ACOS 6.0.7
Harmony™ Controller Integration Guide

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About the Harmony Controller

This document describes how a user can integrate Thunder devices from A10 Networks with Harmony Controller.

NOTE: For more information on Harmony Controller, for an in-depth analysis, and further details, see :http://docs.hc.a10networks.com/

The following topics are covered:

Overview

The Harmony Controller is a software solution, centralized, management and control system.

- It provides management and analytics for the A10 secure application services in multi-cloud environments. It is available in both cloud and non-cloud form.
- It is intended for the descriptions and for more about the commands available in the Harmony Controller profile configuration mode.

References

The following References for Harmony Controller lists the useful links, which the user can refer for the specific topics of the Harmony Controller.

Table 1 : References for Harmony Controller

References	Links
Harmony Controller Product	https://www.a10networks.com/products/service-analytics-management
Harmony Controller Data Sheet	https://www.a10networks.com/resources/data-sheets/a10-harmony-controller
Harmony Controller Documentation	https://documentation.a10networks.com/

Networking Prerequisites

In order to successfully install the controller and to allow devices (Lightning ADC, Thunder ADC) to connect to the controller, the user must perform necessary prerequisites in networking.

NOTE: For more information on how to perform these networking prerequisites, see the following link: http://docs.hc.a10networks.com/

Connecting Thunder Device to Harmony Controller

The user can avail the following benefits, by connecting the Thunder device to the Harmony Controller.

The Harmony Controller simplifies operations and increases the agility of the operations teams.

The infrastructure and application operations teams can centrally manage infrastructure configuration and application policies for the A10 Thunder Series and Lightning application services.

These services also include load balancing, application delivery, and web application firewall.

NOTE: For more information on the benefits of Harmony Controller and its connectivity with the thunder device, see the following link:http://docs.hc.a10networks.com/4.1.0/a10-hc-intro.html#hc-benefits

This following topics are covered:

NOTE: For a detailed process on how to register the Thunder Device to the Harmony Controller using the CLI Mode, see Configuring Harmony Controller Profile on ACOS .

Central Management

The Harmony Controller simplifies the process and allows the Thunder device administrators to push the changes using the CLI configuration snippets or aFleX

templates from the central location by selecting a group of devices.

In case of Lightning ADC, administrators specify the per-application configuration policies and the controller automatically pushes it to right set of devices.

NOTE: For more information on Harmony Controller and details about Central Management, see the following link: http://docs.hc.a10networks.com/4.1.0/a10-central-management.html

Traffic Visibility and Analytics

In the A10 Networks ADC architecture, the ADC keeps collecting metrics and pushes them to the Harmony Controller in real-time without impacting the ADC performance.

The Harmony Controller has a big-data style analytics engine that collects all the metrics, correlates them, and brings out the meaningful and actionable insights.

These insights are displayed on the Harmony Controller Portal for users to consume and fine-tune their application and infrastructure.

NOTE: For more information on Harmony Controller and its details about Traffic Visibility and Analytics, see the following link: http://docs.hc.a10networks.com/4.1.0/a10-hc-analytics.html

Connecting Thunder Device to Harmony Controller

The ACOS devices have the management functionality for application delivery control (ADC). The ACOS devices can be accessed and configured through the GUI, Web User Interface, and the CLI.

The Thunder Device/ADC can be connected to the Harmony Controller for strengthening the utility. The ACOS ADC devices can be integrated to the Harmony Controller platform for visibility, rich analytics, and graphical view of the traffic flowing through it.

Additionally, the Harmony Controller provides the capabilities such as central management, configuration of Provider and Tenant devices or the self-service through Provider-Tenant model, device-clusters, or VM instances.

NOTE: For more information on Harmony Controller and details about the A10 Thunder Series ADC, see the following link:http://docs.hc.a10networks.com/4.1.0/a10-thunder-adc.html

The following are the topics covered in this chapter, describing more about the Harmony Controller configuration and options.

The following topics are covered:

Registering Thunder Device to Harmony Controller : ACOS CLI

The user can register the Thunder device to the Harmony Controller through the CLI mode.

This following topics are covered:

Prerequisites

The user must have Thunder device upgraded to the firmware 4.1.1-P7 version or later.

The configuration steps are as the following:

Log-in to the Thunder device with the following credentials:

username: admin

password: a10

Enter the Enable mode first and then the Configuration mode.

Configure the Harmony Controller profile as in .

Reference

The following is a sample CLI reference for the applicable Thunder versions:

```
harmony-controller profile
    host controller.example.com use-mgmt-port
    thunder-mgmt-ip 13.78.173.250
    provider root
    user-name user@company.com
```

```
    password encrypted pwl23ABCDefgh (The password is displayed as an
encrypted text)
    region India
    availability-zone Bangalore
    metrics-export-interval 60
    !
    harmony-controller telemetry
    log-rate 1
    !
```

Verification

The following are the steps to verify the successful Harmony Controller profile.

Verify whether the Harmony Controller profile is created:

```
ACOS(config-profile)# show run
```

Register the device:

```
ACOS(config-profile)# register
```

NOTE: Use **`deregister`** command to de-register the Thunder device from controller.

Verify the status:

```
ACOS(config-profile)# show harmony-controller status

overall-status : Registration with Harmony Controller is partially
completed.
To complete the registration, please go to Infrastructure page of HC
Portal and map Device Partitions into Tenants
heartbeat-status : ACTIVE
service-registry : ACTIVE
registration-status : PASS
registration-status-code : 200
```

```
schema-registry-status : Registration of schemas with SR passed
broker_info : 10.6.34.53:9093
kafka-broker-state : Up
Number-of-tenant-mapped-partitions : 99
Number-of-tenant-unmapped-partitions : 1
```

New command:

```
ACOS(config-profile)# show harmony-controller partition-tenant-info
partition-name : part1
tenant-name : Dev109_119_All
tenant-id : daa21128-887f-4369-857f-e581f1c550be
cluster-name : cluster1.part1
cluster-id : 1fc77a68-035c-11e9-82df-001fa00d46f0
log-rate-per-sec : 30
ACOS(config-profile)#
```

Harmony Controller Options on ACOS CLI

The following configuration options are available on the ACOS for Harmony Controller profile and its telemetry options.

NOTE: For more details, see Harmony Controller Integration Commands .

Table 2 :

Configuration Option/Command	Description
`host`	FQDN (Fully Qualified Domain Name) or IP address of Harmony Controller.
`thunder-mgmt-ip`	IP address of the management port of the Thunder

Table 2 :

Configuration Option/Command	Description
	device as accessible from the Harmony Controller
`provider`	Name of the provider account in Harmony Controller.
`user-name`	User name of root provider admin for Harmony Controller.
`password`	Password for the user name provided for Harmony Controller.
`region/availability-zone`	Geographical location or data center where the ACOS device is deployed.

Table 3 : Harmony Controller Configuration Options in Profile and Telemetry Mode

Reference

The following is a sample CLI reference for the Harmony Controller Telemetry Mode:

```
    harmony-controller profile
    host controller.example.com use-mgmt-port
    thunder-mgmt-ip 13.78.173.250
    provider root
    user-name user@company.com
    password encrypted pwl23ABCDefgh (The password is displayed as an
encrypted text)
    region India
    availability-zone Bangalore
    metrics-export-interval 60
    !
    harmony-controller telemetry
    log-rate 1
    !
```

NOTE: For more details, see Harmony Controller Integration Commands .

Configuring Harmony Controller Profile on ACOS

The user can configure the Harmony Controller profile through the ACOS CLI mode.

To configure the Harmony Controller profile with the ACOS CLI, use the following commands:

Enable the Harmony Controller profile configuration:

```
ACOS(config)# harmony-controller profile
```

Enable the host for the Harmony Controller:

```
ACOS(config-profile)# host 10.6.100.23 use-mgmt-port
```

Enable the provider with name of length 1 to 128 characters for the Harmony Controller.

```
ACOS(config-profile)# provider root
```

Enter the provider specified user-name.

```
ACOS(config-profile)# user-name user1@a10networks.com
```

Enter the configured password.

```
ACOS(config-profile)# password password
```

Enable register and de-register.

```
ACOS(config-profile)# register
```

To verify the Harmony Controller registration status, use the following command:

```
ACOS(config-profile)# show harmony-controller status

overall-status : Registration with Harmony Controller is partially
completed.
To complete the registration, please go to Infrastructure page of HC
Portal and map Device Partitions into Tenants
heartbeat-status : ACTIVE
service-registry : ACTIVE
registration-status : PASS
registration-status-code : 200
schema-registry-status : Registration of schemas with SR passed
broker_info : 10.6.34.53:9093
kafka-broker-state : Up
Number-of-tenant-mapped-partitions : 99
Number-of-tenant-unmapped-partitions : 1


New command:


ACOS(config-profile)# show harmony-controller partition-tenant-info
partition-name : part1
tenant-name : Dev109_119_All
tenant-id : daa21128-887f-4369-857f-e581f1c550be
cluster-name : cluster1.part1
cluster-id : 1fc77a68-035c-11e9-82df-001fa00d46f0
log-rate-per-sec : 30
ACOS(config-profile)#
```

NOTE: The user can verify the Harmony Controller registration status in single mode or in multi-mode.

NOTE: For more information on how to verify/find `show harmony-controller status` using the Integration Commands for the Harmony Controller see: show harmony-controller status.

ACOS Tunnel Client for HC (HC SaaS Tunnel)

This chapter has the following topics:

The following topics are covered:

Overview

This topic has the following sections:

This following topics are covered:

Introduction

A tunnel between harmony controller and thunder is required for the need of a better secure configuration push. It can perform and enhance the following points:

- The purpose of the tunnel is to avoid the need to open ports on the thunder for allowing aXAPI calls for configuration push from the harmony controller.
- It also solves a customer issue, where the thunder is configured on a private IP address and the configuration push is performed from the harmony controller, running on a public IP address (specifically the SaaS harmony controller).
- With this solution, the IT administrators in an organization need not open new ports in their edge firewall to allow the ingress traffic coming from harmony controller to thunder in the form of configuration push.

Details

The SaaS Tunnel solution consists of two components, namely the tunnel server and the tunnel client. It has the following processes:

- The tunnel server runs as part of the harmony controller deployment.
- The tunnel client is a separate process running on the thunder.
- The communication between the tunnel client and the tunnel server is over SSL.
- The tunnel server uses a self-signed certificate (which is generated during the build time).

Limitations/Known Issues/Dependencies/Assumptions

The following is a list of known issues or limitations or dependencies and risks or assumptions for this feature.

- The configuration push over the tunnel does not work in the case of a VCS cluster.
- While registering multiple flavors of thunder/thunders, it is always noted, either all the thunders are configured as a standalone or as an HA cluster, with a harmony controller.
- The status of the tunnel is visible from thunder CLI, but not the thunder GUI or harmony controller GUI.
- The harmony controller profile is configured through thunder CLI and the thunder UI has no support for this.
- When the user tries to enable the tunnel again, after the disablement, or after the de-registration mode activities, then the user must wait for at least a minimum of 90 seconds.
- Before enabling the tunnel, the device must be registered with the HC.
- After enabling the tunnel, provision the respected device cluster, from the harmony
  controller user interface.

Feature Description

This feature and its descriptions help the user to perform and understand the following:

- Launching the vThunder profile.
- Knowing more on harmony controller, version 5.x.
- Configuring the appropriate parameters under harmony-controller profile on vThunder using CLI.
- Registering the vThunder with the harmony controller from the CLI.

This section has the following sub-sections. The following are the various aspects of this new feature:

This following topics are covered:

Tunnel Client Configuration in ACOS

The only mandatory configuration required for the tunnel client is a flag known as "**tunnel**", which indicates, the need for the tunnel, and whether the tunnel must be created or not. This flag is present under the harmony controller profile and is configured from the thunder CLI.

Establishing the Tunnel Client Initialization Process

The following are the reference points for establishing the tunnel client initialization process:

- The tunnel client can only be started, once the registration with the harmony controller is successful.
- In addition to this, even then, only if the flag to use the tunnel client is enabled in the harmony-controller profile configuration.

Restarting the Tunnel Client Process

Restarting the Tunnel Client process is disabling the tunnel and enabling the tunnel again, like a new start.

Setting up the Harmony Controller Cluster

The following are the reference points for setting-up the harmony controller cluster process:

- In the case of the HA cluster, all the devices in the cluster establish a tunnel connection with harmony controller, using their respective device UUID.
- It is the responsibility of the harmony controller to push the configuration to the devices individually.

CLI Configuration

This topic has the following sections:

This following topics are covered:

Configuration Commands

CLI Options

A new configuration parameter is added as part of the harmony controller profile to enable the tunneling functionality.

```
tunnel (enable | disable)
```

Example

To enable this feature, the following new command set is added. This new command set is disabled by default.

```
vThunder(config)(NOLICENSE)#harmony-controller profile
vThunder(config-profile)(NOLICENSE)#tunnel ?
enable Tunnel Enable
disable Tunnel Disable
vThunder(config-profile)(NOLICENSE)#tunnel enable
vThunder(config-profile)(NOLICENSE)#
```

Show Commands

The following is the new show command set for this feature. The tunnel client status depicts the status of the tunnel connection with the tunnel server. It is also shown as part of the harmony controller status.

```
vThunder(config-profile)(NOLICENSE)#sh context
!Context configuration: 273 bytes
!
harmony-controller profile
  host <xx.xx.xx.xx> use-mgmt-port
  provider root
  username username@a10networks.com
  password encrypted
vgGEdaf1LGnnFqRoZpqpWDwQjLjV2wDnPBCMuNXbAOc8EIy41dsA5zwQjLjV2wDn
  register
  thunder-mgmt-ip <xx.xx.xx.xx>
  tunnel enable
!
vThunder(config-profile)(NOLICENSE)#sh harmony-controller status
overall-status : Registration with Harmony Controller is in progress
heartbeat-status : In Progress
schema-registry-status :
kafka-broker-state : Kafka server not enabled
Number-of-tenant-mapped-partitions : 0
Number-of-tenant-unmapped-partitions : 1
tunnel-status : ACTIVE
vThunder(config-profile)(NOLICENSE)#
```

Harmony Controller Profile and Tunnel Configuration

```
harmony-controller profile
host <HC public ip> use-mgmt-port
provider root
```

```
user-name username@a10networks.com
password <password>
thunder-mgmt-ip <thunder public ip>
register
tunnel enable
```

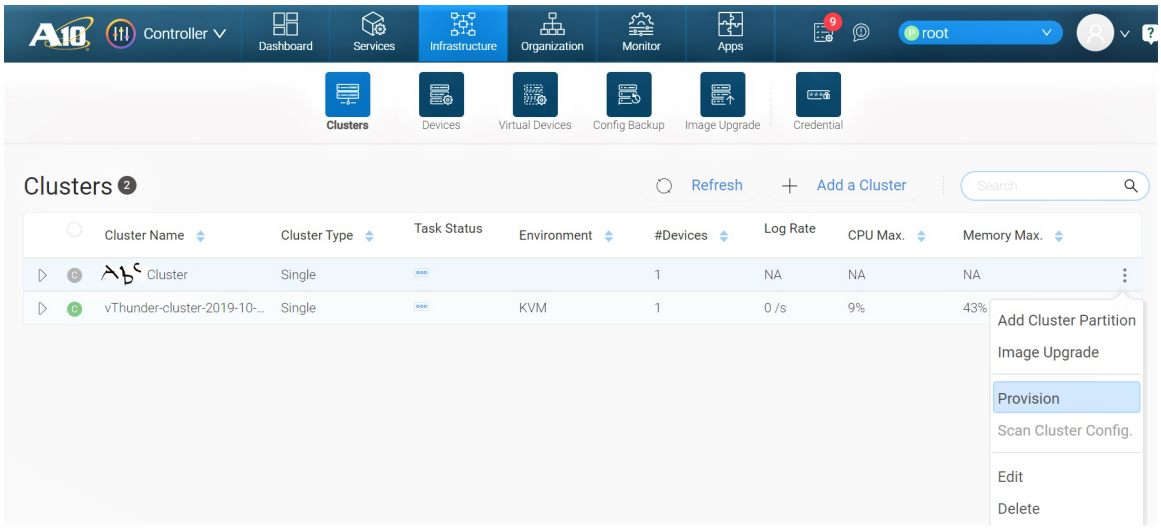
GUI Configuration

There are no changes in the GUI feature and there is no GUI support in this release.

API Configuration for Tunnel Client

The tunnel client is configured by the following modes. The following is a list of new APIs set for this feature:

This following topics are covered:



API for Enabling or Disabling the Tunnel

Details

A10 URL: `/axapi/v3/harmony-controller/profile/tunnel`

Method: POST

Headers

Authorization: `Basic <Base64 encoded username:password>`

Content-Type: application/json

Request Body

```
{
"tunnel": {
      "action":"enable"
    }
}
```

API for Starting the Tunnel

Details

A10 URL: `/axapi/v3/harmony-controller/api/v1/start-tunnel`

Method: POST

Headers

Authorization: `Basic <Base64 encoded username:password>`

Content-Type: application/json

Request Body

```
{
  "server": "<HCPublicIPorHostname>:25500",
  "provider": "<ProviderNameThunderBelongsTo>"
```

```
}
```

Licensing and Platforms

This section has the following sub-sections:

This following topics are covered:

Supported Platforms

All those platforms which support registration with the harmony controller must be supported.

Upgrading or Downgrading Results

The following are the important points, referring to either upgrading or downgrading the system, as per the impact of this feature:

- The command is expected to be ported to all future releases.
- Upgrading is an expected and applicable mode, which is not an issue.
- Downgrading will wipe out the command and malfunctioning.

HA Active Standby Scaleout Handover

This feature supports High Availability (HA) active standby and new Scaleout statistics implemented by CGN group in ACOS 5.2.1 to be exported to Harmony 5.2 correctly.

DNS/GSLB Metrics on Harmony Controller

This chapter has the following topics:

The following topics are covered:

Overview

This topic has the following sections:

This following topics are covered:

Introduction

This feature is an enhancement to (FR-8926) to collect display DNS logs and provide analytics display for DNS type virtual port and GSLB functions. This display support is now provided
on ACOS GUI as well as Harmony Controller.

The DNS application on Harmony Controller receives PR logs and metrics data from ACOS.

Assumptions

This functionality works when a client registers Harmony Controller successfully to ACOS.

DNS/GSLB Analytics

The following information is exchanged for interaction between ACOS and Harmony Controller DNS App. The DNS collection metrics support TCP and UDP protocols. The following information is collected: The following information is collected from ACOS:

- Statistics, Logging, Debugging.
- Messages for Statistics and logging.
- `show tech-support` command output.
- Support for system and network management (for example, CLI, Web UI, SNMP, aXAPI).

DNS/GSLB Log for Harmony Controller

User can analyze the server traffic flow and deploy DNS service, check the request type, class, and check how the server returns data to the client, using HC.

Both the query and response data provide basic information in the header when information is sent out.

The DNS header contains the following data:

- transaction ID
- query information
- answer information
- authentication information
- additional information

ACOS Thunder device sends out logs and metrics to Harmony Controller (HC), that is used as data for DNS App. The application logs contain connection information on DNS query header and also the response header.

ACOS sends logs for the following events:

- GET response
- DROP query
- TIMEOUT query
- Response back from cache or GSLB

When the client registers HC successfully, ACOS sends out telemetry (logs/metrics) for HC and DNS App.

DNS QPS Information

DNS query information is sent out to HC as logs and analytics display for DNS type virtual port, in the following situations:

- DNS request time out
- DNS response incoming

- DNS response by the cache
- DNS response by GSLB

When the client registers Harmony Controller successfully, Thunder device or ACOS sends out telemetry (logs/metrics) for HC and DNS app.

Usage Scenarios

Harmony Controller can be used to:

- Analyze the server traffic flow.
- Deploy the DNS service.
- Check server request type and class.
- Check how the server returns information to the client.

Analysis Reports on Harmony Controller

The following analysis charts or reports are displayed on HC from the collected DNS/GSLB statistics:

QPS with Query Types: Per ACOS System and Per VIP.

List of Top Clients sending DNS Requests for various filters:

DNS Query Health: Percentage of good Health per VIP.

Average Query Size of DNS Request or Query in Total Bytes or Total Packets per VIP.

Average Response Size per VIP.

Malformed DNS Query Rate time chart per VIP.

List of the Top Query Domains

For details, refer docs.hc.a10networks.com

CLI Configuration

Some show commands have been enhanced to export metrics to Harmony Controller.

Show Commands

The following show commands display the metrics that are sent out to Harmony Controller:

```
ACOS(config)# show dns stats
```

```
DNS statistics for SLB:
-----------------------
No. of requests: 0
No. of responses: 0
No. of requests with no response: 0
No. of request retransmits: 0
No. of requests and responses not match: 0
No. of resource failures: 0
DNS requests Drop       : 0: 0
Filter type Drop        : 0: 0
Filter class Drop       : 0: 0
Filter type ANY Drop    : 0: 0
DNS statistics for IP NAT:
-----------------------
DNS requests Drop       : 0: 0
No. of requests: 0
No. of responses: 0
No. of requests with no response: 0
No. of request retransmits: 0
No. of resource failures: 0
No. of requests reusing a transaction id: 0
```

```
ACOS(config)# show slb virtual-server <server_name> <port_number> [dns-udp/dns-tcp] application-statistics
```

```
DNS request receive:     0
DNS request respond
DNS request Drop        : 0
```

```
DNS request send:     0:
DNS response receive:     0
DNS response send:     0
DNS response Drop       : 0
Request timeout
Request retransmit
Cache hit
Query too long Drop     : 0
DNS Response Rate Limiting Total Allowed
DNS Response Rate Limiting Total Drop   : 0ped
DNS Response Rate Limiting Total Slipped
DNS Response Rate Limiting Bad FQDN
Query filter Drop       : 0
GSLB Drop       : 0
GSLB query Drop : 0
GSLB malformed query
GSLB response Drop      : 0
GSLB malformed response
GSLB query forwarded
GSLB response reverse
GSLB response receive:     0
Query type A
Query type AAAA
Query type CNAME
Query type MX
Query type NS
Query type SRV
Query type PTR
Query type SOA
Query type TXT
Query type ANY
Query type other type

Rcode FORMERR receive:     0
Rcode SERVERERR receive:     0
Rcode NXDOMAIN receive:     0
Rcode NOTIMPL receive:     0
Rcode REFUSE receive:     0
Rcode YXDOMAIN receive:     0
Rcode YXRRSET receive:     0
```

```
Rcode NXRRSET receive:      0
Rcode NOTAUTH receive:      0
Rcode DSOTYPEN receive:      0
Rcode OTHER VALUE receive:      0
EDNS query type NSID
EDNS query type DAU
EDNS query type N3U
EDNS query type EXPIRE
EDNS query type COOKIE
EDNS query type KEEPALIVE
EDNS query type PADDING
EDNS query type CHAIN
EDNS rcode BADVER receive:      0
EDNS rcode BADKEY receive:      0
EDNS rcode BADTIME receive:      0
EDNS rcode BADMODE receive:      0
EDNS rcode BADNAME receive:      0
EDNS rcode BADALG receive:      0
EDNS rcode BADTRANC receive:      0
EDNS rcode BADCOOKIE receive:      0
===Device Generate===
Rcode NOERROR generate
Rcode FORMERR send:      0
Rcode SERVERERR send:      0
Rcode NXDOMAIN send:      0
Rcode NOTIMPL send:      0
Rcode REFUSE send:      0
Rcode YXDOMAIN send:      0
Rcode YXRRSET send:      0
Rcode NXRRSET send:      0
Rcode NOTAUTH send:      0
Rcode DSOTYPEN send:      0
Rcode OTHER VALUE send:      0
EDNS rcode BADVER send:      0
EDNS rcode BADKEY send:      0
EDNS rcode BADTIME send:      0
EDNS rcode BADMODE send:      0
EDNS rcode BADNAME send:      0
EDNS rcode BADALG send:      0
EDNS rcode BADTRANC send:      0
```

```
EDNS rcode BADCOOKIE send:     0


Total DNS Filter Query Type Drop        : 0
Total DNS Filter Query Class Drop       : 0
DNS Filter Query Type A Drop    : 0
DNS Filter Query Type AAAA Drop : 0
DNS Filter Query Type CNAME Drop        : 0
DNS Filter Query Type MX Drop   : 0
DNS Filter Query Type NS Drop   : 0
DNS Filter Query Type SRV Drop  : 0
DNS Filter Query Type PTR Drop  : 0
DNS Filter Query Type SOA Drop  : 0
DNS Filter Query Type TXT Drop  : 0
DNS Filter Query Type ANY Drop  : 0
DNS Filter Query Type OTHERS Drop       : 0
DNS Filter Query Class INTERNET Drop    : 0
DNS Filter Query Class CHAOS Drop       : 0
DNS Filter Query Class HESIOD Drop      : 0
DNS Filter Query Class NONE Drop        : 0
DNS Filter Query Class ANY Drop : 0
DNS Filter Query Class OTHERS Drop      : 0
```

NHLD Link Probe Metrics on Harmony Controller

This chapter has the following topics:

The following topics are covered:

Overview

This topic has the following sections:

This following topics are covered:

Introduction

This feature is an enhancement of the existing NHLD feature (FR8485) to allow reporting of link probe metrics to the Harmony Controller. This feature applies to ADC.

Limitations or Known Issues or Dependencies and Risks or Assumptions

The following is a list of known issues or limitations or dependencies and risks or assumptions for this feature.

The data reporting requires information gathering and sending all the entries within one export, resulting in no single or individual entries which cannot be reported.

There is a fixed number of the maximum amount of entries, that can be reported per service group.

Design and Feature Description

This section has the following sub-sections. The following are the various aspects of this new feature:

This following topics are covered:

Design Summary

The following Design Summary Table lists functional and design aspects considered for this feature.

Table 4 : Design Summary Table

Design Aspects	Details
L3V/RBA Implications	L3V partitions are supported.
HA/VRRP-A/Scaleout Considerations	No change as each device maintaining its separate link probes.
VCS/configuration Sync Considerations (2.7.x)	In VCS, the devices push link probe metrics independently of each other.
Chassis Support	Contingent on SLB support for chassis.
Licensing Implications	SLB
Performance	Periodically, statistics and analytics are sent from the device. Timers are utilized to perform this job.
Memory Implications	Memory to hold the packed operational data for each service group NHLD entries is allocated when the Harmony feature is enabled.
Scalability Considerations	When the Harmony feature is enabled, the service group members of each applicable service group are walked to obtain the statistical data to report to Harmony.
Physical Platform Support Considerations (FTA/ non-FTA/ Hybrid)	Same as NHLD.

Design Details

After configuring link probe templates and binding them to the service groups, and after registering the device to the Harmony Controller, the following data about the linked probe entries are reported to the Harmony Controller:

- Next hop server name
- Link probe template name
- Domain name
- URL
- IP target type (statically assigning an IP address or dynamically resolving the hostname)
- Destination IP of the target
- IP version (v4 or v6)
- Data CPU ID
- Link probe entry reference count
- Current running probe in the test
- Configured probes per test
- Configured probe interval
- Configured test interval
- RTT method used
- Last HTTP response status code
- Average RTT value of the entry
- Individual RTT samples
- Also, the following statistics are sent regarding all the link probes within an L3V partition:
- Total TCP connections sent
- Total HTTP probes sent
- Total HTTP responses received
- Total HTTP expected status codes received

- Total HTTP unexpected status codes received
- Total TCP errors in link probe connections
- Smart NAT allocation failures
- Smart NAT port allocation failures
- L4 session allocation failures
- TCP connection initiation failures

User Scenarios

A timer walks through all the service groups in an L3V partition.

For any service group that has a link probe template configured, it needs to be determined, whether the time is appropriate for information on the report, and about the link probe entries in the service group to Harmony, if the device is registered.

When preparing a report to Harmony, the operational data of each link probe entry in the service group is packed into one data structure.

The structure is encoded and enqueued for reporting.

User Requirements

For the usage of the NHLD in a mixed cloud environment.

For monitoring all the ACOS devices in the environment with a Harmony Controller.

After registering the devices to the controller, the user must be able to receive statistical and analytical information about multiple NHLD configurations on the controller.

Functional Requirements

In the Phase-2 enhancement for this feature, it is expected behavior, that the report with statistical and analytical information about the link probe entries are sent periodically to the Harmony Controller device.

Topology and Deployment Scenarios

The following are the various topology and deployment details required for this scenario:

This following topics are covered:

NHLD Reference

Template under a service group.

Template under a service group bound to a policy template.

Equipment and Software

FPGA and non-FPGA DUTs

`tc qdisc` tools or other latency inducing tools in Linux delays.

Harmony Controller

Considerations

Configuring a service group using NHLD with more than 10 members.

Configuring a service group using NHLD with members that use a hostname (servers configured with a name instead of an IP).

Supported Platforms

- FPGA
- Non-FPGA
- Hybrid
- vThunder
- AWS, Azure
- HVA
- Bare Metal
- Container

Support Topologies

- Routed mode
- L3Vs
- HA/VCS
- IPv6

CLI Configuration

This topic has the following sections:

This following topics are covered:

Configuration Commands

To enable this feature, a new command is added. This new command is disabled by default.

```
access-list 102 permit ip any
ip dns primary 10.215.5.2
ntp server 129.6.15.28
```

```
ip route 0.0.0.0 /0 10.215.5.2
ip route 10.6.34.0 /24 10.2.73.1
ip route 129.6.15.28 /32 10.2.73.1
slb template link-probe lpt
probe-interval 2
probes-per-test 10
test-interval 10
destination hostname svc3.unittest.com resolve-to-ipv4
slb service-group www tcp
method fastest-link-only link-probe-template lpt
member real 80
member real2 80
slb virtual-server vs 0.0.0.0 acl 102
port 80 http
source-nat auto
service-group www
no-dest-nat
harmony-controller profile
host 10.6.34.55 use-mgmt-port
provider root
user-name user@a10networks.com
password encrypted
vgGEdaf1LGnnFqRoZpqpWDwQjLjV2wDnPBCMuNXbAOc8EIy41dsA5zwQjLjV2wDn
region US
availability-zone CA
register
thunder-mgmt-ip 10.2.73.165
harmony-controller telemetry
log-rate 60
```

Show Commands

The following are the show commands related to harmony controller.

This following topics are covered:

GUI Configuration

There are no changes in the GUI feature and there is no GUI support in this release.

Harmony Controller Integration Commands

This chapter describes the available commands in the A10 Harmony Controller configuration mode.

NOTE: The following commands are available from the configuration mode or the sub-mode:

`clear` command (for clear or reset functions)

`do` command (for run commands in this configuration mode)

`end` and `exit` commands

Harmony controller can be configured using the available command line interface (CLI) commands from the configuration mode. Show commands are also available.

This following topics are covered:

harmony-controller config-replace

Description This CLI option configures the Harmony Controller config-replace mode.

Syntax

```
harmony-controller config-replace {enable | disable}
```

Mode Harmony controller Configuration Mode

Usage This command enables or disables the Harmony Controller config-replace mode.

Example The following example shows how to enable the Harmony Controller config-replace mode:

```
ACOS(config)#harmony-controller config-replace enable
```

harmony-controller profile

Description This CLI option helps in starting the Harmony Controller profile configuration mode.

Important: This command is only applicable in the shared partition.

Syntax

```
[no] harmony-controller profile
```

Parameters	Description
`[no]`	Disable the Harmony Controller profile
`profile`	Define the Harmony Controller profile

Default Not applicable

Mode ACOS Configuration Mode

Usage It enables the Harmony Controller profile configuration mode.

Example The following example shows how to start the Harmony Controller profile configuration mode:

```
ACOS(config)# harmony-controller profile
```

analytics

Description This CLI option helps in configuring the analytics feature for the harmony controller profile. It enables you to customize the export of analytical information of the ACOS device to HC.

Syntax

```
analytics{all | system | disable}
```

Parameter	Description
all	Exports all analytics data, including all the metrics and logs of the ACOS device to harmony controller.

Parameter	Description

	This is the default option. The ACOS system running-configuration does not reflect this setting.
	
	Example:
	
	`ACOS(config-profile)#analytics all`
	`ACOS(config-profile)#show context harmony-controller profile`

system	Exports system level policy information of the ACOS device to harmony controller. This includes the device metrics and log data but excludes service metrics and log data. If enabled, ACOS exports the following metrics to harmony controller. • THUNDER_METRICS_SYSTEM_TELEMETRY_LOG_DEVICE_STATUS_OPER • THUNDER_METRICS_SYSTEM_TELEMETRY_LOG_ENVIRONMENT_OPER • THUNDER_METRICS_SYSTEM_TELEMETRY_LOG_PARTITION_METRICS_OPER • THUNDER_METRICS_SYSTEM_FPGA_DROP_STATS • THUNDER_METRICS_SYSTEM_DPDK_STATS_STATS • THUNDER_METRICS_EVENT_NOTIFICATION_KAFKA_SERVER_STATS • THUNDER_LOG_SYSTEM_LOGS • THUNDER_AUDIT_LOGS The ACOS system running-configuration displays this setting.

Parameter	Description

	Example:
	`ACOS(config-profile)#analytics system`
	`ACOS(config-profile)#show context`
	`harmony-controller profile`
	`  analytics system`

disable	Disables the export of entire analytics information of the ACOS device to harmony controller.
	The ACOS system running-configuration displays this setting.
	Example:
	`ACOS(config-profile)#analytics disable`
	`ACOS(config-profile)#show context`
	`harmony-controller profile`
	`  analytics disable`

Default By default, analytics exports all device data to HC.

Mode Harmony Controller profile configuration mode

Usage This command provides options for users to export metrics and log data from Thunder to harmony controller. By default, all the analytics data is exported when the device is registered with harmony controller.

Example The following example shows the configuration of the analytics command:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#analytics system
```

auto-analytics-bus-restart

Description This CLI option restarts analytics bus automatically if it is detected as down for the Harmony Controller profile.

Syntax `auto-analytics-bus-restart{enable | disable | interval}`

Parameter	Description
enable	Enables the auto analytics bus to restart. This is the default option. Example: `ACOS(config-profile)#auto-analytics-bus-restart enable`
disable	Disables the auto analytics bus restart. Example: `ACOS(config-profile)#auto-analytics-bus-restart disable`
interval	Enables the auto analytics bus to restart according to the configured time interval in minutes. The default time interval is set to 3 minutes. Example: `ACOS(config-profile)#auto-analytics-bus-restart interval 3`

Default By default, restarts analytics bus automatically.

Mode Harmony Controller profile configuration mode

Usage This command provides options for users to restarts analytics bus automatically.

Example The following example shows the configuration of the auto-analytics-bus-restart command:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#auto-analytics-bus-restart interval 3
```

cluster-id

Description This CLI option helps to assign an ID for the cluster in Harmony Controller, typically an Universally Unique Identifier (UUID).

Syntax

```
cluster-id num
```

Replace num with a UUID for the device.

Default No default ID is assigned.

Mode Harmony Controller profile configuration mode.

Usage This command provides options for users to restarts analytics bus automatically.

Example The following example shows how to assign a UUID 123:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#cluster-id 123
```

cluster-name

Description This CLI option helps to assign a name to a cluster in Harmony Controller that this device is a member.

Syntax

```
cluster-name name
```

Replace name with a required name for the cluster.

Default No default ID is assigned.

Mode Harmony Controller profile configuration mode.

Usage This command provides options for users to restarts analytics bus automatically.

Example The following example shows how to assign a name:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#cluster-name name
```

force

Description This CLI option helps to deregister a thunder forcefully from Harmony Controller.

Syntax

```
force thunder
```

Replace thunder with a registered thunder.

Default No default ID is assigned.

Mode Harmony Controller profile configuration mode.

Usage This command enables you to deregister a thunder forcefully from Harmony Controller.

Example The following example shows how to assign a thunder:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#force thunder
```

availability-zone

Description This CLI option helps in configuring the geographical availability zone of the ACOS device.

Syntax

```
[no]availability-zone <zone_name>
```

Parameters	Description
no	Remove the availability zone of the thunder-device.
zone_name	Name of the availability zone of length from 1 to 128 characters of the thunder device created by the zone command.

Default No default value

Mode Harmony Controller profile configuration mode

Usage The harmony-controller profile is used to specify the location of the Thunder managed devices. The command is similar to the region

command, because both commands are used to specify the location of the managed Thunder devices.
However, whereas the region is typically used to specify a city name, the availability-zone is used to provide more granular information about the location of a managed device, such as the building name or rack ID within a data center.

Example The following example shows how to enter A10 Harmony Controller configuration mode and create a new availability-zone called "**NEW-ZONE123**":

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# availability-zone NEW-ZONE123
ACOS(config-profile)#
```

host

Description This CLI option helps in entering the IP address or FQDN associated with the A10 Harmony Controller.

Syntax

```
[no] host host-name
[port port-num]
[use-mgmt-port]
```

Parameter	Description
[no] host *host-name*	Enter the IP address or fully-qualified domain name (FQDN) of the A10 Harmony Controller. *host-name* The *host-name* can be an alphanumeric value with 1 to 128 characters or an IPv4 address.
[port *port-num*]	The port *port-num* option allows you to specify the port used on the remote Harmony Controller device. The *port-num* can be a numeric value from 1 to 32767. The default value is 8443.

Parameter	Description
[use-mgmt-port]	The use-mgmt-port option uses the ACOS device's management port as the source interface. Otherwise, a data interface is used.

Default No default

Mode Harmony Controller profile configuration mode

Usage Enter the IPv4 address or FQDN of the A10 Harmony Controller. This allows the ACOS device to find the controller on the network during the registration process.

Example The following example shows how to enter the A10 Harmony Controller configuration mode on the ACOS device, in order to enter the host IP address of 1.2.3.4, which is the IP of the controller:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# host 1.2.3.4 port 8445
ACOS(config-profile)#
```

host-ipv6

Description This CLI option helps in entering the IP address or FQDN associated with Harmony Controller.

Syntax

```
[no] host host-name
[port port-num]
[use-mgmt-port]
```

Parameter	Description
[no] host *host-name*	Enter the IP address or fully-qualified domain name (FQDN) of Harmony Controller. *host-name*

Parameter	Description
	The *host-name* can be an alphanumeric value with 1 to 128 characters or an IPv6 address.
[port *port-num*]	The port *port-num* option allows you to specify the port used on the remote Harmony Controller device. The *port-num* can be a numeric value from 1 to 32767. The default value is 8443.
[use-mgmt-port]	The use-mgmt-port option uses the ACOS device's management port as the source interface. Else, a data interface is used.

Default No default

Mode Harmony Controller profile configuration mode

Usage Enter the IPv6 address or FQDN of the A10 Harmony Controller. This allows the ACOS device to find Harmony Controller on the network during the registration process.

Example The following example shows how to enter the A10 Harmony Controller configuration mode on the ACOS device, in order to enter the host IP address of 1.2.3.4.5.6, which is the IP of the controller:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# host 1.2.3.4.5.6 port 8445
ACOS(config-profile)#
```

password

Description This CLI option helps in configuring the password for the Harmony Controller profile.

Syntax **password** {*password_string*}

Parameters	Description
password	Specify the password for the user.
password_string	Specify the password for the user of length maximum 128 characters.
encrypted	Encrypt the password.
string	The encrypted password string of length range, 1 to 512 characters. **NOTE:** Do not use this option manually.

Default No default value

Mode Harmony Controller profile configuration mode

Usage The ACOS device uses the credentials during the registration process to access the tenant account on the A10 Harmony Controller.

Example The following example shows how to enter the A10 Harmony Controller configuration mode on the ACOS device, and how to enter the password of "**PASSWORD123**". This is the password associated with the user account on the Harmony Controller. These credentials are passed to the controller during the registration process:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# password PASSWORD123
ACOS(config-profile)#
```

provider

Description This CLI option helps in configuring the data or information provider for the Harmony Controller.

Syntax

```
[no] provider provider-name
```

Parameter	Description
[no]	Remove data provider for the Harmony Controller
provider-name	The *provider-name* is the owner of the A10 Harmony Controller. For Self-Managed A10 Harmony Controller deployment activities, this parameter becomes the name of the customer, where the device is deployed. For example, a customer purchases the A10 Harmony Controller software and installs it on a Thunder Bare Metal device, and this device is deployed on the customer's own network. In this situation, the customer must ideally enter their name as the *provider-name*. However, for cloud-based deployments, where the metrics collection and analytics are sold as a service, then this can be from the A10 Networks or any other similar service provider. The *provider-name* is an alphanumeric value with 1 to 128 characters. **NOTE:** The default value is **root**. Also, any configured sub-provider under root is a supported use case.

Default No default value

Mode Harmony Controller profile configuration mode

Usage The provider-name is the owner of the A10 Harmony Controller that is selling the software services (SaaS) for metrics collection and analytics for the managed Thunder.

Example The following example shows how to enter the A10 Harmony Controller configuration mode and how to enter the provider name, "**PROV-1**":

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# provider PROV-1
ACOS(config-profile)#
```

region

Description This CLI option helps in specifying the region of the ACOS device network.

Syntax

```
[no] region region_name
```

Parameters	Description
no	Remove the configured region of ACOS device network.
region_name	Name of the region.

Default No default value

Mode Harmony Controller profile configuration mode

Usage The region name is used to specify the location of the Thunder managed devices. The command is similar to the harmony-controller profile command, in that both are used to specify the location of the managed Thunder devices.
However, whereas the region is typically used to specify a city name, the harmony-controller profile could be used to provide more granular information about the location of a managed device, such as the building name or rack ID within a data center.

Example The following example shows how to enter A10 Harmony Controller configuration mode and create a new region called "**REG-BLR-123**":

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# region REG-BLR-123
ACOS(config-profile)#
```

re-sync

Description This CLI option helps to re-sync analytics bus connections and the schema registry.

Syntax

```
re-sync{analytics-bus | schema-registry}
```

Parameter	Description
analytics-bus	Enter the re-sync for analytics bus connections. Example: `ACOS(config-profile)#re-sync analytics-bus`
schema-registry	Enter the re-sync for schema registry. Example: `ACOS(config-profile)#re-sync schema-registry`

Default No default

Mode Harmony Controller profile configuration mode

Usage Enter re-sync for analytics bus connections or the schema registry. This allows re-sync for analytics bus connections or the schema registry.

Example The following example shows how to enter the Harmony Controller configuration mode on the ACOS device, in order to re-sync:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# re-sync analytics-bus
```

thunder-mgmt-ip

Description This CLI option helps in entering the IP address for the Thunder. This address is used to specify the source IP of the Thunder device, and this

information is pushed to the A10 Harmony Controller during the registration.

Syntax

```
[no] thunder-mgmt-ip ip-address
```

Parameter	Description
thunder-mgmt-ip *ip-address*	The *ip-address* can be a standard IPv4 address.

Default No default value

Mode Harmony Controller profile configuration mode

Usage This CLI option **thunder-mgmt-ip** is required for the registration of the A10 Networks Thunder device to the Harmony Controller.
The A10 Networks Thunder device uses this IP address to send the required information and also to communicate back, for on-box UI and TDM communications purpose with the A10 Harmony Controller during registration.
If the CLI option **thunder-mgmt-ip** is configured or set after the registration, then the On-box UI functionality picks this updated IP on the process (There is no re-registration required). However for TDM listing, a re-registration is required.

Example The following example shows how to enter A10 Harmony Controller configuration mode and enter a thunder-mgmt-ip “1.2.3.4” for the Thunder managed device, to be used during registration with the controller:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#thunder-mgmt-ip 1.2.3.4
ACOS(config-profile)#
```

tunnel

Description This CLI option enables or disables the tunnelling feature. A tunnel is created between HC and the Thunder device to securely push the

configuration from HC to Thunder.

Syntax `tunnel {enable | disable}`

Default Disabled

Mode Harmony Controller profile configuration mode

Usage The tunnel facilitates a secure configuration push from the harmony controller, which acts as the tunnel server to the Thunder device, which is the tunnel client. The tunnel client is not required to open new ports for the incoming traffic from HC. The communication between the tunnel client and server takes place over SSL.

Example The following example shows the tunnel configuration:

```
ACOS(config)#harmony-controller profile
ACOS(config-profile)#tunnel enable
```

For more information on the tunnelling functionality, see ACOS Tunnel Client for HC (HC SaaS Tunnel).

user-name

Description This CLI option helps in configuring the user name for the Harmony Controller client.

Syntax `[no]user-name <name>`

Parameters	Description
`[no]`	Remove configured user name.
name	Name string.

Default No default value

Mode Harmony Controller profile configuration mode

Usage Enter the *user-name* for the tenant in the A10 Harmony Controller. The ACOS device uses these credentials to log into the controller.

Example The following example shows how to enter the A10 Harmony Controller configuration mode and also to enter the user-name "**USERNAME123**". This user name is associated with the tenant on the controller:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# user-name USERNAME123
ACOS(config-profile)#
```

register

Description This CLI option helps in registering the ACOS device with the A10 Harmony Controller.
Register: This command is used to start the registration of the thunder device to the Harmony Controller.

Syntax

```
[no] register
```

Default Disabled

Mode Harmony Controller profile configuration mode

Usage This command registers the ACOS device with the A10 Harmony Controller by initiating the registration process from ACOS device to the controller.
Once the registration is complete, the ACOS device can start sending logs or analytics.

Example The following example shows how to enter the A10 Harmony Controller configuration mode and register the ACOS device with the controller:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# register
ACOS(config-profile)#
```

deregister

Description This CLI option helps in de-registering the ACOS device with the A10 Harmony Controller.

Deregister: This command is used to remove the registered thunder device.

Syntax `[no] deregister`

Default Disabled

Mode Harmony Controller profile configuration mode

Usage This command de-registers the ACOS device with the A10 Harmony Controller by initiating the de-registration from the controller. Once the ACOS device is de-registered, the controller stops receiving the logs and the analytics data from the ACOS device.

Example The following example shows how to enter the A10 Harmony Controller configuration mode and then de-register the ACOS device from the controller:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# deregister
ACOS(config-profile)#
```

harmony-controller telemetry

Description This CLI option helps in configuring the A10 Harmony Controller telemetry mode to collect ACOS firewall statistics.
Important: A new command `per partition configuration` is now added.

Syntax `[no] harmony-controller telemetry`

Parameters	Description
`[no]`	Disable telemetry mode for the Harmony Controller
`telemetry`	Telemetry mode.
`per partition configuration`	To enable the configurations to the partition level

Syntax `per partition configuration`

Default No default value

Mode Configuration mode

Usage This is applicable to the statistics of the following:
- Application firewall
- GI firewall
- Data-centre firewall

Example The following example shows how to configure the A10 Harmony Controller telemetry mode to collect the ACOS firewall statistics:

```
ACOS(config)# harmony-controller telemetry per partition
configuration
```

log-rate

Description This CLI option helps in configuring the maximum number of logs per second sent by the ACOS device to the Harmony Controller.

Syntax

```
log-rate <log_rate_value>
```

Parameters	Description
log_rate_value	Maximum number of logs of range (0 to 10000) sent by the partitions per second.

Default The default value is 10

Mode A10 Harmony Controller configuration mode

Usage This option sets the sampling rate of traffic logs sent from the Thunder device to the controller.

Example The following example shows how to enter the A10 Harmony Controller configuration mode on the ACOS device in order to specify a **log-rate** maximum value of 10,000 traffic logs from the managed Thunder device to the controller:

```
ACOS(config)# harmony-controller telemetry
ACOS(config-profile)# log-rate 10000
ACOS(config-profile)#
```

metrics-export-interval

This CLI option helps in configuring the interval in seconds to export the metrics to Harmony Controller.

Syntax `metrics-export-interval`

Parameters	Description
metrics-export-interval	The metrics export interval in seconds. The default value is 60.
export_interval	The metrics export interval in seconds, of value 15 to 300. **NOTE:** The default value is 60 seconds.

Syntax *export_interval*

Default 60 seconds

Mode A10 Harmony Controller configuration mode

Usage The interval specifies how often the metrics information is polled from the Thunder device and sent to the Kafka messaging system, which then relays the information to the A10 Harmony Controller.

Example The following example shows how to enter A10 Harmony Controller configuration mode:

```
ACOS(config)# harmony-controller profile
ACOS(config-profile)# metrics-export-interval 60
ACOS(config-profile)#
```

Show Commands

The following is the new show command set for this feature. The tunnel client status depicts the status of the tunnel connection with the tunnel server. It is also shown as part of the harmony controller status.

```
vThunder(config-profile)(NOLICENSE)#sh context
!Context configuration: 273 bytes
!
harmony-controller profile
  host <xx.xx.xx.xx> use-mgmt-port
  provider root
  username username@a10networks.com
  password encrypted
vgGEdaf1LGnnFqRoZpqpWDwQjLjV2wDnPBCMuNXbAOc8EIy41dsA5zwQjLjV2wDn
  register
  thunder-mgmt-ip <xx.xx.xx.xx>
  tunnel enable
!
vThunder(config-profile)(NOLICENSE)#sh harmony-controller status
overall-status : Registration with Harmony Controller is in progress
heartbeat-status : In Progress
schema-registry-status :
kafka-broker-state : Kafka server not enabled
Number-of-tenant-mapped-partitions : 0
Number-of-tenant-unmapped-partitions : 1
tunnel-status : ACTIVE
vThunder(config-profile)(NOLICENSE)#
```

show harmony-controller status

Description This CLI option helps in displaying the status of the Harmony Controller profile.

Syntax `show harmony-controller status`

Default No default value

Mode Configuration mode

Usage This parameter is used to check the status of the Harmony Controller.

Example The following is an example of the show output:

```
ACOS(config-profile)# show harmony-controller status
overall-status : Registration with Harmony Controller is partially
completed.
To complete the registration, please go to Infrastructure page of HC
Portal and map Device Partitions into Tenants
heartbeat-status : ACTIVE
service-registry : ACTIVE
registration-status : PASS
registration-status-code : 200
schema-registry-status : Registration of schemas with SR passed
broker_info : 10.6.34.53:9093
kafka-broker-state : Up
Number-of-tenant-mapped-partitions : 99
Number-of-tenant-unmapped-partitions : 1
```

```
New command:
```

```
ACOS(config-profile)# show harmony-controller partition-tenant-info
 partition-name : part1
tenant-name : Dev109_119_All
tenant-id : daa21128-887f-4369-857f-e581f1c550be
cluster-name : cluster1.part1
cluster-id : 1fc77a68-035c-11e9-82df-001fa00d46f0
log-rate-per-sec : 30
ACOS(config-profile)#
```

show harmony-controller stats

Description This CLI option helps in displaying the statistics of the Harmony Controller profile.

Syntax **`show harmony-controller stats`**

Default No default value

Mode Configuration mode

Usage This parameter is used to check the statistics of the Harmony Controller.

Example The following is an example of the show output:

```
ACOS(config-profile)# show harmony-controller stats
```

```
-------------------------------------------------------
Counter                                              Value
-------------------------------------------------------
PR topic counter from acos to harmony                0
AVRO device status from acos to harmony              270
AVRO partition metrics from acos to harmony          270
Telemetry exported via avro                          270
PR topic to harmony enqueue error                    0
PR topic to harmony  dequeue error                   0
Telemetry exported via avro failed encoding          0
Telemetry exported via avro failed sending           0
AVRO device status enqueue error                     0
AVRO device status dequeue error                     0
AVRO partition metrics enqueue error                 0
AVRO partition metrics dequeue error                 0
Kafka Unknown topic error                            0
Telemetry Drop  : 0 because kafka broker is down     0
Telemetry Drop  : 0 because kafka Queue is full      0
PR Drop : 0 due to throttling                        0
PR Drop : 0 because not allowed to log               0
PR back-end ttfb is negative                         0
PR back-end ttlb is negative                         0
PR in latency threshold exceeded                     0
PR out latency threshold exceeded                    0
PR out latency negative                              0
PR in latency negative                               0
Telemetry Drop  : 0ped because kafka topic not       0
created
Telemetry exported via avro failed encoding          0
```

```
PC topic counter from acos to harmony              0
PC topic to harmony  dequeue error                 0
CGN PC topic counter from acos to harmony          0
CGN PC topic to harmony dequeue error              0
CGN PE topic counter from acos to harmony          0
CGN PE topic to harmony dequeue error              0
FW PC topic counter from acos to harmony           0
FW PC topic to harmony dequeue error               0
FW DENY PC topic counter from acos to harmony      0
FW DENY PC topic to harmony dequeue error          0
FW RST PC topic counter from acos to harmony       0
FW RST PC topic to harmony dequeue error           0
CGN Summary PE topic counter from acos to harmony 0
CGN Summary PE topic to harmony dequeue error      0
PC Drop : 0 due to throttling                      0
Partition-Tenant mapping not saved on HC         3635
```

show running-config harmony-controller

Description This CLI option displays the running configuration of HC.

Syntax `show running-config harmony-controller`

Default No default value

Mode Configuration mode

Usage This parameter is used to check the existing running configuration for HC. This includes the HC config-replace settings, HC profile config with details on host, port, provider, account details, tunnel, analytics settings, telemetry settings, and so on.

Example The following is an example of the show output:

```
ACOS(config)#show running-config harmony-controller
!Section configuration: 489 bytes
!
harmony-controller profile
      host 10.12.13.55 port 443 use-mgmt-port
```

```
      provider root
      user-name _a10_hc_device
      cluster-name single
      password encrypted
vaz05/L4HaPthKY7JgMxj2PulLjzy90F+xUGBxVWMBgiOgIhHGDsKzwyzIn+EqldhrAfm2KkAn
2oUe230qBbl0UlGw7wPR1HQeAUt0Sl7ov
      DJE+7/
      region ag
      analytics system
      availability-zone "Saint Johns, Saint John"
      tunnel enable
      register
      thunder-mgmt-ip 10.23.19.74
!
harmony-controller telemetry
      log-rate 1257
!
harmony-controller config-replace enable
!
ACOS(config)#
```

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