DVB Video on Demand

The Digital Video Broadcasting (DVB) protocol for encrypting the video services as defined in the ETSI TS 103 197 DVB Simulcrypt specification has been implemented in the cBR-8. This document contains an overview of the commands for configuring DVB on the cBR-8 chassis and the commands for viewing the status of the encryption of services.

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Information About DVB VOD

Overview of DVB VOD

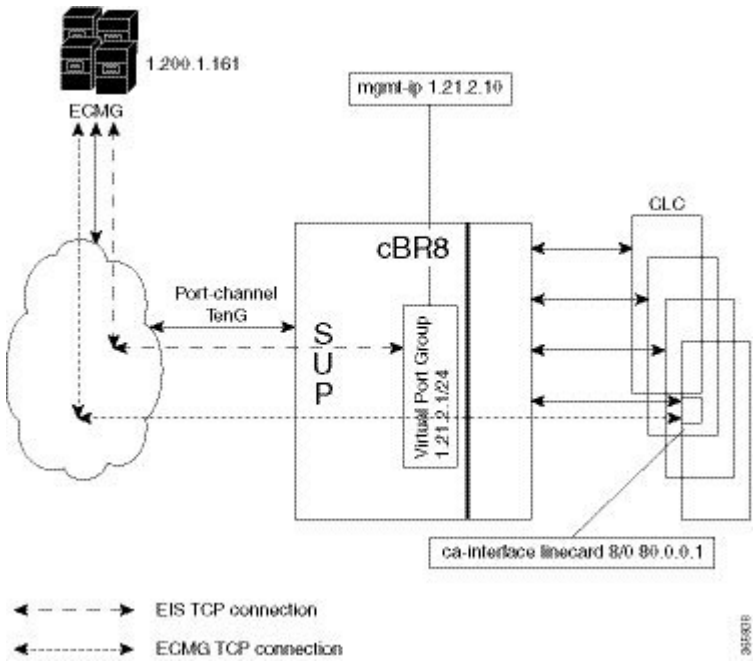
This feature enables the operator to scramble the video sessions on the chassis. It involves the configuration to establish a connection with the Entitlement Control Message Generator (ECMG) and the Event Information Scheduler (EIS).

The two primary modes of scrambling are: session based scrambling and tier-based scrambling. The basic difference between the two modes is that the manner in which the Entitlement Control Messages (ECM) are requested from the ECMG. For session based scrambling, a control word (CW) is generated once every Crypto Period (CP) and the ECM is requested for each session. For tier-based scrambling, the control word is generated once every CP and the ECM generated by the ECMG for the CW is used by all the sessions in the chassis.

Session based Scrambling Setup

The connection with the external EIS Server is established via the Virtual Port Group in the Supervisor. The connection with the external ECMG server is established via the linecard.

Figure 1: Session based Setup



Fail-to-Clear

The fail-to-clear-duration feature is supported on DVB sessions and DualCrypt encryption modes. Based on the session encryption, the following two features are supported on the Cisco cBR Series Converged Broadband Routers.

Fail-to-Clear Duration for DVB Session-based Encryption

This feature is used along with DVB or DualCrypt encryption with external Event Information Scheduler (EIS) configuration. When encryption for a session fails in the Cisco cBR-8, this feature enables the operator to control the configured DVB-encrypted sessions to function without encryption for a configured duration. If the encryption still fails, the DVB session is marked as `Fail-to-black` after the fail-to-clear duration timeout.

Fail-to-Clear for DVB Tier-based Encryption

This feature is used along with Tier-based configuration. When encryption for a session fails in Cisco cBR-8, this feature enables the operator to control the configured DVB-encrypted sessions to function without encryption.

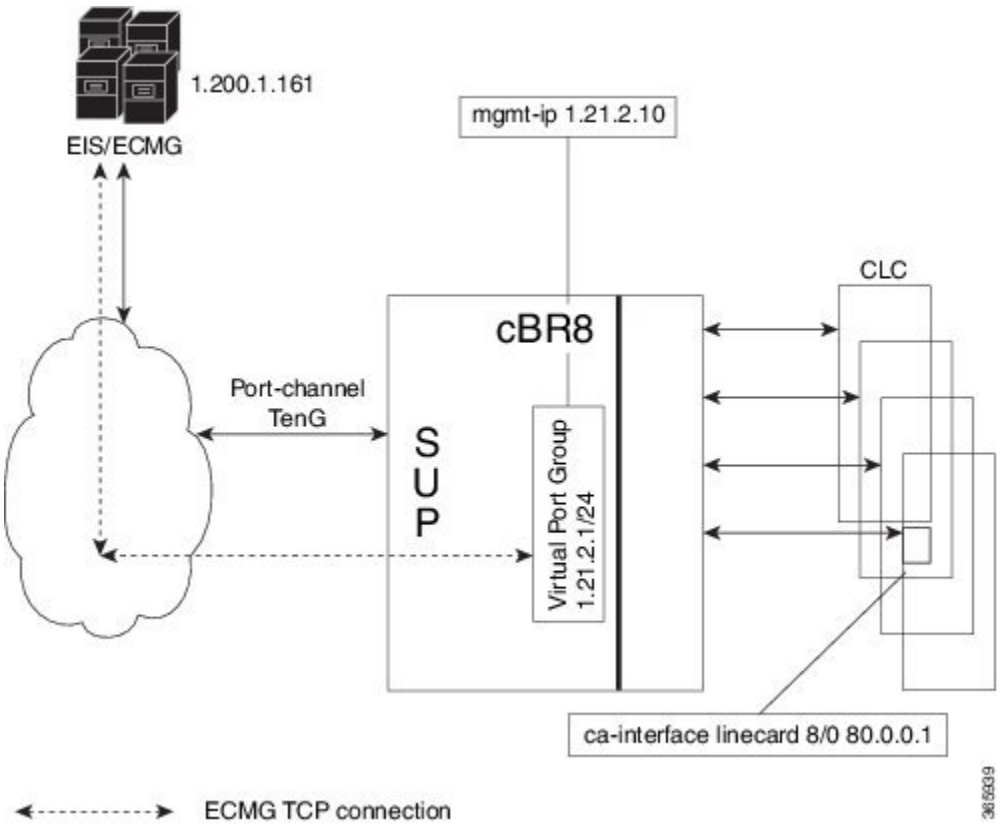
If fail-to-clear is configured, tier-based configuration is enabled, and then if the encryption fails, the DVB session's `Encrypt Status` is marked as `clear`. The status changes to `Encrypted` when the encryption starts.

This feature is not enabled by default.

Tier based Scrambling Setup

The connection with the external ECMG server is established via the Virtual Port Group in the Supervisor.

Figure 2: Tier based Setup



Restrictions for DVB

- This feature is applicable only for remapped table based sessions.
- Fail-to-clear-duration feature is applicable only to session-based scrambling for DVB CAS encryption.
- Fail-to-clear feature is applicable only to DVB tier-based scrambling sessions.

How to Configure DVB

Configuring DVB

Before You Begin

- Virtual Port Group interface must be configured and the management IP for DVB must be identified.
- Management interface is set to this Virtual Port Group interface under cable video configuration.
- Logical Edge Device is configured with the table based protocol.
- The encryption algorithm of the linecard is set to DVB-CSA.

- For session based scrambling, the CA interface on the linecard and the route for reaching the ECMG server must be specified.

To configure session based scrambling, follow the steps below:

```
enable
configure terminal
cable video
mgmt-intf VirtualPortGroup group_id
encryption
linecardslot/bay ca-system dvb scrambler dvb-csa
dvb
route-ecmg ECMG_Server_IP_Address Netmask Interface Forwarding_Router_IP_Address
mgmt-ip ip-address
eis EIS_Name id EIS_ID
listening-port port_number
fail-to-clear-duration < duration in seconds>
ca-interface linecardslot/bay IP_Address
ecmg ECMG_Name id ECMG_ID
mode vod linecardslot/bay
type [standard | hitachi | irdeto | nagra| pkey]
ca-system-id CA_System_ID CA_Subsystem_ID
ecm-pid-source [sid | auto | ecm-id | min-ecm-pid | max-ecm-pid]
connection id id priority connection_priority IP_Address Port
```

The fail-to-clear-duration is measured in seconds. The valid values are in the range from 0 to 10800 seconds. The default value is 0.

To configure tier based scrambling, follow the steps below:

```
enable
configure terminal
cable video
mgmt-intf VirtualPortGroup group_id
encryption
linecardslot/bay ca-system dvb scrambler dvb-csa
dvb
mgmt-ip ip-address
ecmg ECMG_Name id ECMG_ID
mode tier-based
type [standard | hitachi | irdeto | nagra| pkey]
ca-system-id CA_System_ID CA_Subsystem_ID
ecm-pid-source [sid | auto | ecm-id]
connection id id priority connection_priority IP_Address Port
tier-based
ecmg id ECMG_ID access-criteriaaccess_criteria_in_hex
fail-to-clear
enable
```

Note If the tier-based configuration is already enabled, you must first disable the tier-based configuration using the **no enable**, before you configure fail-to-clear feature.

Verifying the DVB Configuration

To verify the configuration of the encryption algorithm on the linecard, use the **show cable video encryption linecard** command as shown in the example below:

```
Router# show cable video encryption linecard 7/0
Line card: 7/0
CA System       Scrambler       DVB-Conformance
================================================
dvb             dvb-csa         Enabled
```

To verify the ECMG connection, use the **show cable video encryption dvb ecmg id** *id* **connection** command as shown in the example below:

```
Router# show cable video encryption dvb ecmg id 1 connection
------------------------------------------------------------------------------------------------------
ECMG ECMG           ECMG     CA Sys CA Subsys PID    Lower Upper Streams/ Open Streams/
Auto Chan Slot ECMG        ECMG
ID   Name           Type     ID     ID        Source limit limit ECMG     ECMG          ID
             Connections Application
------------------------------------------------------------------------------------------------------
1    polaris_ecmg01 standard 0x4748 0x0       sid    0     0     1        1
Enabled   RP   1           Tier-Based

ECMG Connections for ECMG ID = 1

-----------------------------------------------------------
Conn Conn     IP          Port    Channel  Conn    Open
-ID  Priority Address     Number  ID       Status  Streams
-----------------------------------------------------------
1    1        10.10.1.1  8888    1        Open    1
```

The sample output of the session based scrambling configuration verification command is shown below:

```
Router# show cable video encryption dvb ecmg id 7 connection
------------------------------------------------------------------------------------------------------
ECMG ECMG           ECMG     CA Sys CA Subsys PID    Lower Upper Streams/ Open Streams/
Auto Chan Slot ECMG        ECMG
ID   Name           Type     ID     ID        Source limit limit ECMG     ECMG          ID
             Connections Application
------------------------------------------------------------------------------------------------------
7    ecmg-7         standard 0x950  0x1234    sid    0     0     1680     1680
Enabled   7    1           VOD

ECMG Connections for ECMG ID = 1

-----------------------------------------------------------
Conn Conn     IP          Port    Channel  Conn    Open
-ID  Priority Address     Number  ID       Status  Streams
-----------------------------------------------------------
1    1        10.10.1.10  8888    1        Open    1
```

The status of the connection with the ECMG Server is indicated by the Conn Status. The Open Streams field indicates the number of Active ECM Streams.

To verify the EIS connection, use the **show cable video encryption dvb eis id** *id* command as shown in the example below:

```
Router# show cable video encryption dvb eis id 1
-------------------------------------------------------------------------------------------
EIS EIS  Peer       Management TCP  CP       CP       Overwrite Fail-To-Clear Connection
ID  Name IP         IP         Port Overrule Duration SCG       Duration      Status
```

```
-------------------------------------------------------------------------------
1   test 10.10.1.11 10.10.1.1  9898 DISABLED 0        DISABLED  400           Connected
```

To verify the CA Interface configuration in the case of session based scrambling, use the **show cable video encryption dvb ca-interface brief** command as shown in the example below:

```
Router# show cable video encryption dvb ca-interface brief
CA Interface configuration

------------------------------
Linecard    IP Address    VRF
------------------------------
7           10.10.1.1     N/A

ECMG Route configuration

-----------------------------------------------------
IP Address    NetMast         Interface
-----------------------------------------------------
10.10.1.10    255.255.255.224   TenGigabitEthernet4/1/2
```

To verify the encryption status of the sessions, use the **show cable video session logical-edge-device id** command as shown in the example below:

```
Router# show cable video session logical-edge-device id 1
Total Sessions = 1

Session Output Streaming Session Session Source                UDP   Output  Input
Output Input   Output  Encrypt Encrypt   Low     Session
Id      Port   Type      Type    Ucast Dest IP/Mcast IP (S, G) Port  Program State
State  Bitrate Bitrate Type    Status    Latency Name
-------------------------------------------------------------------------------------------------------------------
1048576 1      Remap     UDP     10.10.1.1                   49167 20      ACTIVE-PSI
   1695161 1689747 DVB     Encrypted N       dvbsess.1.0.1.0.23167
```

To verify the ECM PID and whether the CA Descriptor is added to the PMT, use the **show cable video session logical-edge-device id session-id** command as shown in the example below:

```
Router# show cable video session logical-edge-device id 1 session-id 1048576
Output PMT Info:
==============================
  Program 20, Version 3, PCR 49, Info len 18,  (CA SYS-ID 4748, PID 79)
  PID 49: Type 2, Info len 0
  PID 50: Type 3, Info len 6, (lang eng)
```

Troubleshooting Tips

If some configuration errors occur, see the following troubleshooting tips:

- The Management IP must be unique and in the subnet of virtual port group.
- Ensure that the ECMG Server is pingable with source interface as the virtual port group from the Cisco cBR-8 console. This indicates that the ECMG Server is reachable and route is valid.
- Ensure that the TCP port number configured for the ECMG Server in the Cisco cBR-8 is the same as that of the ECMG Server listening port.
- Ensure that the management IP is pingable from the EIS Server. Otherwise, check the routing between the cBR-8 chassis and the EIS server.

- Ensure that the listening port that is configured for the EIS is used for establishing the connection from the EIS Server.
- Ensure that the Virtual Port Group interface is active.
- Ensure that the TenGigabitEthernet interface using which the management traffic reaches the Cisco cBR-8 and the interface through which the CA interface route is configured are active.

Configuration Examples

This section provides examples for the DVB configuration.

Example 1: Basic Session-based Scrambling Configuration

```
Router>enable
Router#config terminal
Router(config)#interface VirtualPortGroup0
Router(config-if)#vrf forwarding vrf_script_red_1
Router(config-if)#ip address 10.10.1.1 255.255.255.224
Router(config-if)#no mop enabled
Router(config-if)#no mop sysid
Router(config-if)#exit
Router(config)#cable video
Router(config-video)#mgmt-intf VirtualPortGroup 0
Router(config-video)#encryption
Router(config-video-encrypt)#linecard 7/0 ca-system dvb scrambler dvb-csa
Router(config-video-encrypt-dvb-conf)#exit
Router(config-video-encrypt)#dvb
Router(config-video-encrypt-dvb)#scramble-video-audio
Router(config-video-encrypt-dvb)#route-ecmg 10.10.1.1 255.255.255.224 TenGigabitEthernet4/1/2
 10.10.1.1
Router(config-video-encrypt-dvb)#mgmt-ip 10.10.1.1
Router(config-video-encrypt-dvb)#eis eis-1 id 1
Router(config-video-encrypt-dvb-eis)#listening-port 8890
Router(config-video-encrypt-dvb-eis)#fail-to-clear-duration 400
Router(config-video-encrypt-dvb-eis)#cp-overrule 60
Router(config-video-encrypt-dvb-eis)#overwrite-scg
Router(config-video-encrypt-dvb-eis)#exit
Router(config-video-encrypt-dvb)#ca-interface linecard 1/0 10.10.1.1 vrf vrf_script_red_1
Router(config-video-encrypt-dvb)#ecmg ecmg-7 id 7
Router(config-video-encrypt-dvb-ecmg)#mode vod linecard 7/0
Router(config-video-encrypt-dvb-ecmg)#type standard
Router(config-video-encrypt-dvb-ecmg)#ca-system-id 950 1234
Router(config-video-encrypt-dvb-ecmg)#auto-channel-id
Router(config-video-encrypt-dvb-ecmg)#ecm-pid-source sid
Router(config-video-encrypt-dvb-ecmg)#connection id 1 priority 1 10.10.1.1 8888
Router(config-video-encrypt-dvb-ecmg)#desc-rule desc_8_1 id 1
Router(config-video-encrypt-dvb-ecmg-desc)#add-priv-data at-es-level private-data 12345678
 ecm-ids 81,82,83,84,85
Router(config-video-encrypt-dvb-ecmg-desc)#exit
Router(config-video-encrypt-dvb-ecmg)#overrule
Router(config-video-encrypt-dvb-ecmg-overrule)#max-comp-time 10000
Router(config-video-encrypt-dvb-ecmg-overrule)#min-cp-duration 60000
Router(config-video-encrypt-dvb-ecmg-overrule)#start-delay -5000
Router(config-video-encrypt-dvb-ecmg-overrule)#rep-period 125
Router(config-video-encrypt-dvb-ecmg-overrule)#max-streams 1920
Router(config-video-encrypt-dvb-ecmg-overrule)#end
Router#config terminal
```

```
Router(config)#cable video
Router(config-video)#service-distribution-group sdg-1 id 1
Router(config-video-sdg)#onid 1
Router(config-video-sdg)#rf-port integrated-cable 7/0/0
Router(config-video-sdg)#end
Router(config-video)#virtual-carrier-group vcg-1 id 1
Router(config-video-vcg)#encrypt
Router(config-video-vcg)#service-type narrowcast
Router(config-video-vcg)#rf-channel 0 tsid 1 output-port-number 1
Router(config-video-vcg)#end
Router(config-video)#bind-vcg
Router(config-video-bd)#vcg vcg-1 sdg sdg-1
Router(config-video-bd)#end
Router(config-video)#logical-edge-device led-1 id 1
Router(config-video-led)#protocol table-based
Router(config-video-led-protocol)#virtual-edge-input-ip 10.10.1.1 input-port-number 1
Router(config-video-led-protocol)#vcg vcg-1
Router(config-video-led-protocol)#end
Router(config-video-led)#end
Router(config-video)#table-based
Router(config-video-tb)#vcg vcg-1
Router(config-video-tb-vcg)#rf-channel 0
Router(config-video-tb-vcg-sess)#session tier_vcg-1 input-port 1 start-udp-port 49152
processing-type remap start-program 1 cbr
```

Example 2: Basic Tier-based Scrambling Configuration

```
Router>enable
Router#config terminal
Router(config)#cable video
Router(config-video)#mgmt-intf VirtualPortGroup 0
Router(config-video)#encryption
Router(config-video-encrypt)#linecard 7/0 ca-system dvb scrambler dvb-csa
Router(config-video-encrypt-dvb-conf)#conformance-dvb
Router(config-video-encrypt-dvb-conf)#exit
Router(config-video-encrypt)#dvb
Router(config-video-encrypt-dvb)#scramble-video-audio
Router(config-video-encrypt-dvb)#strong-pairing-enforce
Router(config-video-encrypt-dvb)#mgmt-ip 10.10.1.1
Router(config-video-encrypt-dvb)#ecmg tier-ecmg-1 id 1
Router(config-video-encrypt-dvb-ecmg)#mode tier-based
Router(config-video-encrypt-dvb-ecmg)#type standard
Router(config-video-encrypt-dvb-ecmg)#ca-system-id 4748 0
Router(config-video-encrypt-dvb-ecmg)#auto-channel-id
Router(config-video-encrypt-dvb-ecmg)#ecm-pid-source sid
Router(config-video-encrypt-dvb-ecmg)#connection id 1 priority 1 10.10.1.1 8888
Router(config-video-encrypt-dvb-ecmg)#desc-rule desc_1 id 1
Router(config-video-encrypt-dvb-ecmg-desc)#add-priv-data at-es-level private-data 12345678
 all
Router(config-video-encrypt-dvb-ecmg-desc)#exit
Router(config-video-encrypt-dvb-ecmg)#overrule
Router(config-video-encrypt-dvb-ecmg-overrule)#max-comp-time 10000
Router(config-video-encrypt-dvb-ecmg-overrule)#min-cp-duration 60000
Router(config-video-encrypt-dvb-ecmg-overrule)#start-delay -5000
Router(config-video-encrypt-dvb-ecmg-overrule)#rep-period 125
Router(config-video-encrypt-dvb-ecmg-overrule)#max-streams 1920
Router(config-video-encrypt-dvb-ecmg-overrule)#exit
Router(config-video-encrypt-dvb-ecmg)#exit
Router(config-video-encrypt-dvb)#tier-based
Router(config-video-encrypt-dvb-tb)#ecmg id 1 access-criteria 1234512345
Router(config-video-encrypt-dvb-tb)#fail-to-clear
Router(config-video-encrypt-dvb-tb)#enable
```

```
Router#config terminal
Router(config)#cable video
Router(config-video)#service-distribution-group sdg-1 id 1
Router(config-video-sdg)#onid 1
Router(config-video-sdg)#rf-port integrated-cable 7/0/0
Router(config-video-sdg)#end
Router(config-video)#virtual-carrier-group vcg-1 id 1
Router(config-video-vcg)#encrypt
Router(config-video-vcg)#service-type narrowcast
Router(config-video-vcg)#rf-channel 0 tsid 1 output-port-number 1
Router(config-video-vcg)#end
Router(config-video)#bind-vcg
Router(config-video-bd)#vcg vcg-1 sdg sdg-1
Router(config-video-bd)#end
Router(config-video)#logical-edge-device led-1 id 1
Router(config-video-led)#protocol table-based
Router(config-video-led-protocol)#virtual-edge-input-ip 10.10.1.1 input-port-number 1
Router(config-video-led-protocol)#vcg vcg-1
Router(config-video-led-protocol)#end
Router(config-video-led)#end
Router(config-video)#table-based
Router(config-video-tb)#vcg vcg-1
Router(config-video-tb-vcg)#rf-channel 0
Router(config-video-tb-vcg-sess)#session tier_vcg-1 input-port 1 start-udp-port 49152
processing-type remap start-program 1 cbr
```

Additional References

Related Documents

Related Topic	Document Title
Configuring Tier-Based Scrambling	*Cisco RF Gateway 10 Software Configuration Guide*

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature Information for Low Latency VOD Support

Note The following table lists the software release in which a given feature is introduced. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1: Feature Information for Low Latency VOD Support

Feature Name	Releases	Feature Information
Low Latency VOD Support	Cisco IOS XE Everest 16.6.1	This feature was integrated on the Cisco cBR Series Converged Broadband Routers.