Configuring VSM and CCAG with CLI

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

Topics in this section include:

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
                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
                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.

Configure VSM CCAG Components

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

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 34) 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 **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 [cre-
                 ate]
```

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 [cre-
          ate]
```

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

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 42) 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 CCAG 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#
```

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Modifying CCAG Parameters

CLI Syntax: `config>vsm#`
```
            ccag ccag-id [create]
            no ccag ccag-id [force]
               access
                  adapt-qos {link|distribute|port-fair}
               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 46
- VPLS on page 47
- IES on page 48
- VPRN on page 49

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
        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
        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#
```