

Configuring VSM and CCAG with CLI

This section provides information to configure cards, MDAs, and ports.

Topics in this section include:

- [Configuring VSM and CCAG with CLI on page 2047](#)
- [Basic Configuration on page 2048](#)
- [Common Configuration Tasks on page 2051](#)
- [Service Management Tasks on page 2061](#)

Basic Configuration

The following fields require specific input (there are no defaults) to configure VSM:

- CCAG ID
- For a local service, two SAPs must be configured specifying the source and destination nodes and ports
- For a distributed service, one SAP and one SDP must be specified

The following example displays VSM defaults when a *ccag-id* is created.

```
A:ALA-48>config>vsm# info detail
#-----
echo "Versatile Services Module Configuration"
#-----
vsm
  ccag 1 create
    no description
    cca-rate max
    access
      adapt-qos distribute
    exit
  path a
    weight 50
    rate max aggregate
    sap-sap
      no mac
      no mtu
      egress
        pool
          resv-cbs default
          slope-policy "default"
        exit
      exit
    ingress
      pool
        resv-cbs default
        slope-policy "default"
      exit
    exit
  sap-net
    no mac
    no mtu
    egress
      pool
        resv-cbs default
        slope-policy "default"
      exit
    exit
  ingress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  exit
exit
```

```

net-sap
  no mac
  no mtu
  no accounting-policy
  no collect-stats
  queue-policy "default"
  egress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  exit
exit
exit
path b
  weight 50
  rate max aggregate
  sap-sap
    no mac
    no mtu
    egress
      pool
        resv-cbs default
        slope-policy "default"
      exit
    exit
  ingress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  exit
exit
sap-net
  no mac
  no mtu
  egress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  ingress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  exit
exit
net-sap
  no mac
  no mtu
  no accounting-policy
  no collect-stats
  queue-policy "default"
  egress
    pool
      resv-cbs default
      slope-policy "default"
    exit
  exit

```

```
        exit
      exit
    no shutdown
  exit
exit
-----
A:ALA-48>config>vsm#
```

Common Configuration Tasks

This section provides a brief overview of the tasks that should be performed to configure VSM on an MDA, router, router interface, and services.

- Provision one or more CCA as MDAs in the system.
 - Create VSM CCAGs on the system.
 - Provision CCAG path bandwidth, path weighting, and overall bandwidth parameters.
 - Provision member CCAs into a CCAG.
 - Provision service SAPs using a CCAG, path, and CCID for cross connect purposes.
 - Bind routed network IP interfaces to a CCAG, path, and CCID for cross connect purposes.
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Configure VSM CCAG Components

Use the CLI syntax displayed below to configure the following entities:

- [Provision VSM on an MDA on page 2051](#)
 - [Cross Connecting Network IP Interfaces on page 2056](#)
 - [Provision CCAG Parameters on page 2053](#)
 - [Configure Path Components on page 2054](#)
 - [Cross Connecting Services on page 2057](#)
-

Provision VSM on an MDA

Before a CCA module may be utilized in the system, the CCA must be provisioned into an MDA slot. The MDA provisioning command must be modified to support provisioning a CCA adaptor type. Up to 8 member CCAs can be configured per CCAG.

CLI Syntax: `config>card# mda mda-number mda-type {other-MDA-type|cca}`

The following example displays the command usage to provision CCA on an MDA:

Example:

```
config# card 10
config>card# mda 1
config>card>mda# mda-type vsm-cca
config>card>mda# exit
config>card#
```

The following example displays the configuration:

```
A:ALA-48>config>card# info
-----
card-type iom-20g
mda 1
    mda-type vsm-cca
exit
mda 2
    mda-type m20-1gb-tx
exit
-----
A:ALA-48>config>card#
```

Provision CCAG Parameters

Once a CCA is provisioned into the system, it must be placed in a Cross Connect Aggregation Group (CCAG) to be used by cross connect objects. Besides CCA membership, the CCAG also supports bandwidth control parameters (see [Configure Path Components on page 2054](#)) used to manipulate forwarding distribution between objects in the alpha and beta path groups and the aggregate rate allowed on the CCA.

Use the following CLI syntax to provision CCAG components.

CLI Syntax:

```
config>vsm#
  ccag ccag-id [create]
  cca-rate kilobits-per-second
  description description-string
  member-cca card-slot/mda-number
  path {a|b}
  no shutdown
```

The following example displays the command usage to provision CCAG components:

Example:

```
config>vsm# ccag 1
config>vsm>ccag# description "VSM test"
config>vsm>ccag# cca-rate 1000000
config>vsm>ccag# member-cca 10/1
```

The following example displays the configuration:

```
A:ALA-48>config>vsm# info
-----
      ccag 1 create
        description "VSM test"
        cca-rate 1000000
        member-cca 10/1
      exit
...
-----
A:ALA-48>config>vsm#
```

Configure Path Components

Each CCA is divided into two distinct paths for bandwidth management purposes. One path is identified as alpha (a) and the other beta (b). The significance of each path for bandwidth distribution is dependent on the relative path weights each path is given in relationship to the other. A maximum path rate may also be defined allowing the provisioning of a maximum cap on the aggregate bandwidth allowed to the SAP or IP interface queues associated with the path.

Each path is separated into three other contexts; SAP-2-SAP (sap-sap), SAP-2-Net (sap-net) and Net-2-SAP (net-sap). Each path context allows for the definition of the features that are usually associated with physical ports on other MDAs in the system. These include buffer pool management, ingress network queue definitions and accounting policy control.

Use the following CLI syntax to provision path components.

- Net SAP
- SAP net
- SAP SAP

Use the following CLI syntax to provision CCAG path components.

CLI Syntax: config>vsm>ccag#
path {a|b}
net-sap
 accounting-policy *policy-id*
 collect-stats
 egress
 pool
 resv-cbs *percent-or-default*
 slope-policy *slope-policy-name*
 mac *ieee-address*
 mtu *mtu-bytes*
 queue-policy *queue-policy-name*
rate *kilo-bits-per-second* [aggregate|cca]
sap-net
 egress
 pool
 resv-cbs *percent-or-default*
 slope-policy *slope-policy-name*
 ingress
 pool
 resv-cbs *percent-or-default*
 slope-policy *slope-policy-name*
 mac *ieee-address*
 mtu *mtu-bytes*
sap-sap


```

egress
  pool
    resv-cbs percent-or-default
    slope-policy slope-policy-name
ingress
  pool
    resv-cbs percent-or-default
    slope-policy slope-policy-name
mac ieee-address
mtu mtu-bytes
weight path-weight

```

The following displays a CCAG path configuration example:

```

A:ALA-48>config>vsm# info
-----
      ccag 1 create
        description "VSM test"
        member-cca 10/1
        path a
          weight 100
        exit
        path b
          weight 100
          rate 99999999
        exit
        no shutdown
      exit
...
-----
A:ALA-48>config>vsm#

```

Cross Connecting Network IP Interfaces

To support cross connection between services and network IP interfaces, the network interface port command has been augmented to allow the binding of the IP interface to a **ccag** *cc-id*. Similar to service CCAG SAPs, the network IP interface port binding command must reference the *ccag-id*, the CCA path (.a or .b) and the *cc-id* used by the service CCAG SAP on the other CCA path.

Use the following CLI syntax to configure CCAG a network IP interface.

CLI Syntax: config# router [*router-name*]
 interface *interface-name*
 port ccag-*ccag-id*.{a|b}[.net-sap]:*cc-id*
 address {*ip-address/mask* | *ip-address netmask*} [broadcast
 all-ones|host-ones]
 mac *ieee-address*

The following displays CCAG network IP interface configuration examples:

```
A:ALA-48>config>router# info
#-----
echo "IP Configuration"
#-----
...
    interface "ccanet"
        address 2.1.1.1/24
        port ccag-1.a.net-sap:200
        mac 00:00:00:00:00:ff
    exit
    interface "ccanet2"
        address 4.1.1.1/24
        port ccag-1.b.net-sap:300
        static-arp 4.1.1.2 00:00:00:00:00:aa
    exit
...
#-----
A:ALA-48>config>router#
```

Cross Connecting Services

Services are provisioned onto a CCAG using a special CCAG SAP definition. CCAG SAPs must reference a *ccag-id*, a CCA path (a or b), a pairing type (sap-sap or sap-net) and a unique *cc-id*. The *ccag-id* identifies the group of CCAs that will be used for forwarding packets associated with the SAP. The path identifies the bandwidth control grouping used to manage CCA egress bandwidth. The pairing type helps the system identify which buffering resources will be used to manage egress queuing of packets. Finally, the *cc-id* is used to explicitly cross connect the SAP to another SAP or network IP interface configured with the same *cc-id*.

- [Epipe on page 2057](#)
- [VPLS on page 2058](#)
- [IES on page 2059](#)
- [VPRN on page 2060](#)

Epipe

CLI Syntax: `config>service#
 epipe service-id [customer customer-id]
 sap ccag-ccag-id.{a|b}[.sap-net|.sap-sap]:cc-id [create]`

The following displays an Epipe SAP configuration referencing a *ccag-id*:

```
A:ALA-48>config>service# info
-----
...
    epipe 103 customer 6 vpn 103 create
      sap 3/1/1.1.1 create
      exit
      sap ccag-1.a:100 create
      exit
      no shutdown
    exit
-----
A:ALA-48>config>service#
```

VPLS

CLI Syntax: config>service#
vpls service-id [customer customer-id]
sap ccag-ccag-id.{a|b}[.sap-net|.sap-sap]:cc-id [create]

The following displays a VPLS SAP configuration referencing a *ccag-id*:

```
A:ALA-48>config>service# info
-----
...
vpls 740 customer 1 vpn 740 create
  stp
    shutdown
  exit
  sap 1/1/19:1 create
  exit
  sap 1/1/19:2 create
    ingress
      qos 3
    exit
  exit
  sap ccag-1.a:456 create
    ingress
      qos 3
    exit
    egress
      qos 1010
    exit
  exit
  no shutdown
  exit
...
-----
A:ALA-48>config>service#
```

IES

CLI Syntax: config>service#
 ies service-id [customer customer-id]
 interface ip-interface-name
 sap ccag-ccag-id.{a|b} [.sap-net|.sap-sap]:cc-id [create]

The following displays an IES SAP configuration referencing a *ccag-id*:

```
A:ALA-48>config>service# info
-----
...
    ies 200 customer 1 create
      interface "ccaiesif" create
        address 8.1.1.1/24
        sap ccag-1.b:456 create
          ingress
            qos 3
          exit
        egress
          qos 1010
        exit
      exit
    exit
  no shutdown
  exit
...
-----
A:ALA-48>config>service#
```

VPRN

CLI Syntax: config>service#
vprn *service-id* [*customer customer-id*]
 interface *ip-interface-name*
 sap ccag-ccag-id.{a|b}[.sap-net|.sap-sap]:cc-id [create]

Example: config>service# vprn 701 customer 2 create
config>service>vprn\$ interface "VSM Test" create
config>service>vprn>if\$ sap ccag-2.a:100 create
config>service>vprn>if>sap\$ no shutdown
config>service>vprn>if>sap# exit
config>service>vprn>if# exit
config>service>vprn# no shutdown

The following output displays the configuration:

```
A:ALA-48>config>service>vprn# info
-----
      interface "VSM Test" create
          sap ccag-2.a:100 create
          exit
      exit
      no shutdown
-----
A:ALA-48>config>service>vprn#
```

Service Management Tasks

This section discusses the following service management tasks:

- [Modifying or Deleting a VSM MDA on page 2061](#)
- [Modifying CCAG Parameters on a Network IP Interface on page 2062](#)
- [Modifying CCAG Parameters on page 2063](#)
- [Modifying Path Parameters on page 2064](#)
- [Modifying Service Parameters on page 2066](#)

Modifying or Deleting a VSM MDA

To change or delete a VSM MDA already provisioned for a specific slot, first you must shut down and remove all service SAP and router interface associations ([page 2062](#)) to delete the VSM MDA from the configuration.

CLI Syntax:

```
config> card slot-number
      [no] mda mda-number
      [no] mda-type mda-type
      shutdown
```

Example:

```
config# card 10
config>card# mda 1
config>card>mda# mda-type vsm-cca
config>card>mda# shutdown
config>card>mda# exit
config>card# no mda 1
```

The following example displays the configuration:

```
A:ALA-48>config>card# info
-----
      card-type iom-20g
      mda 2
      mda-type vsm-cca
      exit
-----
A:ALA-48>config>card#
```

Modifying CCA Parameters on a Network IP Interface

CLI Syntax: config# router [*router-name*]
 interface *interface-name*
 shutdown
 no port ccag-*ccag-id*.{a|b}[.net-sap]:*cc-id*

The following example displays the command usage:

Example: config>router# interface ccanet
config>router>if# address 3.1.1.1/24
config>router>if# exit

```
A:ALA-48>config>router# info
-----
#-----
echo "IP Configuration"
#-----
...
    interface "ccanet"
        address 3.1.1.1/24
        port ccag-1.a.net-sap:200
        mac 00:00:00:00:00:ff
    exit
    interface "ccanet2"
        address 4.1.1.1/24
        port ccag-1.b.net-sap:300
        static-arp 4.1.1.2 00:00:00:00:00:aa
    exit
...
#-----
A:ALA-48>config>router#
```


Modifying CCAG Parameters

CLI Syntax: config>vsm#

```

ccag ccag-id [create]
no ccag ccag-id [force]
access {link|distribute}
    adapt-qos
cca-rate kilobits-per-second
no cca-rate
description description-string
no description
[no] member-cca card-slot/mda-number
path {a|b}
no shutdown

```

The following example displays the command usage to provision CCAG components:

Example:config>vsm# ccag 1

```

config>vsm>ccag# access
config>vsm>ccag>access#
config>vsm>ccag>access# adapt-qos distribute
config>vsm>ccag>access# exit
config>vsm>ccag# member-cca 10/2
config>vsm>ccag# exit

```

The following example displays the configuration:

```

A:ALA-48>config>vsm# info
-----
ccag 1 create
description "VSM test"
member-cca 10/1
member-cca 10/2
path a
    weight 100
exit
path b
    weight 100
    rate 99999999
exit
no shutdown
exit

```

```

...
-----
A:ALA-48>config>vsm# ccag 1

```

Modifying Path Parameters

The following example displays the command usage to provision CCAG path parameters:

```
Example:config>vsm# ccag 1
config>vsm>ccag# path a
config>vsm>ccag>path# no weight
config>vsm>ccag>path# net-sap
config>vsm>ccag>path>net-sap# queue-policy nq1
config>vsm>ccag>path>net-sap# egress
config>vsm>ccag>path>net-sap>egr# pool
config>vsm>ccag>path>net-sap>egr>pool# slope-policy A
config>vsm>ccag>path>net-sap>egr>pool# exit
config>vsm>ccag>path>net-sap>egr# exit
config>vsm>ccag>path>net-sap# exit
config>vsm>ccag>path# exit
config>vsm>ccag# path b
config>vsm>ccag>path# no rate
config>vsm>ccag>path# sap-sap
config>vsm>ccag>path>sap-sap# egress
config>vsm>ccag>path>sap-sap>egr# pool
config>vsm>ccag>path>sap-sap>egr>pool#
config>vsm>ccag>path>sap-sap>egr>pool# slope-policy B
config>vsm>ccag>path>sap-sap>egr>pool# exit
config>vsm>ccag>path>sap-sap>egr# exit
config>vsm>ccag>path>sap-sap# exit
config>vsm>ccag>path# exit
config>vsm>ccag#
```

The following example displays the configuration:

```
A:ALA-48>config>vsm# info
-----
ccag 1 create
  description "VSM test"
  member-cca 10/1
  member-cca 10/2
  path a
    net-sap
      queue-policy "nq1"
      egress
        pool
          slope-policy "A"
        exit
      exit
    exit
  exit
  path b
    weight 100
    sap-sap
      egress
        pool
```

```
                slope-policy "B"  
            exit  
        exit  
    exit  
    exit  
    no shutdown  
exit  
...  
-----  
A:ALA-48>config>vsm#
```

Modifying Service Parameters

- [Epipe on page 2066](#)
- [VPLS on page 2067](#)
- [IES on page 2068](#)
- [VPRN on page 2069](#)

Epipe

CLI Syntax: config>service#
epipe service-id
sap ccag-ccag-id.{a|b}[.sap-net|.sap-sap]:cc-id
no sap sap-id
shutdown

The following service examples display the command usage to provision CCAG.

Example: config>service# epipe 103
config>service>epipe# sap ccag-1.a:100
config>service>epipe>sap# shutdown
config>service>epipe>sap# exit
config>service>epipe# no sap ccag-1.a:100
config>service>epipe# sap ccag-1.b:200 create
config>service>epipe>sap\$ no shutdown
config>service>epipe>sap\$ exit
config>service>epipe#

The following output displays the configuration:

```
A:ALA-48>config>service>epipe# info
-----
      sap 3/1/1.1.1 create
      exit
      sap ccag-1.b:200 create
      exit
      no shutdown
-----
A:ALA-48>config>service>epipe#
```

VPLS

CLI Syntax: config>service#
 vpls *service-id* [*customer customer-id*]
 sap *ccag-ccag-id*.{a|b}[.*sap-net*|.*sap-sap*]:*cc-id*
 no sap *sap-id*
 shutdown

Example: config>service>vpls# sap ccag-1.a:456
 config>service>vpls>sap# shutdown
 config>service>vpls>sap# exit
 config>service>vpls# no sap ccag-1.a:456
 config>service>vpls# sap ccag-1.b:100 create
 config>service>vpls>sap\$ no shutdown
 config>service>vpls>sap\$ exit
 config>service>vpls# sap ccag-1.a:100
 config>service>vpls>sap# ingress
 config>service>vpls>sap>ingress# qos 3
 config>service>vpls>sap>ingress# exit
 config>service>vpls>sap# egress
 config>service>vpls>sap>egress# qos 1010
 config>service>vpls>sap>egress# exit
 config>service>vpls>sap# exit

A:ALA-48>config>service>vpls# info

```
-----
      stp
        shutdown
      exit
      sap 1/1/19:1 create
      exit
      sap 1/1/19:2 create
        ingress
          qos 3
        exit
      exit
      sap ccag-1.b:100 create
      exit
      no shutdown
-----
```

A:ALA-48>config>service>vpls#

IES

CLI Syntax: config>service#
 ies service-id [customer customer-id]
 interface ip-interface-name
 sap ccag-ccag-id.{a|b}[.sap-net|.sap-sap]:cc-id
 no sap sap-id
 shutdown

Example: config>service# ies 200
 config>service>ies# interface "ccanet6"
 config>service>ies>if# sap ccag-1.a:101 create
 config>service>ies>if>sap# ingress
 config>service>ies>if>sap>ingress# qos 3
 config>service>ies>if>sap>ingress# exit
 config>service>ies>if>sap# egress
 config>service>ies>if>sap>egress# qos 1010
 config>service>ies>if>sap>egress# exit
 config>service>ies>if>sap# no shutdown
 config>service>ies>if>sap# exit
 config>service>ies>if#

The following output displays the configuration:

```
A:ALA-48>config>service>ies# info
-----
interface "ccaiesif" create
  address 8.1.1.1/24
  sap ccag-1.b:456 create
  ingress
    qos 3
  exit
  egress
    qos 1010
  exit
exit
interface "ccanet6" create
  address 7.1.1.1/24
  sap ccag-1.a:101 create
  ingress
    qos 3
  exit
  egress
    qos 1010
  exit
exit
no shutdown
-----
A:ALA-48>config>service>ies#
```

VPRN

CLI Syntax: config>service#
 vprn *service-id* [*customer customer-id*]
 interface *ip-interface-name*
 sap ccag-*ccag-id*.{a|b}[*.sap-net|.sap-sap*]:*cc-id*
 no sap *sap-id*
 shutdown

On a VPRN service SAP:

Example: config>service# vprn 701
 config>service>vprn# interface "VSM-Test Config" create
 config>service>vprn>if\$ sap ccag-2.b:50 create
 config>service>vprn>if>sap\$ no shutdown
 config>service>vprn>if>sap\$ exit
 config>service>vprn>if# exit
 config>service>vprn#

The following output displays the configuration:

```
A:ALA-48>config>service>vprn# info
-----
      interface "VSM Test" create
          sap ccag-2.a:100 create
          exit
      exit
      interface "VSM-Test Config" create
          sap ccag-2.b:50 create
          exit
      exit
      no shutdown
-----
A:ALA-48>config>service>vprn#
```

