



Multiple Bearer Support For VDSL Platforms

For BCM963xx DSL Linux

Version 3.10 and beyond

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REVISION HISTORY

<i>Revision Number</i>	<i>Date</i>	<i>Change Description</i>
V1.0	2/21/2007	Initial Release.

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1.0 INTRODUCTION

This document serves as an application note on the details of the multiple bearer feature that is supported in Linux releases (3.10 and beyond) of BCM963xx platforms. This feature is currently applicable for all VDSL platforms. This is also called as **dual latency** support.

There are 2 different paths are supported in VDSL, namely fast and interleaved.

2.0 MULTIPLE BEARER SUPPORT

The support allows concurrent paths supporting different latencies in the VDSL platform. The fast path can be used for Voice/Video traffic and the interleaved path can be used for Data/non-critical applications.

In Linux platform, each of these paths are represented by means of interface/port identifier. For each VC that is configured, there will be a port configuration denoting which path the VC corresponds to. Existing WAN ID, which was a <vpi,vci> combination, has been extended to include <port, vpi, vci> for all configuration purposes.

For ex,

WAN setup screen looks as follows:

Choose Add, Edit, or Remove to configure WAN interfaces.

Choose Save/Reboot to apply the changes and reboot the system.

Port/Vpi/Vci	VLAN Mux	Con. ID	Category	Service	Interface	Protocol	Igmp	QoS	State	Remove
0/0/35	Off	1	UBR	br_0_0_35	nas_0_0_35	Bridge	N/A	Disabled	Enabled	<input type="checkbox"/>
1/0/35	Off	1	UBR	br_1_0_35	nas_1_0_35	Bridge	N/A	Disabled	Enabled	<input type="checkbox"/>

All throughout the WEBUI/CLI interfaces, the port identifier is added to the WAN Id, Services, interfaces etc., along with VPI/VCI.

So, the nas_0_35 becomes nas_0_0_35 on the port 0.

nas_0_35 on port1 becomes nas_1_0_35 and so on.

2.1 CO Configuration

The multiple bearer for VDSL line is driven by CO. Some sample CO configuration GUI screens as of 9_1_17 GUI are given below for a configuration of multiple bearers. Basically, 2 bearers (bearer 0 and bearer 1) needs to be enabled for a given line and the following criteria must be met.

First bearer must be interleaved with some min INP and the second bearer must be fast (mdelay = 0, minINP=0).

The ratio_BC is the % you want to allocate to B0 and to B1 (how to allocate the excessive capacity between B0 and B1).

2.1.1 Bearer 0

The screenshot shows a Microsoft Word document titled "MultipleBearer_Vdsl - Microsoft Word" with a "Line Configuration" dialog box open. The dialog box has tabs for "Traffic", "Physical", "Physical VDSL", "ATM", "STM", "Utopia", and "Test". The "Physical VDSL" tab is selected, and "Bearer 0" is chosen from a dropdown menu. The "Enable bearer channel" checkbox is checked. The "Upstream parameters" section includes fields for "Minimum upstream bitrate" (64), "Maximum upstream bitrate" (64000), "Maximum upstream delay" (20), "Rate adaptation ratio" (50), and "Minimum number of DMT symbol impulse noise protection upstream" (0, 1, 2, 4, 8, 16). The "Downstream parameters" section includes fields for "Minimum downstream bitrate" (64), "Maximum downstream bitrate" (64000), "Maximum downstream delay" (20), "Rate adaptation ratio" (50), and "Minimum number of DMT symbol impulse noise protection downstream" (0, 1, 2, 4, 8, 16). The "L2 parameters" section includes fields for "L2 packet size" (10), "Minimum L2 bitrate" (32), and "L2 low rate slots" (65546). The "TPS TC Type" section has "ATM TPS TC" checked and "PTM TPS TC" unchecked. At the bottom of the dialog are "Apply", "Ok", and "Cancel" buttons. The background shows a Word document with a footer that reads "Broadcom Corporation", "Document BCM963xxR Multiple Bearer Support For VDSL-1", and "Page 3".

Line Configuration

Traffic Physical Physical VDSL ATM STM Utopia Test

Bearer 0

☒ Enable bearer channel

Upstream parameters

Minimum upstream bitrate 64

Maximum upstream bitrate 64000

Maximum upstream delay 20

Rate adaptation ratio 50

Minimum number of DMT symbol impulse noise protection upstream ☐ 0 ☐ 1 ☐ 2 ☐ 4 ☐ 8 ☐ 16

Downstream parameters

Minimum downstream bitrate 64

Maximum downstream bitrate 64000

Maximum downstream delay 20

Rate adaptation ratio 50

Minimum number of DMT symbol impulse noise protection downstream ☐ 0 ☐ 1 ☐ 2 ☐ 4 ☐ 8 ☐ 16

L2 parameters

L2 packet size 10

Minimum L2 bitrate 32

L2 low rate slots 65546

TPS TC Type

☒ ATM TPS TC ☐ PTM TPS TC

Apply Ok Cancel

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2.1.2 Bearer 1

The screenshot shows a Microsoft Word document titled "MultipleBearer_Vdsl - Microsoft Word" with a "Line Configuration" dialog box open. The dialog box is titled "Line Configuration" and has tabs for "Traffic", "Physical", "Physical VDSL", "ATM", "STM", "Utopia", and "Test". The "Physical VDSL" tab is selected. Under the "Bearer 1" dropdown, the "Enable bearer channel" checkbox is checked. The "Upstream parameters" section includes fields for "Minimum upstream bitrate" (64), "Maximum upstream bitrate" (64000), "Maximum upstream delay" (0), "Rate adaptation ratio" (50), and "Minimum number of DMT symbol impulse noise protection upstream" (0, 1/2, 1, 2, 4, 8, 16). The "Downstream parameters" section includes fields for "Minimum downstream bitrate" (64), "Maximum downstream bitrate" (64000), "Maximum downstream delay" (0), "Rate adaptation ratio" (50), and "Minimum number of DMT symbol impulse noise protection downstream" (0, 1, 2, 4, 8, 16). The "L2 parameters" section includes fields for "L2 packet size" (10), "Minimum L2 bitrate" (32), and "L2 low rate slots" (65551). The "TPS TC Type" section has a checked "ATM TPS TC" checkbox and an unchecked "PTM TPS TC" checkbox. At the bottom right of the dialog box are "Apply", "Ok", and "Cancel" buttons. Below the dialog box, in the Word document, is a section titled "2.2.3 Type of the flow" with text stating: "In the current linux release, it is possible to monitor all the bridge traffic (Bridging, 802.3, MMR, PPPoE etc.) which are Ethernet based in nature. It is not possible to monitor XoA traffic (PPPoA, IPoA etc.) which are non-ethernet based rather routed traffic."

2.1.3 Detailed Status

Upon the line trained to Showtime, the detailed status page displays both the paths being active and usable.

MultipleBearer_Vdsl - Microsoft Word

File Edit View Insert Format Tools Table Window Help Adobe PDF

Normal + Bold, Helvetica 10

Final Showing Markup Show Revis with Chances...

Detailed Line Status for line 0

Status control

Number of measurements: 2

Status data

-Per line status

VDSL2 Profile: Profile 17a

Current line state: SHOWTIME_L0 Last init failure cause: Not available

Current selected protocol: G.993.2 VDSL2

Upstream line attenuation	-0.7 dB	Downstream line attenuation	0.5 dB
Upstream SNR margin	5.3 dB	Downstream SNR margin	16.4 dB
Upstream transmit power	7.8 dBm	Downstream transmit power	8.4 dBm
Upstream electrical length	0.0 dB	Downstream electrical length	0.2 dB
Upstream refPsd	0.0 dB	Downstream refPsd	0.0 dB
Actual Line upstream rate	57347 kbit/s	Actual Line downstream rate	100444 kbit/s

-Bearer 0-

VDSL2 TPS-TC: ATM

Maximum attainable upstream rate	61455 kbit/s	Maximum attainable downstream rate	150000 kbit/s
Actual upstream rate	27563 kbit/s	Actual downstream rate	54224 kbit/s
Upstream transmission delay	7 msec	Downstream transmission delay	9 msec
Upstream coding type	REED SOLOMON	Downstream coding type	TRELLIS - REED SOLOMON
Upstream INP	2.02	Downstream INP	2.99

-Bearer 1-

VDSL2 TPS-TC: ATM

Maximum attainable upstream rate	61455 kbit/s	Maximum attainable downstream rate	150000 kbit/s
Actual upstream rate	29579 kbit/s	Actual downstream rate	46039 kbit/s
Upstream transmission delay	0 msec	Downstream transmission delay	0 msec
Upstream coding type	REED SOLOMON	Downstream coding type	TRELLIS
Upstream INP	0	Downstream INP	0

-Per line failures-

Current near end failures	0 0 0 0 0 0 0	Current far end failures	0 0 0 0 0 0 0
Changed near end failures	0 0 0 0 0 0 0	Changed far end failures	0 0 0 0 0 0 0

Framing parameters Bit loadings/SNRs Plot margin data Cpe Hs data View line features Save Cancel

Page 4 Sec 4 6/9 At 1.5" Ln 3 Col 1 REC TRK EXT OVR

2.1.4 CPE Status

Upon Showtime in VDSL multiple bearer mode, the CPE displays the following in the device info page for both the channels.

The screenshot shows the DSL Router web interface in a Mozilla Firefox browser window. The address bar shows the URL `http://192.168.1.1/`. The browser's bookmark bar contains several links, including "DSL Router", "Broadcom Directory Services", "NIP: Immunization Scheduler", and "http://192.168.1.10/bondinginfo_reset.xml".

The main content area displays the "Device Info" page, which includes a sidebar with navigation links and a main content area with the following information:

Device Info

Board ID:	96358H
Software Version:	1519_022007-3.10L.01test2.Azp8022c_rc1.d20e_rc4
Bootloader (CPE) Version:	1.0.37-9.12
VDSL Software Version:	09.03.05, 2007-02-12
Wireless Driver Version:	4.100.27.0.cpe2.1

This information reflects the current status of your DSL connection.

B0 Traffic Type:	ATM
B0 Line Rate - Upstream (Kbps):	27563
B0 Line Rate - Downstream (Kbps):	54234
B1 Traffic Type:	ATM
B1 Line Rate - Upstream (Kbps):	29579
B1 Line Rate - Downstream (Kbps):	46039
LAN IP Address:	192.168.1.1
Default Gateway:	
Primary DNS Server:	192.168.1.1
Secondary DNS Server:	192.168.1.1

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Find: Find Next Find Previous Highlight all Match case Phrase not found

Done

In the VDSL platform, the port/interface 0 is interleaved path and port/interface 1 is fast path. Traffic can be sent/received on each of these paths in an independent manner and in concurrent fashion.

2.1.5 Traffic

Traffic can be distributed onto each of the port/vpi/vci based on various criteria in Linux platform. Some of them are mentioned here, however it is not limited to the following list alone.

1. Mac Address based forwarding/filtering.
2. Port Mapping
3. VLAN based.

3.0 CONCLUSION

This support in Linux is generic enough to scale for different platforms, be it ADSL or VDSL. VDSL PHY supports multiple bearer as of today and when ADSL PHY starts supporting this feature, this support will extend itself automatically.

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