

Bundling Cable Interfaces Sample Configuration and Verification

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Introduction

This document shows a sample configuration for bundling on one of the Cisco's Cable Modem Termination Systems (CMTS).

The Bundling Cable Interfaces feature allows multiple cable interfaces to share a single IP subnet. Without the use of this feature, each interface must be configured with a separate IP subnet. For users with limited IP address space, assigning a separate IP subnet to each interface can consume limited IP address resources.

Cable bundling also allows for more scalable network designs by avoiding the need to reassign IP addresses as new cable cards are added to compensate for growth in the network.

Finally, it allows cable modems configured with static IP addresses to be inserted into the CMTS anywhere across the cable plant, as the entire plant is on the same subnet.

Interface bundles can only be configured using the Cisco IOS® Software Release Command Line Interface (CLI); you cannot use Management Information Base (MIB) objects to configure cable interface bundles.

One interface must be selected as the master of the bundle (the one on which you will configure IP), and the remaining are slaves. The master is set with the **cable bundle 1 master** command, and slaves with the **cable bundle 1** command. It is possible to configure multiple cable bundles on a router using different numbered bundles.

Before You Begin

Conventions

For more information on document conventions, see the Cisco Technical Tips Conventions.

Prerequisites

There are no specific prerequisites for this document.

Components Used

The information in this document is based on the software and hardware versions below.

- Cisco IOS Software Releases 12.0(7)XR and 12.1(1)T
- Cisco IOS Software Release 12.0(8)SC or later
- Cisco IOS Software Release 12.1(3)EC and later if you have an MC28C board on your router
- Cisco uBR7223
- Cisco uBR7246
- Cisco uBR7246VXR

Note: Cisco bug ID CSCdp57826 (registered customers only) can cause cable modems not to come up when switching from one cable interface to another within a bundle. This bug has been resolved in the Cisco IOS Software releases below.

- Cisco IOS Software Release 12.1(1)T
- Cisco IOS Software Release 12.0(8)SC1

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

Configure

In this section, you are presented with the information to configure the features described in this document.

Note: To find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only) .

This is a sample configuration that bundles two cable interfaces together. Notice that IP is only configured on the master interface (Cable3/0). If you have an IP address on the interface that is the slave in the bundle and you try to configure bundling, you receive the following message:

```
Please remove the IP address configuration first and reenter
this command. If this is not done, it creates problems later.
```

In the test bed, a uBR7246VXR running Cisco IOS Software Release 12.1(4)EC with one Eurodocsis MC16E card, one MC16C, one MC28C, and an NPE300 is used.

Before configuring bundling, it is a good sanity check to verify that the configuration without bundling is correct and all (or most) of the cable modems are online.

In this example, the **show cable modem** command is used to check that the configuration is correct.

```
7246VXR#show cable modem
```

Interface	Prim Sid	Online State	Timing Offset	Rec Power	QoS	CPE	IP address	MAC address
Cable4/0/U0	2	online	2298	-0.50	5	0	172.16.30.106	0010.7bb3.fb7b
Cable4/0/U0	3	online	2820	0.25	5	0	172.16.30.108	0001.64ff.eb3d
Cable4/0/U0	4	online	2721	0.25	5	0	172.16.30.109	0002.fdfa.0a63
Cable5/0/U0	26	online	2287	-0.25	6	0	172.16.31.17	00d0.bad3.c659
Cable5/0/U0	27	online	2813	0.25	6	0	172.16.31.21	0002.1685.b5db
Cable5/0/U0	28	online(pt)	2809	-0.75	6	0	172.16.31.18	0030.96f9.65f1
Cable5/0/U0	29	online(pt)	2815	-0.75	6	0	172.16.31.20	0001.64ff.e47d
Cable5/0/U0	30	online(pt)	2813	0.50	6	0	172.16.31.19	0001.64ff.eb39

As you can see from this output, the three modems connected to Cable4/0/U0 are in the 172.16.30.0 network and the five connected to Cable5/0/U0 are in network 172.16.31.0. These are two different networks. When you configure bundling, all the cable modems are on the same network that the master interface is on. Below are the configurations.

If you look at the Address Resolution Protocol (ARP) table before doing bundling, you see that there are entries for both cable interfaces.

```
7246VXR#show arp
Protocol  Address          Age (min)  Hardware Addr  Type   Interface
Internet  172.16.135.11    -          00b0.8ef5.9038  ARPA   Ethernet2/0
Internet  172.16.31.1     -          00b0.8ef5.908c  ARPA   Cable5/0
Internet  172.16.30.1     -          00b0.8ef5.9070  ARPA   Cable4/0
Internet  172.16.31.19    30         0001.64ff.eb39  ARPA   Cable5/0
Internet  172.16.31.18    30         0030.96f9.65f1  ARPA   Cable5/0
Internet  172.16.31.17    0          00d0.bad3.c659  ARPA   Cable5/0
Internet  172.16.31.21    0          0002.1685.b5db  ARPA   Cable5/0
Internet  172.16.31.20    30         0001.64ff.e47d  ARPA   Cable5/0
Internet  172.16.30.106   139        0010.7bb3.fb7b  ARPA   Cable4/0
Internet  172.16.30.108   104        0001.64ff.eb3d  ARPA   Cable4/0
Internet  172.16.30.109   57         0002.fdfa.0a63  ARPA   Cable4/0
```

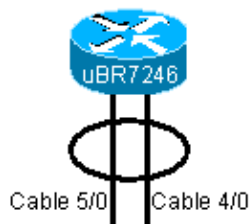
The same outputs are shown after configuring bundling below so that you can see the difference.

If you have a working configuration and you do want to change it for a bundling configuration, it is necessary to remove all the IP configurations on all of the interfaces that are the slaves, otherwise you receive the following warning message when you enter the command **cable bundle 1**:

```
Please remove the IP address configuration first and reenter
this command. If this is not done, it creates problems later.
```

Network Diagram

This document uses the network setup shown in the diagram below.



Configurations

This document uses the configuration shown below.

```
uBR7246, uBR7223, or uBR7246VXR
hostname 7246VXR
!
interface Ethernet2/0
 ip address 172.16.135.11 255.255.255.128
 no ip mroute-cache
 half-duplex
```

```

!
interface Cable4/0
  ip address 172.16.30.1 255.255.255.0

  !--- IP address configured.

  ip helper-address 172.16.135.20

  !--- IP address of dhcp server.

  no ip route-cache cef
  no keepalive
  cable bundle 1 master

  !--- Master interface in bundle 1.

  cable downstream rate-limit token-bucket shaping
  cable downstream annex B
  cable downstream modulation 64qam
  cable downstream interleave-depth 32
  cable downstream frequency 555000000
  cable upstream 0 frequency 40000000
  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
  cable dhcp-giaddr policy
!
interface Cable5/0
  no ip address
  load-interval 30
  no keepalive
  cable bundle 1

  !--- Slave interface in bundle 1.

  cable downstream rate-limit token-bucket shaping
  cable downstream annex B
  cable downstream modulation 64qam
  cable downstream interleave-depth 32
  cable downstream frequency 620000000
  cable upstream 0 frequency 25008000
  cable upstream 0 power-level 0
  cable upstream 0 channel-width 1600000 3200000
  no cable upstream 0 shutdown
  no cable upstream 1 shutdown
  no cable upstream 2 shutdown
  cable upstream 3 shutdown
  cable upstream 4 shutdown
  cable upstream 5 shutdown
  cable dhcp-giaddr policy
!

```

Verify

This section provides information you can use to confirm your configuration is working properly.

Certain **show** commands are supported by the Output Interpreter Tool (registered customers only) , which allows you to view an analysis of **show** command output.

- **show cable bundle 1 forwarding-table** – Displays the MAC addresses of all the cable modems on the bundle and the physical interface they belong to.
- **show cable modem** – For this configuration, the show cable modem command shows the cable modems that were online before configuring bundling.
- **show arp** – Displays entries in the ARP table.

To verify if the configuration is working, check that the cable modems from both interfaces show up in the following table using the **show cable bundle 1 forwarding-table** command.

The **show cable bundle 1 forwarding-table** command tells you the MAC addresses of all the cable modems on the bundle and the physical interface they belong to.

```
7246VXR#show cable bundle 1 forwarding-table
MAC address      Interface
00d0.bad3.c659   Cable5/0
0001.64ff.e47d   Cable5/0
0010.7bb3.fb7b   Cable4/0
0001.64ff.eb3d   Cable4/0
0001.64ff.eb39   Cable5/0
0002.1685.b5db   Cable5/0
0030.96f9.65f1   Cable5/0
0002.fdfa.0a63   Cable4/0

Total = 8, sublink total = 0
Free = 1016, low_mark = 1016
```

The following is the **show cable modem** output after configuring bundling.

The **show cable modem** command shows the same cable modems that were online before configuring bundling. Notice however, that all the cable modems are now in the 172.16.30.0 network which is the one on the master cable interface.

```
7246VXR#show cable modem
Interface      Prim Online  Timing Rec   QoS CPE IP address  MAC address
              Sid  State   Offset Power
Cable4/0/U0  5    online  2815  0.25  5  0  172.16.30.109  0002.fdfa.0a63
Cable4/0/U0  6    online  2296  -0.50  5  0  172.16.30.106  0010.7bb3.fb7b
Cable4/0/U0  7    online  2819  0.25  5  0  172.16.30.108  0001.64ff.eb3d
Cable5/0/U0  31   online  2287  -0.25  5  0  172.16.30.110  00d0.bad3.c659
Cable5/0/U0  32   online  2810  0.25  5  0  172.16.30.100  0002.1685.b5db
Cable5/0/U0  33   online  2812  -0.50  5  0  172.16.30.104  0001.64ff.e47d
Cable5/0/U0  34   online  2807  -0.75  5  0  172.16.30.103  0030.96f9.65f1
Cable5/0/U0  35   online  2809  0.50  5  0  172.16.30.105  0001.64ff.eb39
```

The following is the output of the **show arp** command.

Notice that now the interface that they show is Cable4/0. This is because, as far as the ARP algorithm is concerned, the cable modems belong to Cable 4/0 which, in this sample, is the master interface.

```
7246VXR#show arp
Protocol  Address          Age (min)  Hardware Addr  Type  Interface
Internet  172.16.135.11   -          00b0.8ef5.9038 ARPA  Ethernet2/0
Internet  172.16.30.1     -          00b0.8ef5.9070 ARPA  Cable4/0
Internet  172.16.30.103  0          0030.96f9.65f1 ARPA  Cable4/0
Internet  172.16.30.100  0          0002.1685.b5db ARPA  Cable4/0
Internet  172.16.30.106  0          0010.7bb3.fb7b ARPA  Cable4/0
Internet  172.16.30.104  0          0001.64ff.e47d ARPA  Cable4/0
Internet  172.16.30.105  0          0001.64ff.eb39 ARPA  Cable4/0
Internet  172.16.30.110  0          00d0.bad3.c659 ARPA  Cable4/0
Internet  172.16.30.108  0          0001.64ff.eb3d ARPA  Cable4/0
Internet  172.16.30.109  0          0002.fdfa.0a63 ARPA  Cable4/0
```

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.

Related Information

- **Cable Interface Bundling for the Cisco uBR7200 Series Cable Router**
 - **Cable Technology Support Pages**
 - **Technical Support – Cisco Systems**
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