

Reference Bandwidth on DSL Interfaces

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Introduction

This document describes the concept of reference bandwidth on Digital Subscriber Line (DSL) interfaces. The difference of values seen under the DSL controller and interface is also discussed.

Contributed by Richika Jain, Cisco TAC Engineer.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on Cisco Routers that support DSL connections like Very-high-bit-rate digital subscriber line (VDSL), Symmetrical high-speed digital subscriber line (SHDSL), Asymmetric digital subscriber line (ADSL) on access side.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Reference Bandwidth on DSL Interfaces

In DSL, unlike other medias, there is a difference in upstream and downstream bandwidth.

For example, for E1, there is 2.048 mb upstream and 2.048 mb downstream and when the router calculates txload and reloads, it takes it as a fraction of [2.048](#) mb for both upstream and downstream and normalizes it in a scale of 255 and displays it. So, if the input rate under the interface is [2048000](#), you will see an rxload of 255/255.

Now, when it comes to DSL, the router needs a reference bandwidth value for the same calculation. But here there are two bandwidths, upstream and downstream. The bandwidth shown under the interface is upstream bandwidth.

```
Ethernet0/0/0 is up, line protocol is up
  Hardware is VDSL_ETHERNET, address is 3033.199e.1948

  MTU 1500 bytes, BW 9998 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation 802.1Q Virtual LAN, Vlan ID 1., loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 05:00:00
  Last input 3w6d, output 00:00:00, output hang never
  Last clearing of "show interface" counters 06:15:00
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/1024 (size/max)
  5 minute input rate 2850000 bits/sec, 420 packets/sec
  5 minute output rate 5749000 bits/sec, 1747 packets/sec
    3887957 packets input, 3183892807 bytes, 0 no buffer
  Received 0 broadcasts (0 IP multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
  1573 packets output, 100231 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

The reason why upstream bandwidth is chosen as reference bandwidth here is because most of the time the QoS policies are used in output direction and it needs accurate reference bandwidth.

In this output for VDSL controller, there are two kinds of speed values: Attainable Rate and Speed, both for Upstream and Downstream. Speed is the value on which the line is trained with the ISP and Attainable Rate is the maximum speed of the VDSL circuit.

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```

0 lost carrier, 0 no carrier
0 output buffer failures, 0 output buffers swapped out

Complete Output for VDSL controller:

Router#show controller vdsl 0/1/0

Controller VDSL 0/1/0 is UP

Daemon Status: Up

	XTU-R (DS)	XTU-C (US)
Chip Vendor ID:	'BDCM'	'BDCM'
Chip Vendor Specific:	0x0000	0xA1AA
Chip Vendor Country:	0xB500	0xB500
Modem Vendor ID:	'CSCO'	' '
Modem Vendor Specific:	0x4602	0x0000
Modem Vendor Country:	0xB500	0x0000
Serial Number Near:	FOC15163V2Q 2911/K9 15.5(1)T	
Serial Number Far:		
Modem Version Near:	15.5(1)T	
Modem Version Far:	0xa1aa	

Modem Status: TC Sync (Showtime!)

DSL Config Mode: AUTO
Trained Mode: G.993.2 (VDSL2) Profile 17a
TC Mode: PTM
Selftest Result: 0x00
DELT configuration: disabled
DELT state: not running

Full inits: 1
Failed full inits: 0
Short inits: 0
Failed short inits: 0

Firmware	Source	File Name
-----	-----	-----
VDSL	embedded	VDSL_LINUX_DEV_01212008

Modem FW Version: 130205_1433-4.02L.03.B2pvC035j.d23j
Modem PHY Version: B2pvC035j.d23j

Trellis:	ON	ON
SRA:	disabled	disabled
SRA count:	0	0
Bit swap:	enabled	enabled
Bit swap count:	0	0

Line Attenuation:	0.0 dB	0.0 dB
Signal Attenuation:	0.0 dB	0.0 dB
Noise Margin:	11.1 dB	6.0 dB

Attainable Rate: 40440 kbits/s 3280 kbits/s

Actual Power: 14.5 dBm 4.9 dBm

Per Band Status:	D1	D2	D3	U0	U1	U2	U3
Line Attenuation(dB):	20.0	48.3	73.7	9.4	37.9	56.2	N/A
Signal Attenuation(dB):	20.0	48.3	N/A	10.2	36.2	53.3	N/A
Noise Margin(dB):	10.9	11.3	N/A	5.9	6.0	6.0	N/A
Total FECC:	97252	0					
Total ES:	7	0					
Total SES:	0	0					
Total LOSS:	0	0					
Total UAS:	24	24					
Total LPRS:	0	0					

```
Total LOFS:      0          0
Total LOLS:      0          0
```

!--- DSL trained speed can be found below

```
DSChannel1  DSChannel0  US Channel1  US Channel0
Speed (kbps):      0          25087          0          3192
SRA Previous Speed:  0          0          0          0
Previous Speed:    0          0          0          0
Reed-Solomon EC:   0          97252         0          0
CRC Errors:        0          15          0          0
Header Errors:     0          62          0          0
Interleave (ms):   0.00        8.00         0.00        8.00
Actual INP:        0.00        3.01         0.00        2.00
```

Training Log : Stopped

Training Log Filename : flash:vdslllog.bin

Now for txload and rxload calculation, it uses same reference bandwidth i.e. Upstream Bandwidth. So, when the input traffic rate for example is [9998000](#), you see the rxload of 255/255, and when the input rate is above that (20 mb, 30 mb), it displays rxload 255/255. So, the rxload value that is displayed won't be accurate at all times with default reference bandwidth. However, it won't have any impact on actual bandwidth you receive/the speed or throughput.

If you want to change it for QoS purpose, you can change it with the use of the bandwidth command under the interface. However, regardless of what value the bandwidth command is set to, the interface will not change its transmission speed.

Related Information

- [Cisco DSL Router Configuration and Troubleshooting Guide - PPPoA Implementation Options](#)
- [Cisco DSL Router Configuration and Troubleshooting Guide](#)
- [Technical Support & Documentation - Cisco Systems](#)