Fabric. You can access the Controllers and Switches via SSH, Console, or CIMC to perform these tasks:

This Section will:

- **Generate a Temporary Root Password to be used for this Lab**
- **Check CURRENT Date and Time on Each Controller and Node Switches**
- **Update and Save UPDATED Date and Time on Each Controller and Node Switches. Make sure to synchronize the Updated System Running Clock to the Hardware Clock.**
- **Check Existing NTP Configuration Parameters on Each Controller and Node Switches**

Note: As mentioned above, Please refer to the Table above to use for a reference for the Technote Fabric and Date & Time Servers.

STEP 1: Generate a Temporary Root Password to be used for the following tasks in this section.

You can generate a temporary Root Password before you start this section or you can generate them as needed.

- SSH to an APIC or NODE Switch (Assumption made for this lab is that all Nodes are already registered to your ACI Fabric)
- Execute CLI Command "[acidiag dbgtoken](#)"
- Open a Web Browser and goto to URL "<http://git.insieme.local/cgi-bin/generateRootPassword.py>" for the APIC Temporary Root Password Generator Tool.
- Enter your Debug-Token and Click **GENERATE**
- **Copy** the Temporary-Root-Password#> String and **Paste** to a Temporary Text File to be used for the tasks in this section.

Sample Task Output

From the APIC CONTROLLER:

```
admin@fab2-apic1:~> acidiag dbgtoken  
DCCCKHDALAGJ
```

```
APIC Temporary Root Password Generator  
http://git.insieme.local/cgi-bin/generateRootPassword.py
```

```
Temporary-Root-Password#> VJZLFMZADht+JzCWVP4qqzR55iUXb+DRJXD0/r/  
RUQujHpp0dARn9TRAdEMTyU26XjbGpjBo8muuDSvsaCoRnw==
```

Note: The same process can be performed on the Node Switches. If all Nodes are registered as part of the same ACI Fabric, the generated "Temporary-Root-Password#>" string can be used on all Nodes in the Fabric.

STEP 2: Check CURRENT Date and Time on Each Controller and Node Switches.

- Access the Controllers and Switches via SSH, Console, or CIMC
- Login as "root" User
- Check **CURRENT** Date and Time

Sample Task Output

From the APIC CONTROLLER:

```
admin@fab2-apic1:~> ssh root@127.0.0.1  
Warning: Permanently added '127.0.0.1' (RSA) to the list of known hosts.  
Happy New Year from the ACI Solutions Team!  
root@127.0.0.1's password: VJZLFMZADht+JzCWVP4qqzR55iUXb+DRJXD0/r/  
RUQujHpp0dARn9TRAdEMTyU26XjbGpjBo8muuDSvsaCoRnw==
```

```
root@fab2-apic1:~# whoami  
root
```

```
# Check Current OS Date and Time  
root@fab2-apic1:~# date  
Sat Jan 5 22:15:06 UTC 2013  
** Notice the Date is a 2 years off
```

```
# Check Current Hardware Clock
root@fab2-apic1:~# hwclock
Sat Jan 5 22:15:11 2013 -0.437933 seconds
```

From a LEAF\SPINE NODE:

```
fab2-leaf1# ssh root@127.0.0.1
Password: VJZLFMZADht+JzCWVP4qqzR55iUXb+DRJXD0/r/
RUQujHpp0dARn9TRAdEMTyU26XjbGpjBo8muuDSvsaCoRnw==
```

```
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2014, Cisco Systems, Inc. All rights reserved.
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
```

```
fab2-leaf1# whoami
root
```

```
# Check Current OS Date and Time
fab2-leaf1# date
Sat Jan 5 22:31:05 UTC 2013
```

```
# Check Current Hardware Clock
fab2-leaf1# hwclock
Sat Jan 5 22:31:20 2013 -0.594122 seconds
```

STEP 3: Update and Save UPDATED Date and Time on Each Controller and Node Switches. Make sure to synchronize the Updated System Running Clock to the Hardware Clock.

Note: Even if the Date and Time are correct, Go ahead and UPDATE time anyway. Updating the Hardware Clock is crucial to preserve the Date and Time configuration after a Controller or Node Switch is reloaded.

From the APIC CONTROLLER:

```
# Set Date and Time
root@fab2-apic1:~# date --set="05 JAN 2015 22:16:30"
Mon Jan  5 22:16:30 UTC 2015

# Check Hardware Clock
root@fab2-apic1:~# hwclock
Sat Jan  5 22:16:03 2013  -0.359768 seconds

# Synchronize\Save Current Running Clock to Hardware Clock
root@fab2-apic1:~# hwclock --systohc

# Verify Clock Synchronization
root@fab2-apic1:~# date
Mon Jan  5 22:16:49 UTC 2015

root@fab2-apic1:~# hwclock
Mon Jan  5 22:16:56 2015  -0.594129 seconds
```

From a LEAF\SPINE NODE:

```
# Set Date and Time
fab2-leaf1# date --set="05 JAN 2015 22:34:30"
Mon Jan  5 22:34:30 UTC 2015

# Check Hardware Clock
fab2-leaf1# hwclock
Sat Jan  5 22:33:51 2013  -0.969122 seconds

# Synchronize\Save Current Running Clock to Hardware Clock
fab2-leaf1# hwclock --systohc
```



```
fab2-leaf1# date
Mon Jan 5 22:35:00 UTC 2015
```

```
fab2-leaf1# hwclock
Mon Jan 5 22:35:05 2015 -0.495720 seconds
```

STEP 4: Check Existing NTP Configuration Parameters on Each Controller and Node Switches.

Note: This task is performed prior to NTP being setup. This task simply verifies there is no NTP configuration at this point in the Fabric setup. If NTP is already running in your fabric, use the following sections to check and verify the existing NTP configuration.

Check CURRENT NTP Configuration on APIC(s)

```
root@fab2-apic1:~# cat /etc/ntp.conf
# For more information about this file, see the man pages
# ntp.conf(5), ntp_acc(5), ntp_auth(5), ntp_clock(5), ntp_misc(5),
ntp_mon(5).
logfile /var/log/ntp.log
```

```
root@fab2-apic1:~# ntpstat
unsynchronised
  time server re-starting
  polling server every 8 s
```

Check CURRENT NTP Configuration on Node SWITCH(s)

```
# Exit ROOT User
fab2-leaf1# exit
logout
Connection to 127.0.0.1 closed.
```

```
fab2-leaf1# whoami
admin
```

```
fab2-leaf1# show clock
22:37:00.538197 UTC Mon Jan 05 2015
```

```
fab2-leaf1# show ntp peers
```

```
-----  
Peer IP Address          Serv/Peer  
-----
```

```
fab2-leaf1# show ntp peer-status
```

```
Total peers : 0
```

```
* - selected for sync, + - peer mode(active),
```

```
- - peer mode(passive), = - polled in client mode
```

```
remote          local          st    poll    reach delay  
vrf
```

```
-----
```

```
fab2-leaf1# vsh -c "show ntp status"
```

```
Distribution : Disabled
```

```
Last operational state: No session
```

The ACI Fabric is in a prepared state and is ready to proceed to the next stages of this Technote.

Configuring a Date & Time Policy using Network Time Protocol (NTP)

The date and time policies are based on international time zones and a defined NTP server. Before configuring a date and time policy under a domain group, this policy must first be created. Policies under the domain group's root were already created by the system and ready to configure.

This Section will:

- **Create a Date and Time Policy using APIC Admin GUI**
- **Add a NTP SERVER using Rest API**
- **Add a NTP SERVER using APIC CLI**

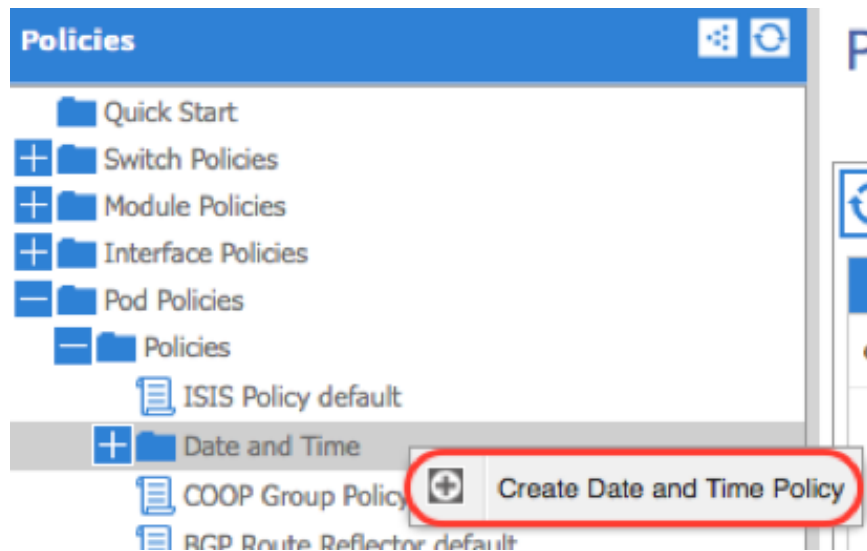
Note: As mentioned above, Please refer to the Table above to use for a reference for the Technote Fabric and Date & Time Servers.

STEP 1: Create a Date and Time Policy using APIC Admin GUI

Create Date and Time Policy for your ACI Fabric. Create the new policy with the NTP Providers. For this example, I am using "NTP Server 1" and "NTP Server 2" provided in the Table above.

Task 1.1 Create Date and Time Policy for your designated Fabric. "NTP Server 1" and "NTP Server 2" for NTP Providers

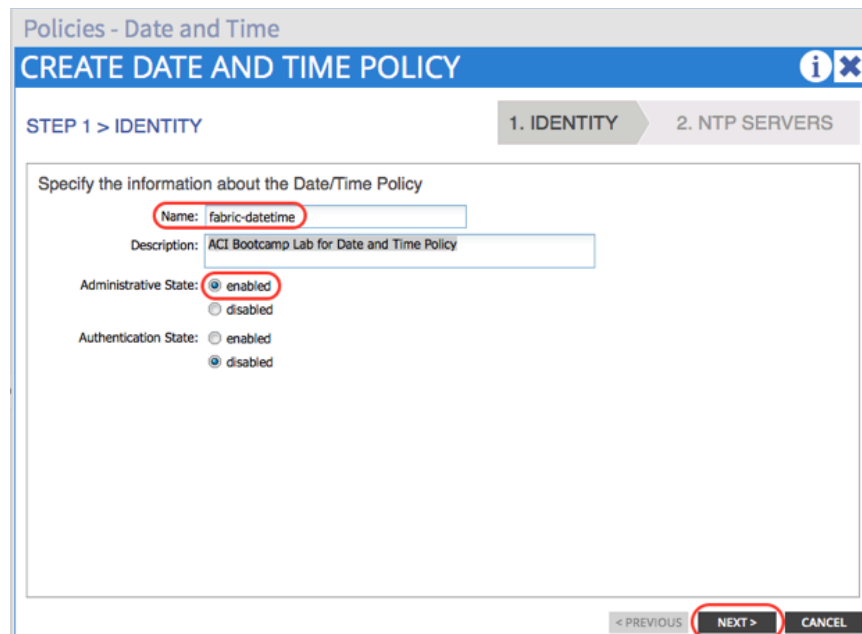
- On the menu bar, choose **FABRIC > FABRIC POLICIES**. In the Navigation pane, perform the following actions:
 - ➔ Expand **Pod Policies**
 - ➔ Expand **Policies**
 - ➔ Select **Date and Time**
 - ➔ Right Click and Select "**Create Date and Time Policy**"



- In the **CREATE DATE AND TIME POLICY** Wizard

➔ **STEP 1 > IDENTITY**

- Enter Name (*fabric-datetime*)
- Enter Description (*ACI Bootcamp Lab for Date and Time Policy*)
- Select Administrative State (*enabled*)
- Select Authentication State (*disabled*)
- Click **NEXT**



➔ STEP 2 > NTP SERVERS

- Specify the NTP servers to be used in this policy
- Click "+" to add NTP Servers
- **Create Providers** Wizard, perform actions:
 - Enter **Name** (which is Hostname or IP Address) (172.18.108.15)
 - Enter **Description** (NTP Server 1 (Preferred))
 - Check the **Preferred** Box
 - Minimum Polling Interval (4)
 - Maximum Polling Interval (6)
 - Select Management EPG (default (Out-of-Band))
 - Click **OK**

Repeat STEP 2 to add a second NTP Server (NTP Server 2 - 10.81.254.202). For the PREFERRED field, leave UNCHECKED. The remaining values are the same as NTP Server 1.

- Click **FINISH**

CREATE PROVIDERS

Specify the information about the NTP Server

Name: 172.18.108.15

Description: NTP Server 1 (Preferred)

Preferred:

Minimum Polling Interval: 4

Maximum Polling Interval: 6

Management EPG: default (Out-of-Band)

OK

CREATE PROVIDERS

Specify the information about the NTP Server

Name: 10.81.254.202

Description: NTP Server 2

Preferred:

Minimum Polling Interval: 4

Maximum Polling Interval: 6

Management EPG: default (Out-of-Band)

OK

CREATE DATE AND TIME POLICY

STEP 2 > NTP SERVERS

1. IDENTITY 2. NTP

Specify the NTP servers to be used in this policy

Host Name/IP Address	Preferred	Minimum Polling Interval	Maximum Polling Interval	Management EPG
172.18.108.15	True	4	6	default (Out-of-Band)
10.81.254.202	False	4	6	default (Out-of-Band)

- Verify Date and Time Policy creation with NTP Servers
 - ➔ Expand "Date and Time"
 - ➔ Select "Policy fabric-datETIME"
 - ➔ In the "Policy fabric-datETIME" Work pane, verify the following:
 - ⦿ Administrative State (enabled)
 - ⦿ NTP Server Configuration should list 172.18.108.15 (preferred) and 10.81.254.202

Date and Time Policy - Policy fabric-datETIME

POLICY

↻ ↓

PROPERTIES

Name: **fabric-datETIME**

Description: ACI Bootcamp Lab for Date and Time Policy

Administrative State: enabled
 disabled

Authentication State: enabled
 disabled

NTP Servers: + ×

HOST NAME/IP ADDRESS	PREFERRED	MINIMUM POLLING INTERVAL	MAXIMUM POLLING INTERVAL	MANAGEMENT EPG
10.81.254.202	False	4	6	default (Out-of-Band)
172.18.108.15	True	4	6	default (Out-of-Band)

Task 1.2 Configure the Datetime Format

For this task, you will set the Time Zone for your designated Fabric and configure the properties for the Fabric's Datetime Format.

- In the navigation pane under Fabric > Fabric Policies > Pod Policies > Policies > Date and Time, Select DATE/TIME Format and perform the following actions:
 - ➔ Select **Time Zone** (UTC(-04:00) America/New_York)
 - ➔ Select **Display Format** (local)
 - ➔ Select **Offset State** (enabled)
 - ➔ Click **SUBMIT**

Datetime Format - Date/Time Format

The screenshot shows a configuration window titled "PROPERTIES" with the following settings:

- Time Zone: UTC(-04:00) America/New_York
- Display Format: utc, local
- Offset State: enabled, disabled

Task 1.3 Configure the Fabric Pod Policy to use your Date\Time Policy

In the navigation pane under **Fabric > Fabric Policies > Pod Policies**, expand **Policies** and perform the following actions:

- **Create a POD Policy Group**
 - ➔ Select **Policy Groups**
 - ➔ Right Click and Select "**Create POD Policy Group**"
 - ➔ In the **CREATE POD POLICY GROUP** wizard, perform the following actions:
 - ⦿ Enter **Name** (fabric-policyGroup)

- Enter **Description** (ACI Bootcamp Lab for Date and Time Policy)
- Select **Date Time Policy** (fabric-datetime)
- Click **SUBMIT**

Policy Groups

default

Global Policies

Create POD Policy Group

CREATE POD POLICY GROUP

Specify the Policy Group properties

Name: fabric-policyGroup

Description: ACI Bootcamp Lab for Date and Time Policy

Date Time Policy: fabric-datetime

- **Assign New Policy Group as the DEFAULT "Fabric Policy Group"**
 - ➔ In the navigation pane under **Fabric > Fabric Policies > Pod Policies**, Select "**default**" and in the **Pod Selector - default** Work pane, perform the following actions:
 - Enter **Description** (ACI Bootcamp Lab for Date and Time Policy)
 - Select **Fabric Policy Group** (fabric-policyGroup)

Pod Selector - default

Refresh Download

PROPERTIES

Name: default

Description: ACI Bootcamp Lab for Date and Time Policy

Type: ALL

Fabric Policy Group: fabric-policyGroup

STEP 2: Add a NTP SERVER using Rest API

Add "NTP Server 3" to the existing Date and Time Policy. Use the NTP Information below and use the **APIC REST API** and **POSTMAN** application to add the NTP Server to the Date and Time policies Provider list.

Date and Time Policy = fabric-datetime

NTP Server Information

host-name-ip-address = 171.68.38.66

description = NTP Server 3

preferred = no

minimum-polling-interval = 4

maximum-polling-interval = 6

management-epg = tenants/mgmt/node-management-epgs/default/out-of-band/default

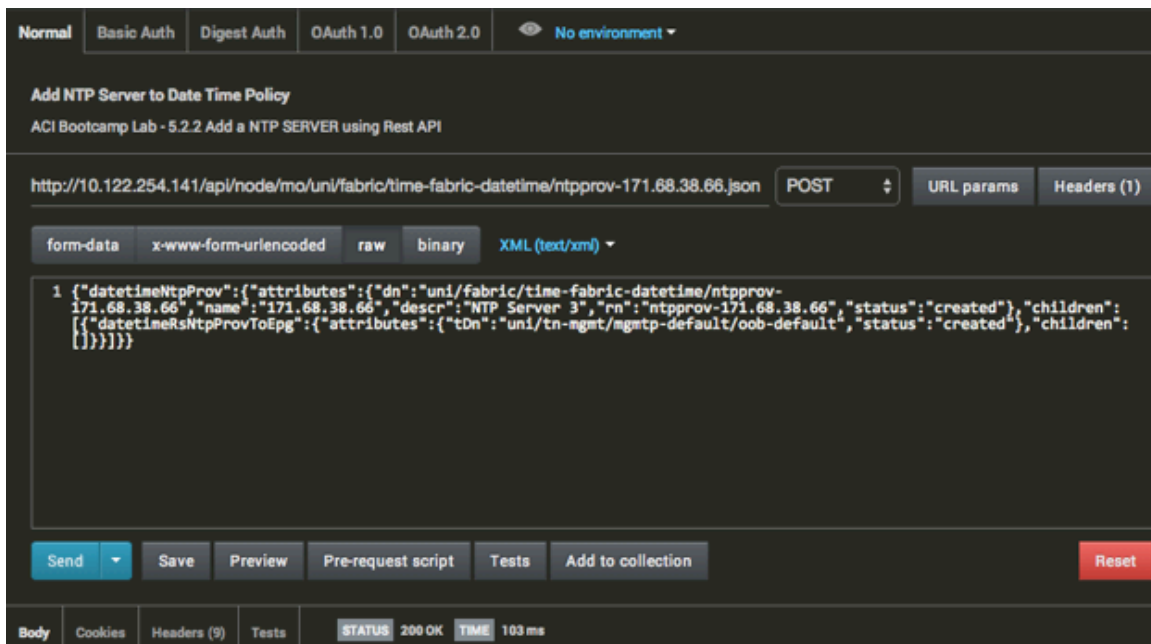
method: **POST**

url:

<http://10.122.254.141/api/node/mo/uni/fabric/time-fabric-datetime/ntpprov-171.68.38.66.json>

payload

```
{ "datetimeNtpProv": { "attributes": { "dn": "uni/fabric/time-fabric-datetime/ntpprov-171.68.38.66", "name": "171.68.38.66", "descr": "NTP Server 3", "rn": "ntpprov-171.68.38.66", "status": "created" }, "children": [ { "datetimeRsNtpProvToEpg": { "attributes": { "tDn": "uni/tn-mgmt/mgmt-default/oob-default", "status": "created" }, "children": [ ] } } ] } }
```



STEP 3: Add a NTP SERVER using APIC CLI

Add "NTP Server 4" to the existing Date and Time Policy. Use the NTP Information below and use the **APIC CLI** to add the NTP Server to the Date and Time policies Provider list.

Date and Time Policy = fabric-datetime

NTP Server Information

host-name-ip-address = 10.81.254.131
 description = NTP Server 4
 preferred = no
 minimum-polling-interval = 4
 maximum-polling-interval = 6
 management-epg = tenants/mgmt/node-management-epgs/default/out-of-band/default

- **SSH to an APIC and perform the following actions:**

- ➔ cd /home/admin/aci/fabric/fabric-policies/pod-policies/policies/date-and-time/date-and-time-policy-fabric-datetime/ntp-servers
- ➔ mcreate providers 10.81.254.131
- ➔ cd providers-10.81.254.131
- ➔ moset description "NTP Server 4"
- ➔ moset preferred no
- ➔ moset minimum-polling-interval 4
- ➔ moset maximum-polling-interval 6
- ➔ moset management-epg tenants/mgmt/node-management-epgs/default/out-of-band/default
- ➔ moconfig commit

Example Output:

```
admin@fab2-apic1:~> cd /home/admin/aci/fabric/fabric-policies/pod-policies/policies/date-and-time/date-and-time-policy-fabric-datetime/ntp-servers
```

```
admin@fab2-apic1:ntp-servers> pwd
/home/admin/aci/fabric/fabric-policies/pod-policies/policies/date-and-time/date-and-time-policy-fabric-datetime/ntp-servers
```

```
admin@fab2-apic1:ntp-servers> mcreate providers 10.81.254.131
```

```
admin@fab2-apic1:ntp-servers> ls
providers-10.81.254.131 providers-10.81.254.202
providers-171.68.38.66 providers-172.18.108.15 summary
```

```
admin@fab2-apic1:ntp-servers> cd providers-10.81.254.131

admin@fab2-apic1:providers-10.81.254.131> moset description "NTP
Server 4"
admin@fab2-apic1:providers-10.81.254.131> moset preferred no
admin@fab2-apic1:providers-10.81.254.131> moset minimum-polling-
interval 4
admin@fab2-apic1:providers-10.81.254.131> moset maximum-polling-
interval 6
admin@fab2-apic1:providers-10.81.254.131> moset management-epg
tenants/mgmt/node-management-eggs/default/out-of-band/default
admin@fab2-apic1:providers-10.81.254.131> moconfig commit
Committing mo 'fabric/fabric-policies/pod-policies/policies/date-and-
time/date-and-time-policy-fabric-datetime/ntp-servers/
providers-10.81.254.131'
```

All mos committed successfully.

```
admin@fab2-apic1:providers-10.81.254.131> cat summary
# providers
host-name-ip-address      : 10.81.254.131
description                : NTP Server 4
preferred                  : no
minimum-polling-interval  : 4
maximum-polling-interval  : 6
key-id                     : 0
management-epg            : tenants/mgmt/node-management-eggs/default/
out-of-band/default
auth-key-id                :
```

Verify Date & Time Policy using Network Time Protocol (NTP) is Applied and Operational on APICs and Switches

Verify the configuration of NTP Services for Controllers and Leaf\Spine Switches in your ACI fabric. This section will provide references for CLI commands and tools that may be helpful in troubleshooting the configuration and application of the Date & Time policy for Controllers and Leaf \Spine Switches in your ACI fabric.

This section will:

- **Verify configuration of Date & Time Policy (NTP) on APIC Controllers.**
- **Verify configuration of Date & Time Policy (NTP) on Leaf\Spine Node Switches.**

Note: The examples given in this section of the Technote are not totally inclusive. These are just some examples that I have gathered while troubleshooting NTP Services for the ACI Fabric.

Task 1 Verify configuration of Date & Time Policy (NTP) on APIC Controllers

- **SSH to APIC Controllers and perform the following actions:**

- ★ **CLI Commands**

- ➔ `cat /etc/ntp.conf`
- ➔ `ntpstat`
- ➔ `ntpq -pn`
- ➔ `echo $?`

Sample Output:

```
admin@fab2-apic1:~> cat /etc/ntp.conf
OPTIONS="-u ntp:ntp -p /var/run/ntpd.pid"

# Permit time synchronization with our time source, but do not
# permit the source to query or modify the service on this system.
restrict default kod nomodify notrap nopeer noquery
restrict -6 default kod nomodify notrap nopeer noquery

# Permit all access over the loopback interface. This could
# be tightened as well, but to do so would effect some of
# the administrative functions.
#restrict default ignore
```

```
restrict 127.0.0.1
#restrict -6 ::1
keysdir /etc/ntp/
keys /etc/ntp/keys
```

```
server 10.81.254.131 minpoll 4 maxpoll 6
server 171.68.38.66 minpoll 4 maxpoll 6
server 172.18.108.15 prefer minpoll 4 maxpoll 6
server 10.81.254.202 minpoll 4 maxpoll 6
```

```
# show network time synchronization status
```

```
admin@fab2-apic1:~> ntpstat
```

```
synchronised to NTP server (172.18.108.15) at stratum 2
```

```
time correct to within 4 ms
```

```
polling server every 64 s
```

```
admin@fab2-apic1:~> ntpq -pn
```

```
remote          refid          st t when poll reach  delay  offset
jitter
```

```
=====
```

```
*172.18.108.15  .GPS.          1 u   63   64  377   0.102
0.026   0.007
+10.81.254.202  .GPS.          1 u   59   64  377   0.324
-0.012   0.022
```

```
admin@fab2-apic1:~> echo $?
```

```
0
```

```
# exit status
```

```
# 0 - Clock is synchronised
```

```
# 1 - Clock is not synchronised
```

```
# 2 - If clock state is indeterminant, for example if ntpd is not
contactable.
```

```
admin@fab2-apic1:~> date
```

```
Wed Jan  7 02:45:11 EST 2015
```

Task 2 Verify configuration of Date & Time Policy (NTP) on Leaf\Spine Node Switches

- **SSH to LEAF\SPINE NODES and perform the following actions:**

★ CLI Commands

- ➔ show ntp peers
- ➔ show ntp peer-status
- ➔ show ntp statistics peer ipaddr 172.18.108.15
- ➔ vsh -c "show ntp status"
- ➔ vsh -c "show ntp statistics io"
- ➔ vsh -c "show ntp statistics local"
- ➔ show ntp internal log-buffer
- ➔ show ntp internal event-history msgs
- ➔ show ntp internal event-history config
- ➔ (root) tcpdump -i eth0 -f port 123
- ➔ cat /etc/timezone
- ➔ cat /etc/timestamp

Sample Output:

```
fab2-leaf1# show ntp peers
```

```
-----
Peer IP Address          Serv/Peer
-----
172.18.108.15           Server (configured)
10.81.254.202           Server (configured)
171.68.38.66           Server (configured)
10.81.254.131          Server (configured)
```

```
fab2-leaf1# show ntp peer-status
```

```
Total peers : 4
```

```
* - selected for sync, + - peer mode(active),
```

```
- - peer mode(passive), = - polled in client mode
```

```
remote          local          st  poll  reach delay  vrf
-----
*172.18.108.15  0.0.0.0        1   64   337  0.00037 management
=10.81.254.202  0.0.0.0        1   64   377  0.00046 management
=171.68.38.66   0.0.0.0        1   64   377  0.07112 management
=10.81.254.131  0.0.0.0        2   64    0   0.00000 management
```

```
fab2-leaf1# show ntp statistics peer ipaddr 172.18.108.15
```

```
remote host:          172.18.108.15
local interface:      Unresolved
time last received:   33s
time until next send: 29s
reachability change:  44612s
packets sent:         2655
packets received:     2601
bad authentication:   0
bogus origin:         0
duplicate:            0
bad dispersion:       0
bad reference time:   0
candidate order:      6
```

```
fab2-leaf1# date
```

```
Wed Jan  7 02:46:55 EST 2015
```

```
fab2-leaf1# show ntp internal log-buffer
```

```
l3vm_api_init() failed
```

```
Log buffer:
```

```
Mon 18:29:11 UTC Nov 24 2014NTPD pid is not valid
```

```
Mon 18:29:11 UTC Nov 24 2014ntp_spawn_ntpd: Parent gets the pid of child: 4515
```

```
Mon 18:29:11 UTC Nov 24 2014ntp_openhost: Binding to /tmp/ntp_client_1
```

```
Mon 18:29:11 UTC Nov 24 2014ntp_openhost: Opening a client unix socket successful
```

```
Mon 18:29:12 UTC Nov 24 2014ntp_handle_hello_sanity: Hello sanity check failed, ret_val = 1077346330, count = 1
```

```
Mon 18:29:13 UTC Nov 24 2014ntp_handle_hello_sanity: Hello sanity check failed, ret_val = 1077346330, count = 2
```

```
Mon 18:29:14 UTC Nov 24 2014ntp_handle_hello_sanity: Hello sanity check failed, ret_val = 1077346330, count = 3
```

```
Mon 18:29:16 UTC Nov 24 2014ntp_handle_hello_sanity: Hello sanity check failed, ret_val = 1077346330, count = 4
```

```
Mon 18:29:17 UTC Nov 24 2014ntp_handle_hello_sanity: Hello sanity check failed, ret_val = 1077346330, count = 5
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_create_un_socket: Connection with ntpd successful
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_apply_db_to_ntpd: Adding db_type [1] from ntpd. total elements 0
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_pss_reload_rt_db: Reading new runtime database PSS
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_pss_reload_rt: Reading runtime database PSS
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_pss_init :Fab-dist DISABLED, registering in DIS mode
```

```
Mon 18:29:18 UTC Nov 24 2014ntp_cfs_register: Registering with CFS with
mode [CFS_APP_REGISTER_DISABLE]
Mon 18:29:18 UTC Nov 24 2014ntp_cfs_register: CFS register failed. error
[0x80b30020].
Mon 18:29:18 UTC Nov 24 2014ntp_pss_init: PSS Init restarting state-
machine...
Mon 18:29:18 UTC Nov 24 2014ntp_pss_save_ntp_db: 284 bytes sent for RT_DB
sync
Mon 18:29:18 UTC Nov 24 2014ntp_pss_save_ntp_db: Saved the ntp_db info in
PSS
Mon 18:29:18 UTC Nov 24 2014getnetnum: Obtaining ip for host localhost
Mon 18:29:18 UTC Nov 24 2014getnetnum: Obtaining ip for host localhost
Mon 18:29:18 UTC Nov 24 2014ntp_get_addr: start_up_seq = 1
Mon 18:29:18 UTC Nov 24 2014getnetnum: localhost resolved
Mon 18:29:18 UTC Nov 24 2014Setting NTP server localhost as RESOLVED
```

```
fab2-leaf1# show ntp internal event-history msgs
```

- 1) Event:E_MTS_RX, length:44, at 26621 usecs after Tue Dec 16 23:59:33 2014
[NOT] Opc:MTS_OPC_LCP_SET_CTIME(414), Id:0X067E3129, Ret:SUCCESS
Src:0x00000102/901, Dst:0x00000101/72, Flags:None
HA_SEQNO:0X00000000, RRtoken:0x00000000, Sync:UNKNOWN, Payloadsize:0
- 2) Event:E_MTS_TX, length:52, at 16430 usecs after Tue Dec 16 23:59:33 2014
[NOT] Opc:MTS_OPC_CLOCK_CHANGE_NOTIF(3101), Id:0X01C85529, Ret:SUCCESS
Src:0x00000101/72, Dst:0x00000101/619, Flags:None
HA_SEQNO:0X00000000, RRtoken:0x00000000, Sync:UNKNOWN, Payloadsize:8
Payload:
0x0000: b5 0d 91 54 25 40 00 00
- 3) Event:E_MTS_TX, length:60, at 16419 usecs after Tue Dec 16 23:59:33 2014
[NOT] Opc:MTS_OPC_NTP_TIME_UPD(2707), Id:0X01C85528, Ret:SUCCESS
Src:0x00000101/72, Dst:0x00000101/0, Flags:None
HA_SEQNO:0X00000000, RRtoken:0x00000000, Sync:UNKNOWN, Payloadsize:16
Payload:
0x0000: b5 0d 91 54 fd 3f 00 00 07 95 1d 00 f3 74 0f 13
- 4) Event:E_MTS_TX, length:60, at 16372 usecs after Tue Dec 16 23:59:33 2014
[NOT] Opc:MTS_OPC_LCP_SET_CTIME(414), Id:0X01C85527, Ret:SUCCESS
Src:0x00000101/72, Dst:0x00000102/901, Flags:None
HA_SEQNO:0X00000000, RRtoken:0x00000000, Sync:UNKNOWN, Payloadsize:26
Payload:
0x0000: 57 65 64 20 44 65 63 20 31 37 20 30 34 3a 35 39


```
5) Event:E_MTS_RX, length:44, at 18301 usecs after Tue Dec 16 23:58:03 2014
   [NOT] Opc:MTS_OPC_LCP_SET_CTIME(414), Id:0X067E1C50, Ret:SUCCESS
   Src:0x00000102/901, Dst:0x00000101/72, Flags:None
   HA_SEQNO:0X00000000, RRtoken:0x00000000, Sync:UNKNOWN, Payloadsize:0
```

```
fab2-leaf1# show ntp internal event-history config
```

```
1) Event:E_DEBUG, length:123, at 485297 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Successfully added peer (Peer: 10.81.254.202, Flags:33,
Key: 0, is snmp: 0, associd: 0, Vrf id: 1: Vrf name: ) to ntpd

2) Event:E_DEBUG, length:118, at 474290 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Added peer (Peer: 10.81.254.202, Flags:33, Key: 0, is snmp:
0, associd: 3, Vrf id: 1: Vrf name: ) to ntp database

3) Event:E_DEBUG, length:122, at 452013 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Successfully added peer (Peer: 171.68.38.66, Flags:33, Key:
0, is snmp: 0, associd: 0, Vrf id: 1: Vrf name: ) to ntpd

4) Event:E_DEBUG, length:117, at 439500 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Added peer (Peer: 171.68.38.66, Flags:33, Key: 0, is snmp:
0, associd: 2, Vrf id: 1: Vrf name: ) to ntp database

5) Event:E_DEBUG, length:123, at 417959 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Successfully added peer (Peer: 172.18.108.15, Flags:41,
Key: 0, is snmp: 0, associd: 0, Vrf id: 1: Vrf name: ) to ntpd

6) Event:E_DEBUG, length:118, at 407311 usecs after Mon Nov 24 13:35:05
2014
   [541541955] Added peer (Peer: 172.18.108.15, Flags:41, Key: 0, is snmp:
0, associd: 1, Vrf id: 1: Vrf name: ) to ntp database
```

```
fab2-leaf1# iping -V management 172.18.108.15
PING 172.18.108.15 (172.18.108.15): 56 data bytes
64 bytes from 172.18.108.15: icmp_seq=0 ttl=55 time=3.684 ms
64 bytes from 172.18.108.15: icmp_seq=1 ttl=55 time=2.931 ms
64 bytes from 172.18.108.15: icmp_seq=2 ttl=55 time=5.874 ms
64 bytes from 172.18.108.15: icmp_seq=3 ttl=55 time=2.63 ms
64 bytes from 172.18.108.15: icmp_seq=4 ttl=55 time=2.095 ms

--- 172.18.108.15 ping statistics ---
5 packets transmitted, 5 packets received, 0.00% packet loss
round-trip min/avg/max = 2.095/3.442/5.874 ms
```

```
fab2-leaf1# ip route show
default via 10.122.254.1 dev eth0
10.122.254.0/24 dev eth0 proto kernel scope link src
10.122.254.128
127.1.0.0/16 dev kpm_inb proto kernel scope link src 127.1.1.1
```

(ROOT)

```
fab2-leaf1# tcpdump -i eth0 -f port 123
tcpdump: verbose output suppressed, use -v or -vv for full protocol decode
listening on eth0, link-type EN10MB (Ethernet), capture size 65535 bytes
23:51:00.212989 IP fab2-leaf1-oob.cisco.com.ntp > 10.81.254.202.ntp: NTPv4,
Client, length 48
23:51:00.213556 IP 10.81.254.202.ntp > fab2-leaf1-oob.cisco.com.ntp: NTPv4,
Server, length 48
23:51:02.212963 IP fab2-leaf1-oob.cisco.com.ntp > 10.81.254.202.ntp: NTPv4,
Client, length 48
23:51:02.213593 IP 10.81.254.202.ntp > fab2-leaf1-oob.cisco.com.ntp: NTPv4,
Server, length 48
23:51:04.212948 IP fab2-leaf1-oob.cisco.com.ntp > 10.81.254.202.ntp: NTPv4,
Client, length 48
23:51:04.213479 IP 10.81.254.202.ntp > fab2-leaf1-oob.cisco.com.ntp: NTPv4,
Server, length 48
23:52:07.213485 IP 10.81.254.202.ntp > fab2-leaf1-oob.cisco.com.ntp: NTPv4,
Server, length 48
23:52:09.212974 IP fab2-leaf1-oob.cisco.com.ntp > 10.81.254.202.ntp: NTPv4,
Client, length 48
```

Additional information for Troubleshooting Date & Time Policy using Network Time Protocol (NTP) on APICs and Switches

Note: In regards to display questions with Date & Time. The TimeZone parameter alters the TimeZone configured and displayed on the CLI of the APIC. For example, when using the DATE command. A symbolic link is created for localtime to zoneinfo.

ie. localtime -> /usr/share/zoneinfo/America/New_York

The display format local\utc and Offset State configuration is for what is "displayed" for Current System Time on the status bar of the APIC GUI. This information is retrieved from the API using "topInfo". In versions 1.0(1x) and 1.0(2x), there is no adjustments in relation to Daylight savings. As a result, you may see a time differential of 1 hour from the actual time. In the next FCS release, Daylight Savings will be accounted for in the Offset State.

Check System Time on DEVICES

★ On APIC:

```
cat /mit/topology/pod-1/node-1/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-2/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-3/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-101/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-102/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-103/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-104/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-201/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-202/sys/summary | grep currentTime
```

★ Visore:

[topInfo](#)

[datetimeANtpAuthKey](#) (Client Authentication Key)

[datetimeANtpProv](#) (Datetime Providers)

[datetimeAPol](#) (Date and Time Policy)

[datetimeClkPol](#) (Date Time Policy)

[datetimeConfIssues](#) (Datetime Policy Configuration Issues)

[datetimeFormat](#) (Datetime Format)

[datetimeNtpAuth](#) (Authentication Key)

[datetimeNtpAuthKey](#) (Datetime Client Authentication Key)

[datetimeNtpProv](#) (Providers)

[datetimeNtpProvider](#) (NTP Server)

[datetimeNtpProviderStatus](#) (ProviderStatus)

[datetimeNtpq](#) (Ntp Concrete Details)
[datetimePol](#) (Date and Time Policy)
[datetimeRsNtpProvToEpg](#) (Relation to Reachability Epg)
[datetimeRsNtpProvToEpp](#) (Relation to Datetime Provider Reachability EPP)
[datetimeRsNtpProvToNtpAuthKey](#) (Relation to Datetime Authentication Key)
[datetimeRsNtpProviderToNtpAuth](#) (Ntp Authentication Attachment)
[datetimeRtCtrlrDatetimeFormat](#) (Relation Holder)
[datetimeRtFormatPol](#) (Relation Holder)
[datetimeRtNtpProvToNtpAuthKey](#) (Providers)
[datetimeRtNtpProviderToNtpAuth](#) (NTP Server)
[datetimeRtResDatetimeFormat](#) (Access Instance)
[datetimeRtTimePol](#) (POD Policy Group)
[datetimeStatistics](#) (Ntp Provider Statistics)

[moquery -c datetimeFormat](#) (apic)
[moquery -c topInfo](#) (apic)
[moquery -c datetimeNtpq](#) (apic)
[moquery -c datetimeConflIssues](#) (leaf\spine)
[acidiag avread](#)
[acidiag fnvreadex](#)

Sample of Information to Request from Customer to assess Date & Time Issues:

★ From an APIC Controller

```
version
acidiag verifyapic
date
date -u
cat /mit/topology/pod-1/node-1/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-101/sys/summary | grep currentTime
cat /mit/topology/pod-1/node-201/sys/summary | grep currentTime
moquery -c toplInfo
moquery -c datetimeFormat
moquery -c datetimeNtpq
cat /etc/ntp.conf
ntpstat
ntpq -pn
echo $?
acidiag avread
acidiag fnvreadex
```

★ From a Leaf node

```
date
date -u
show clock
show ntp peers
show ntp peer-status
acidiag avread
acidiag fnvreadex
cat /etc/timezone
cat /etc/timestamp
```

★ From a Spine node

```
date
date -u
show clock
show ntp peers
show ntp peer-status
acidiag avread
acidiag fnvreadex
cat /etc/timezone
cat /etc/timestamp
```

End of Document