



APPENDIX C

Viewing Sample Configuration Files

This appendix contains examples of Cisco uBR7200 series universal broadband router configuration files. To view the current configuration of a Cisco uBR7200 series router, enter the **show running-config** command at the CLI prompt in EXEC mode or privileged EXEC mode.

Basic Internet Access Examples

General Example

This section provides a Cisco Release 12.0(5)T sample configuration file for the Cisco uBR7246, including spectrum management and modulation profile configuration for QAM 16:

```
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname uBR7246
!
boot system flash slot0:ubr7200-p-mz.120-5.T
boot system flash
!
cable spectrum-group 1 frequency 40000000
cable spectrum-group 1 frequency 20000000 2
cable modulation-profile 3 request 0 16 1 8 16qam scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 3 initial 5 34 0 48 16qam scrambler 152 no-diff 256 fixed uw16
cable modulation-profile 3 station 5 34 0 48 16qam scrambler 152 no-diff 256 fixed uw16
cable modulation-profile 3 short 5 75 6 8 16qam scrambler 152 no-diff 144 fixed uw8
cable modulation-profile 3 long 8 220 0 8 16qam scrambler 152 no-diff 160 fixed uw8
no cable qos permission create
no cable qos permission update
cable qos permission modems
ip subnet-zero
ip dhcp relay information option
!
interface FastEthernet0/0
ip address 10.1.70.2 255.255.255.0
no ip directed-broadcast
no ip mroute-cache
!
!
interface Ethernet2/3
ip address 1.3.59.1 255.255.0.0
```

```

no ip directed-broadcast
!
interface Cable5/0
ip address 172.1.71.1 255.255.255.0 secondary
ip address 10.1.71.1 255.255.252.0
no ip directed-broadcast
no ip route-cache
no ip mroute-cache
no keepalive
no cable proxy-arp

cable helper-address 10.1.70.30
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable upstream 0 spectrum-group 1
cable upstream 0 modulation-profile 3
cable downstream frequency 531000000
cable upstream 0 frequency 28000000
cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable upstream 1 shutdown
cable upstream 2 shutdown
cable upstream 3 shutdown
cable upstream 4 shutdown
cable upstream 5 shutdown
!
!
router eigrp 100
network 10.0.0.0
!
ip classless
no ip http server
!
!
!
line con 0
password cisco
login
transport input none
line aux 0
line vty 0 4
password cisco
login
!
end

```

The command lines in the sample configuration file beginning with the string **cable spectrum-group** contain the critical elements necessary to set up spectrum management in your overall configuration:

```

cable spectrum-group 1 frequency 40000000
cable spectrum-group 1 frequency 20000000 2

```

In this case, the user has configured spectrum management group number “1” to be available to upstream channels. As defined by the two command lines above, the “preferred” choice is for the upstream to operate on a 40 MHz channel. If that channel is not suitable for the transmission scheme available, the upstream will automatically move over to transmitting at 20 MHz and increase the receive power rating by 2 dB.

The command lines in the sample configuration file beginning with the string **cable modulation-profile** contain the critical elements necessary to set up a modulation profile in your overall configuration:

```

cable modulation-profile 3 request 0 16 1 8 16qam scrambler 152 no-diff 128 fixed uw16
cable modulation-profile 3 initial 5 34 0 48 16qam scrambler 152 no-diff 256 fixed uw16
cable modulation-profile 3 station 5 34 0 48 16qam scrambler 152 no-diff 256 fixed uw16
cable modulation-profile 3 short 5 75 6 8 16qam scrambler 152 no-diff 144 fixed uw8
cable modulation-profile 3 long 8 220 0 8 16qam scrambler 152 no-diff 160 fixed uw8

```

In this case, the user has configured modulation profile number “3” to be available to upstream channels wherever they are configured to apply it. Note that this modulation profile has been configured to operate with a 16 QAM modulation scheme. The default modulation scheme for any upstream profile (if it is not set to 16 QAM) is QPSK.

Later in the configuration file example, upstream port 0 on the cable modem card installed in slot 5 utilizes both the spectrum management and the modulation profile configured in the sample.

```

cable upstream 0 spectrum-group 1
cable upstream 0 modulation-profile 3

```

This section provides a Cisco Release 12.0(8)SC sample configuration file, showing roughly the same capabilities as in the Cisco IOS Release 12.0(5)T image:

```

version 12.0
service timestamps debug uptime
service timestamps log uptime
service password-encryption
!
hostname newtown01-7246
!
boot system flash slot0:ubr7200-klps-mz.120-8.SC.bin
boot system flash slot0:
boot config slot0:C7246
boot bootldr slot0:ubr7200-boot-mz.120-8.SC.bin
enable secret 5 <removed>
enable password 7 <removed>
!
cable flap-list size 4000
cable flap-list power-adjust threshold 3
cable flap-list aging 86400
cable spectrum-group 1 hop threshold 15
cable spectrum-group 1 frequency 26000000
cable spectrum-group 1 frequency 24000000 1
cable spectrum-group 1 frequency 22000000 2
no cable qos permission create
no cable qos permission update
cable qos permission modems
!
!
!
!
clock timezone GMT 0
ip subnet-zero
no ip source-route
no ip finger
ip telnet source-interface FastEthernet0/0
!
!
!
interface FastEthernet0/0
ip address 10.0.0.1 255.255.255.0 secondary
ip address 209.187.212.2 255.255.255.252
no ip directed-broadcast
no ip mroute-cache
full-duplex
no cdp enable
!

```

```

interface Cable3/0
description Sunnyvale, CA
ip address 209.187.213.1 255.255.255.0 secondary
ip address 10.8.0.1 255.255.0.0
no ip directed-broadcast
no ip mroute-cache
no keepalive
cable spectrum-group 1
cable dhcp-giaddr policy
cable helper-address 209.187.212.12
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 description Sunnyvale 1-5
cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable upstream 1 description Sunnyvale 6-10
cable upstream 1 power-level 0
no cable upstream 1 shutdown
cable upstream 2 description Sunnyvale 1-6
cable upstream 2 power-level 0
no cable upstream 2 shutdown
cable upstream 3 description Sunnyvale 7-11
cable upstream 3 power-level 0
no cable upstream 3 shutdown
cable upstream 4 description Sunnyvale 12-17
cable upstream 4 power-level 0
no cable upstream 4 shutdown
cable upstream 5 description Sunnyvale 18-23
cable upstream 5 power-level 0
no cable upstream 5 shutdown
!
interface Cable4/0
description Santa Clara, CA
ip address 207.252.148.1 255.255.255.0 secondary
ip address 10.9.0.1 255.255.0.0
no ip directed-broadcast
no ip mroute-cache
no keepalive
cable spectrum-group 1
cable dhcp-giaddr policy
cable helper-address 209.187.212.12
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 description Santa Clara 1-8
cable upstream 0 power-level 0
cable upstream 0 shutdown
cable upstream 1 description Santa Clara 1-7
cable upstream 1 power-level 0
no cable upstream 1 shutdown
cable upstream 2 description Santa Clara 8-13
cable upstream 2 power-level 0
no cable upstream 2 shutdown
cable upstream 3 description Santa Clara 14-19
cable upstream 3 power-level 0
no cable upstream 3 shutdown
cable upstream 4 description Santa Clara 20-26
cable upstream 4 power-level 0
no cable upstream 4 shutdown
cable upstream 5 description Santa Clara 27-33
cable upstream 5 power-level 0

```

```

no cable upstream 5 shutdown
!
interface Cable5/0
description San Jose, CA
ip address 207.252.149.1 255.255.255.0 secondary
ip address 10.10.0.1 255.255.0.0
no ip directed-broadcast
no ip mroute-cache
no keepalive
cable spectrum-group 1
cable dhcp-giaddr policy
cable helper-address 209.187.212.12
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 description Willow Glen 1-8
cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable upstream 1 description Willow Glen 9-16
cable upstream 1 power-level 0
no cable upstream 1 shutdown
cable upstream 2 description Willow Glen 17-24
cable upstream 2 power-level 0
no cable upstream 2 shutdown
cable upstream 3 description Willow Glen 25-32
cable upstream 3 power-level 0
no cable upstream 3 shutdown
cable upstream 4 description Evergreen 1-8
cable upstream 4 power-level 0
no cable upstream 4 shutdown
cable upstream 5 description Evergreen 9-17
cable upstream 5 power-level 0
no cable upstream 5 shutdown
!
interface Cable6/0
description Morgan Hill, CA
ip address 209.187.214.1 255.255.255.0 secondary
ip address 10.11.0.1 255.255.0.0
no ip directed-broadcast
no ip mroute-cache
no keepalive
cable spectrum-group 1
cable dhcp-giaddr policy
cable helper-address 209.187.212.12
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 description Santa Theresa 1-5
cable upstream 0 power-level 0
cable upstream 0 shutdown
cable upstream 1 description Santa Theresa 6-10
cable upstream 1 power-level 0
cable upstream 1 shutdown
cable upstream 2 description Santa Theresa 11-14
cable upstream 2 power-level 0
cable upstream 2 shutdown
cable upstream 3 description Santa Theresa 1-5
cable upstream 3 power-level 0
no cable upstream 3 shutdown
cable upstream 4 description Santa Theresa 6-11
cable upstream 4 power-level 0
no cable upstream 4 shutdown

```

```

cable upstream 5 description Santa Theresa 12-17
cable upstream 5 power-level 0
no cable upstream 5 shutdown
!
ip classless
ip route 0.0.0.0 0.0.0.0 209.187.212.1
ip route 0.0.0.0 0.0.0.0 Null0 255
!
> no cdp run
> snmp-server engineID local 0000000902000030190E0900
snmp-server community <removed> RO
snmp-server location San Jose, CA
snmp-server contact Jim Smith
snmp-server chassis-id 01
!
banner login ^C Warning! Unauthorized use of this system is prohibited. =
You will be prosecuted to the fullest extent of =
the law.^C
alias exec qos show cable qos profile
alias exec scm show cable modem
alias exec noise show cable modem detail
!
line con 0
transport input none
line aux 0
line vty 0 4
exec-timeout 0 0
password 7 <removed>
login
!
ntp clock-period 17179915
ntp update-calendar
ntp max-associations 2000
ntp server 129.7.1.66 source FastEthernet0/0 prefer
end

```

Baseline Privacy Interface Example

The Cisco uBR7200 series supports 56-bit and 40-bit encryption/decryption; 56 bit is the default. After you choose a CMTS image that supports BPI, BPI is enabled by default for the Cisco uBR7200 series. Key commands that appear in the Cisco uBR7200 series configuration file that denote encryption/decryption is supported include:

```

int cable 2/0
cable privacy kek grace-time 800
cable privacy kek life-time 750000
cable privacy tek grace-time 800
cable privacy tek life-time 56000
cable privacy enable
cable privacy mandatory

```



Note

The cable modem must also support encryption/decryption.

When baseline privacy is enabled, the Cisco uBR7200 series routes encrypted/decrypted packets from a host or peer to another host or peer. BPI is configured with key encryption keys (keks) and traffic encryption keys (teks). A kek is assigned to a CM based on the CM's service identifier (SID) and permits the CM to connect to the Cisco uBR7200 series router when baseline privacy is activated. The tek is assigned to a CM when its kek has been established. The tek is used to encrypt data traffic between the CM and the Cisco uBR7200 series router.

Keks and teks can be set to expire based on a gracetime or a lifetime value. A gracetime key is used to assign a temporary key to a CM to access the network. A lifetime key is used to assign a more permanent key to a CM. Each CM that has a lifetime key assigned will request a new lifetime key from the Cisco uBR7200 series router before the current one expires.

**Tip**

Use the **show cable modem** command to identify a CM with encryption/decryption enabled. The *online(pk)* output of this command reveals a CM that is registered with BPI enabled and a KEK assigned. The *online(pt)* output reveals a CM that is registered with BPI enabled and a TEK assigned.

Should you want to change the Cisco uBR7200 series default of 56-bit encryption/decryption to 40-bit, use the “40-bit-des” option:

```
CMTS(config-if)#cable privacy ?
  40-bit-des          select 40 bit DES
  ^^^^^^^^^
  authenticate-modem  turn on BPI modem authentication
  authorize-multicast turn on BPI multicast authorization
  kek                 KEK Key Params
  mandatory           force privacy be mandatory
  tek                 TEK Key Params
```

Software then generates a 40-bit DES key, where the DES key that is generated and returned masks the first 16-bits of the 56-bit key to zero in software. To return to 56-bit encryption/decryption after changing to 40-bit, enter the **no** command preceding the “40-bit-des” option.

**Caution**

Cisco uBR7200 series telco return images that support BPI, do not support encryption/decryption in the telco return path.

Euro-DOCSIS Operation Example

The Cisco uBR7200 series supports Euro-DOCSIS channel plans when using the MC16E cable interface line card. Key commands that appear in the Cisco uBR7200 series configuration file that denote Euro-DOCSIS operation include:

- **cable downstream annex A**—Annex A is reserved for Euro-DOCSIS operations (Annex B is used for DOCSIS NTSC operations). Annex A is chosen by default when using the MC16E.
- **cable upstream 0 frequency <5008000>**—The Euro-DOCSIS upstream valid range is from 5,000,000 to 65,000,000 Hz. You choose the value here.

**Note**

The following Cisco IOS releases support Euro-DOCSIS operation using the MC16E cable interface line card: 12.0(7)T, 12.0(7)XR2, 12.1 Mainline, 12.1(1a)T1 and higher; SC train images including 12.0(8)SC, 12.0(9)SC, and higher.

**Tip**

In contrast to other cable interface line cards where you set the downstream modulation and interleave depth, the downstream interleave value is fixed for the MC16E and cannot be configured. The MC16E also does not support enhanced spectrum management.

A sample Euro-DOCSIS configuration file follows:

!

```

version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname R7732-06-uBR7246-CE
!
!
cable modulation-profile 1 request 0 16 1 8 16qam scrambler 152
no-diff 128 fixed uw16
cable modulation-profile 1 initial 5 34 0 48 16qam scrambler 152
no-diff 256 fixed uw16
cable modulation-profile 1 station 5 34 0 48 16qam scrambler 152
no-diff 256 fixed uw16
cable modulation-profile 1 short 6 75 6 8 16qam scrambler 152 no-diff
144 fixeduw8
cable modulation-profile 1 long 8 220 0 8 16qam scrambler 152 no-diff
160 fixeduw8
cable modulation-profile 2 request 0 16 1 8 qpsk scrambler 152 no-diff
64 fixeduw8
cable modulation-profile 2 initial 5 34 0 48 qpsk scrambler 152
no-diff 128 fixed uw16
cable modulation-profile 2 station 5 34 0 48 qpsk scrambler 152
no-diff 128 fixed uw16
cable modulation-profile 2 short 5 75 6 8 qpsk scrambler 152 no-diff
72 fixed uw8
cable modulation-profile 2 long 8 220 0 8 qpsk scrambler 152 no-diff
80 fixed uw8
!
no cable qos permission create
no cable qos permission update
cable qos permission modems
!
!
!
!
ip subnet-zero
ip host abrick 223.255.254.254
!
!
!
interface Loopback0
ip address 222.2.4.1 255.255.255.255
no ip directed-broadcast
!
interface Loopback2
ip address 111.0.4.2 255.255.255.255
no ip directed-broadcast
!
interface FastEthernet0/0
ip address 1.8.93.9 255.255.0.0
no ip directed-broadcast
!
interface Cable3/0
ip address 3.214.1.1 255.255.255.0
no ip directed-broadcast
load-interval 30
no keepalive
cable spectrum-group 1
cable helper-address 1.8.93.100
→ cable downstream annex A
cable downstream modulation 64qam
cable downstream frequency 669000000
→ cable upstream 0 frequency 5008000

```

```

cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable upstream 1 frequency 10000000
cable upstream 1 power-level 0
no cable upstream 1 shutdown
cable upstream 2 frequency 15008000
cable upstream 2 power-level 0
no cable upstream 2 shutdown
cable upstream 3 frequency 20000000
cable upstream 3 power-level 0
no cable upstream 3 shutdown
cable upstream 4 frequency 55008000
cable upstream 4 power-level 0
no cable upstream 4 shutdown
cable upstream 5 frequency 60000000
cable upstream 5 power-level 0
no cable upstream 5 shutdown
!
ip default-gateway 1.8.0.1
ip classless
ip route 223.255.254.254 255.255.255.255 1.8.0.1
!
snmp-server engineID local 00000009020000D0BA1EED00
snmp-server community public RO
snmp-server community private RW
!
alias exec scm show cable modem
!
line con 0
  exec-timeout 0 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

Virtual Private Network (VPN) Example

VPN features let MSOs and ISPs offer private network connections to telecommuters and other business-oriented customers. In the configuration example that follows, a VPN is set up between two termination points:

- One at a remote cable modem
- The other at a VPN gateway residing at a corporate office firewall



Tip

To properly transmit and receive encrypted/decrypted traffic, each peer in the VPN must activate encryption/decryption and have matching access key strings.



Note

The Cisco uBR7200 series allows encrypted traffic to pass over the cable network (and often the Internet) from one peer to the other, based on a routing table setup in its configuration file.

GRE Tunnel Example

In the example that follows, a Cisco uBR7200 series connects two branch office networks to their respective head office using a GRE tunnel.



Note

Each branch office network is connected to the Cisco uBR7200 series using the cable interface. Each customer is assigned a separate subinterface over the physical cable interface.

The cable interface number 3 has been configured with two subinterfaces. Each subinterface connects to a customer Small Office Home Office (SOHO) CM:

```
!
interface Cable3/0
  no ip address
  no ip directed broadcast
  no keepalive
  ip route-cache policy
  !(To configure policy based route-cache on subinterfaces. This command not available on
  subinterfaces.)
  cable downstream annex B
  cable downstream modulation 64qam
  cable downstream interleave-depth 32
  cable upstream 0 power-level 0
  no cable upstream 0 shutdown
  !(While configuring the physical interface IP address and IP helper address parameters
  must not be entered.)
  interface c3/0.1
    ip address 172.100.1.1 255.255.255.0
    cable helper address 11.0.0.2
    ip policy route-map customer1
    no ip directed-broadcast
    no cable proxy-arp
    no cable ip-multicast-echo

  interface c3/0.2
    ip address 174.100.1.1 255.255.255.0
    ip helper address 11.0.0.2
    ip policy route-map customer2
    no ip directed-broadcast
    no cable proxy-arp
    no cable ip-multicast-echo

interface serial 0
  ip address 151.145.1.1 255.255.255.0
interface tunnel 0
  ip address 172.100.3.1 255.255.255.252
  tunnel source s0
  tunnel destination 151.145.2.1

interface tunnel 1
  ip address 174.100.3.1 255.255.252
  tunnel source s0
  tunnel destination 151.145.3.1

! configure route maps to forward traffic coming over c3/0.1 and c3/0.2 to go over the
tunnel 0 and
! tunnel 1 respectively.
route-map customer1 permit 10
  match ip address 101
  set ip next-hop 11.1.1.1
route-map customer1 permit 20
```

```

        match ip address 102
        set ip next-hop 172.100.3.2
route-map customer2 permit 10
    match ip address 101
    set ip next-hop 11.1.1.1
!(traffic to go over the interface that connects to DHCP/DNS/TFTP Server)
route-map customer2 permit 20
    match ip address 102
    set ip next-hop 174.100.3.2
access-list 101 permit ip any 11.1.1.0 0.0.0.255
!(matches traffic destined for DHCP/DNS/TFTP server)
access-list 102 permit ip any any
!(any other traffic that is not meant for DHCP/DNS/TFTP server)
ip route 151.145.0.0 255.255.0.0 s0 <- static route to connect to IP Cloud.

```

**Note**

You can use **set ip default next-hop a.b.c.d** to avoid setting up two access lists. The access list can match all IP traffic and the **route-map** command should use **set ip default next-hop a.b.c.d**. This works with CEF and process switching, not with cache-based fast switching. The packets are first routed normally using the routing table. If a route is not found, then they are forwarded to **a.b.c.d** which is the IP address at the other end of the tunnel.

Configuration for Router #1

```

interface ethernet0
    ip address 172.100.2.1 255.255.255.0

interface serial 0
    ip address 151.145.2.1 255.255.255.0

interface tunnel 0
    ip address 172.100.3.2 255.255.255.252
    tunnel source s0
    tunnel destination 151.145.1.1

ip route 151.145.0.0 255.255.0.0 s0
!(static route to connect to IP Cloud)

```

Configuration for Router #2

```

interface ethernet0
    ip address 174.100.2.1 255.255.255.0
interface serial 0
    ip address 151.145.3.1 255.255.255.0
interface tunnel 0
    ip address 174.100.3.2 255.255.255.252
    tunnel source s0
    tunnel destination 151.145.1.1
ip route 151.145.0.0 255.255.0.0 s0
!(static route to connect to IP Cloud)
exec-timeout 0 0
login
transport input none
line aux 0
line vty 0 4
    password lab
    login
!
scheduler allocate 988 200
end

```

IP Telephony Example

General Example

To support IP telephony, a cable modem supporting VoIP communications must reside at the subscriber site.



Caution

In certain countries, the provisioning of voice telephony over the Internet or use of these products might be prohibited and/or subject to laws, regulations or licenses, including requirements applicable to the use of the products under telecommunications and other laws and regulations; customers must comply with all such applicable laws in the countries where customers intend to use the product.

Following is a sample voice over IP configuration file for the Cisco uBR7246:

```
!
version 12.0
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname twoslot
!
enable password ****
!
!
ip subnet-zero
no ip domain-lookup
ip host abrick 223.255.254.254
ip host muck 255.255.255.255
ip host keyer 223.255.254.254
ip host bell 223.255.254.253
!
!
!
interface FastEthernet0/0
ip address 2.2.2.2 255.255.255.0
no ip directed-broadcast
no ip mroute-cache
shutdown
!
interface Ethernet1/0
ip address 1.11.8.1 255.255.0.0
ip broadcast-address 1.11.255.255
ip helper-address 223.255.254.254
no ip directed-broadcast
no ip mroute-cache
!
interface Ethernet1/1
ip address 10.20.122.2 255.255.255.192
ip helper-address 10.0.0.2
no ip directed-broadcast
!
interface Ethernet1/2
no ip address
no ip directed-broadcast
shutdown
!
interface Ethernet1/3
```

```

no ip address
no ip directed-broadcast
shutdown
!
interface Cable2/0
ip address 20.20.20.20 255.255.255.0
no ip directed-broadcast
no keepalive
cable downstream modulation 64qam
cable upstream 0 frequency 10000000
cable upstream 0 power-level 0
no cable upstream 0 shutdown
cable upstream 1 frequency 10000000
cable upstream 1 power-level 0
no cable upstream 1 shutdown
cable upstream 2 shutdown
cable upstream 3 shutdown
cable upstream 4 shutdown
cable upstream 5 shutdown
!
ip default-gateway 1.11.0.1
ip classless
ip route 0.0.0.0 0.0.0.0 10.20.122.1
ip route 223.255.254.254 255.255.255.255 1.11.0.1
ip http server
!
!
!
!
line con 0
exec-timeout 0 0
transport input none
line aux 0
line vty 0 4
login
line vty 5 11
login
!
end

```

Clock Support Example

Clock support enables the Cisco uBR7246 VXR router to synchronize to an external timing reference and distribute clock to Cisco MC16S and MC16E cable interface line cards. The synchronized DOCSIS time stamps are then passed downstream to all CMs.



Note

Clock support is designed for cable networks running VoIP applications where synchronized timing is vital to maintain voice quality. The clocking feature is supported only on a Cisco uBR7246 VXR chassis that contains the clock card and uses Cisco IOS Release 12.1(1a)T1 or higher. The CM must also support VoIP and the clock mode.



Tip

No configuration tasks are required to use the clock card after it is installed in the Cisco uBR7246 VXR. When the clock card is present, it becomes the midplane TDM clock reference source.

Key commands that appear in the Cisco uBR7246 VXR configuration file that denote clock support include:

```

cable clock source-midplane
no cable clock force primary
no cable clock force secondary

```

Telco Return Example

Cisco IOS Release CMTS software images that support telco return contain a “t” in the file name. To support telco return, a DOCSIS-compliant telco return cable modem must reside at the subscriber site and support the telco return path.

Verify whether or not the cable modem requires the following setup:

- Dial-on-demand functionality; include the **cable telco-return spd number dial-timer seconds** command in the Cisco uBR7200 series configuration file. This command embeds dial-timer information in the TCD messages that are sent regularly to the remote cable modem which ultimately cuts-off any inactive upstream connections.
- Cisco Network Registrar setup to service both telco return and two-way cable modems over the same downstream channel.



Note

Some vendors' telco return cable modems cannot receive traffic over the same downstream channel as cable modems operating on a two-way data system. In these instances, segment your cable plant to allow more than one downstream channel.

The following elements must be configured for a telco return network:

- Authentication, authorization, and accounting configuration, as well as specific RADIUS dial server information
- Telco return-specific configuration
- SNMP server-specific configuration

This sample Cisco uBR7200 series configuration file supports telco return:

```

!
version 12.0
service timestamps debug uptime
service timestamps log uptime
service password-encryption
!
hostname uBR7246
!
boot system flash slot0:ubr7200-p-mz.*****
boot system flash
logging buffered 100000 debugging
aaa new-model
aaa authentication login default radius enable
aaa authentication login vty line
aaa accounting update newinfo
aaa accounting exec default start-stop radius
aaa accounting commands 15 default start-stop radius
aaa accounting network default start-stop radius
aaa accounting system default start-stop radius
enable secret guess_my_password_ha_ha_ha.
!
no cable qos permission create
no cable qos permission update
cable qos permission modems
ip subnet-zero

```

```

no ip finger
no ip domain-lookup
!
!
!
interface Loopback0
ip address 24.1.2.246 255.255.255.0
no ip directed-broadcast
!
interface FastEthernet0/0
no ip address
no ip directed-broadcast
shutdown
media-type MII
full-duplex
!
interface Hssi1/0
ip unnumbered Loopback0
no ip directed-broadcast
!
interface Cable3/0
ip address 10.1.1.1 255.255.255.0
no ip directed-broadcast
cable helper-address 24.1.1.84
no keepalive
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 frequency 13008000
no cable upstream 0 shutdown
cable upstream 1 shutdown
cable upstream 2 shutdown
cable upstream 3 shutdown
cable upstream 4 shutdown
cable upstream 5 shutdown
!
interface Cable6/0
ip address 172.16.1.1 secondary
ip address 10.1.1.1
no ip directed-broadcast
cable helper-address 24.1.1.84
no keepalive
cable downstream annex B
cable downstream modulation 64qam
cable downstream interleave-depth 32
cable downstream frequency 687000000
cable upstream 0 frequency 13008000
no cable upstream 0 shutdown
cable telco-return enable
cable telco-return spd 1 factory-default
cable telco-return spd 1 dhcp-authenticate
cable telco-return spd 1 dhcp-server 24.1.1.84
cable telco-return spd 1 ppp-authenticate chap
cable telco-return spd 1 phonenum 918005555555
cable telco-return spd 1 phonenum 18005555555
cable telco-return spd 1 username test
cable telco-return spd 1 password test
!
router ospf 100
network 10.0.0.0 0.255.255.255 area 0
network 24.1.0.0 0.0.255.255 area 0
!
ip classless

```

```

ip route 0.0.0.0 0.0.0.0 24.1.2.21
!
logging 24.1.1.78
snmp-server community public RO
snmp-server community favorite_server_community RW
snmp-server location favorite_location
!
radius-server host 24.1.1.78 auth-port 1645 acct-port 1646
radius-server key radius_server_key
!
line con 0
password No need to change; this is encrypted already.
transport input none
flowcontrol software
line aux 0
password No need to change; this is encrypted already.
flowcontrol hardware
line vty 0 4
password No need to change; this is encrypted already.
login authentication vty
!
end

```

The command lines in the sample configuration file beginning with the string **aaa** contain the critical elements for authentication, authorization, and accounting (AAA) setup:

```

aaa new-model
aaa authentication login default radius enable
aaa authentication login vty line
aaa accounting update newinfo
aaa accounting exec default start-stop radius
aaa accounting commands 15 default start-stop radius
aaa accounting network default start-stop radius
aaa accounting system default start-stop radius

```

The command lines in the sample configuration file beginning with the string **cable telco-return** contain the critical elements to minimally set up the telco return network:

```

cable telco-return enable
cable telco-return spd 1 factory-default
cable telco-return spd 1 dhcp-authenticate
cable telco-return spd 1 dhcp-server 24.1.1.84
cable telco-return spd 1 ppp-authenticate chap
cable telco-return spd 1 phonenum 918005555555
cable telco-return spd 1 phonenum 18005555555
cable telco-return spd 1 username test
cable telco-return spd 1 password test

```

First, activate telco return functionality with the **enable** keyword. Then activate DHCP authentication and identify the location of the DHCP server, provide up to three telephone numbers for dial-in access, specify the type of PPP authentication for upstream transmission, and provide the user name and password to authorize login to the dial-up network.



Note

PPP is the only upstream communication medium offered between a remote cable modem and a dial-up access server. You can, however, configure a Challenge Handshake Authentication Protocol (CHAP), or Password Authentication Protocol (PAP) authentication method, or both methods for upstream data transmission.

The command lines in the sample configuration file beginning with the string **snmp-server** contain the critical elements for minimal SNMP-server setup:

```
logging 24.1.1.78
snmp-server community public RO
snmp-server community favorite_server_community RW
snmp-server location favorite_location
```

The command lines in the sample configuration file beginning with the string **radius-server** contain the critical elements for minimal RADIUS dial server setup:

```
radius-server host 24.1.1.78 auth-port 1645 acct-port 1646
radius-server key radius_server_key
```

**Note**

For more detailed information regarding AAA, telco return, SNMP server, and RADIUS dial server software functionality, you can access Cisco IOS software configuration documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

