

3 Specification

3.1 Feature licences

Part of the MileGate functionality is subject to feature licences. For more information on feature licences please refer to [\[012\] Release Note "MileGate R5B"](#) and to [\[915\] Technical Bulletin "Feature Licences for MileGate"](#).

3.2 Function and feature overview

3.2.1 General unit functions

Table 5: SUVD3 specific functions and features

Feature	Rating or Standard
VDSL2	ITU-T G.993.2 (02/2006), Very high speed digital subscriber line transceivers 2 (VDSL2), Annex B (Europe)
ADSL / ADSL2 / ADSL2plus over POTS	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5 Annex A
Support of SELT, DELT	SELT: ITU-T G.996.2 DELT: ITU-T G.993.2

Table 6: SUVM4 specific functions and features

Feature	Rating or Standard
VDSL2	ITU-T G.993.2 (02/2006), Very high speed digital subscriber line transceivers 2 (VDSL2), Annex B (Europe)
ADSL / ADSL2 / ADSL2plus over ISDN	ADSL2, ADSL2plus -> ITU-T G.992.1, ITU-T G.992.5 Annex B
Support of SELT, DELT and Metallic Line Testing (MELT)	SELT: ITU-T G.996.2 DELT: ITU-T G.993.2 MELT: ITU-T G.996.2
Support of virtual noise	

Table 7: Functions and features common to SUVx3/4

Feature	Rating or Standard
Maximum number of units in a MileGate 25x0	20
Maximum number of units in a MileGate 23x0	7
Enhanced security features:	

Table 7: Functions and features common to SUVx3/4 (continued)

Feature	Rating or Standard
Broadcast filtering	DSL Forum TR-101, Migration to Ethernet Based DSL Aggregation, April 2006
Multicast filtering	
MAC source filtering for Nto1 services	
MAC destination filtering for Nto1 services	
L2 packet filtering per logical interface	
Enhanced DHCP logon options	DSL Forum TR-101
Enhanced PPPoE tag options	DSL Forum TR-101
Additional support for subscriber VLANs (service separation); up to 8 sub-interfaces (EFM, VLAN tagged) per port	DSL Forum TR-101
PSD Spectrum shaping through profiles	
Ethernet transport VDSL2 (Ethernet in the First Mile, EFM)	IEEE 802.3ah
Support of dying gasp	ITU-T G.991.2
Inter-operability with VDSL2 CPE and splitters	ITU-T G.993.2
Support of VDSL2 profiles 8a, 8b, 8c, 8d, 12a, 12b, 17a	ITU-T G.993.2
US0 selectable but dependent on bandplan/profile combination	ITU-T G.993.2
Support of VDSL2 bandplans 997 and 998 (for details about bandplans, please refer to Table 15: "Transmission parameters" (on page 18))	ITU-T G.993.2
Support of DPBO, UPBO	ITU-T G.993.2
Support of frequency-domain transmit spectrum shaping	ITU-T G.993.2
Support of operator-defined RFI notches	ITU-T G.993.2
Custom of PSD masks	ITU-T G.993.2
Handshaking procedures	ITU-T G.994.1 (05/03), Handshake procedures for digital subscriber line (DSL) transceivers
Interworking performance:	packet rate of up to 700 k packets/s (up to 500 k packets/s per direction with unsymmetrical rates) at a packet size of 64 ... 1522 bytes
VLAN support	IEEE 802.1Q and IEEE 802.1ad, Virtual Bridged Local Area Networks, 1998
VLAN tagging in upstream direction and VLAN filtering in downstream direction (frames from subscribers are not tagged or priority tagged, except for Transparent LAN services)	DSL Forum TR-101 IEEE 802.1D, Part 3: Media Access Control (MAC) Bridges, 1998
Support of single latency mode (fast and interleaved with selectable latency)	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.993.2, ITU-T G.992.5
Support of VLAN QoS with Class of Service (CoS) handling: 8 CoS by four priority queues, with selectable scheduler per queue: - strict priority - weighted fair queuing (WFQ)	IEEE 802.1p, Traffic Class Expediting and Dynamic Multicast Filtering (in 802.1D-1998), DSL Forum TR-101
Support of 1:1 VLAN mode	DSL Forum TR-101
Support of N:1 VLAN mode	DSL Forum TR-101
Support of MAC address translation	

Table 7: Functions and features common to SUVx3/4 (continued)

Feature	Rating or Standard
IGMP snooping with IPoE, IGMP proxy with report message suppression	IETF RFC 2236, Internet Group Management Protocol, Version 2, November 1997; IETF RFC 3376, Internet Group Management Protocol, Version 3, October 2002
Multicast stream preview	
Multicast pre-join and post-leave intervals	
Multicast bandwidth allocation per port and per stream	
PPPoE on VDSL2 lines	DSL Forum TR-101
PPPoE intermediate agent	DSL Forum TR-101, IETF RFC 2516, A Method for Transmitting PPP Over Ethernet (PPPoE), February 1999
IPoE on VDSL2 lines	DSL Forum TR-101
DHCP relay option 82	IETF RFC 2131 IETF RFC 951 IETF RFC 3046, DHCP Relay Agent Information Option, January 2001
Tunneling of L2CP messages for private line services	
Security features: - Broadcast handling - Prevention of L2 peer to peer (hair pin) forwarding - Prevention of source MAC spoofing - Prevention of source MAC flooding - MAC address filtering - MAC address aging	DSL Forum TR-101
Fault Management	ITU-T X.733
Support of SNMP Alarm-MIB (RFC 3877), Entity-MIB (RFC 4133), IF-MIB (RFC 2863), KM-DIAG-NOSTIC-MIB (proprietary)	RFC 2863 RFC 3877 RFC 4133

Table 8: Power consumption

Feature	Rating or Standard
Power supply range	refer to [201] System Description "MileGate R5B"
Maximum current consumption (all DSL lines activated with maximum output power), $V_{bat} = -48\text{ V}$	1.35 A
Maximum total power requirement from battery, $V_{bat} = \text{nominal voltage}$	65 W
Basic power consumption (all ports disabled), $V_{bat} = \text{nominal voltage}$	23 W
Maximum power dissipation on unit, $V_{bat} = \text{nominal voltage}$	62 W

Table 9: Mechanical parameters

Feature	Rating or Standard
Construction practice	19 inches
Height of the unit	6 HU (1 HU = 44.45 mm)

Table 9: Mechanical parameters

Feature	Rating or Standard
Width of the unit	4 TE (1 slot) (1 TE = 5.08 mm)
Size of the PCB (H x D)	233 mm x 220 mm
Weight of the unit	approximately 480g

Table 10: Reliability and ambient conditions

Feature	Rating or Standard
Calculated MTTF at 35 °C (MIL-HDBK-217F)	>50 years
Emission	refer to [201] System Description "MileGate R5B"
Immunity	refer to [201] System Description "MileGate R5B"
Safety	refer to [201] System Description "MileGate R5B"
Ambient conditions	refer to [201] System Description "MileGate R5B"

For additional information and functional contents or limitations, refer to [\[012\] Release Note "MileGate R5B"](#).

3.2.2 Features in ADSL operation mode

Table 11: ADSL over POTS specific functions and features

Feature	Rating or Standard
ADSL with non-overlapped spectrum	ITU-T G.992.1 (06/99), Asymmetric digital subscriber line (ADSL) transceivers, Annex A
ADSL2 with non-overlapped spectrum	ITU-T G.992.3 (01/05), Asymmetric digital subscriber line transceivers 2 (ADSL2), Annex A
ADSL2plus with non-overlapped spectrum	ITU-T G.992.5 (01/05), Asymmetric Digital Subscriber Line (ADSL) transceivers - Extended bandwidth ADSL2 (ADSL2plus), Annex A
Support of ADSL2 extended upstream bandwidth for POTS lines	ITU-T G.992.3 Annex M
Support of ADSL2plus extended upstream bandwidth for POTS lines	ITU-T G.992.5 Annex M
Interworking with MileGate SUPC3/4 without CO splitter	

Table 12: ADSL over ISDN specific functions and features

Feature	Rating or Standard
ADSL with non-overlapped spectrum	ITU-T G.992.1 (06/99), Asymmetric digital subscriber line (ADSL) transceivers, Annex B
ADSL2 with non-overlapped spectrum	ITU-T G.992.3 (01/05), Asymmetric digital subscriber line transceivers 2 (ADSL2), Annex B
ADSL2plus with non-overlapped spectrum	ITU-T G.992.5 (01/05), Asymmetric Digital Subscriber Line (ADSL) transceivers - Extended bandwidth ADSL2 (ADSL2plus), Annex B

Table 13: Functions and features common in ADSL mode

Feature	Rating or Standard
Enhanced security features: - Broadcast filtering - Multicast filtering - MAC source filtering for Nto1 services - MAC destination filtering for Nto1 services - L2 packet filtering per logical interface	DSL Forum TR-101, Migration to Ethernet Based DSL Aggregation, April 2006
Enhanced DHCP logon options	DSL Forum TR-101
Enhanced PPPoE tag options	DSL Forum TR-101
Support of Single Ended Line Test (SELT)	ITU-T G.996.2
Detailed presentation of SELT results	
Support of Double Ended Line Testing (DELT)	ITU-T G.992.3
Allows up to 640 ADSL2plus ports per MileGate 2500 subrack	
Interworking performance: packet rate of up to 500 k packets/s (up to 500 k packets/s per direction with unsymmetrical rates) at a packet size of 64 ... 1526 bytes	
Security features: - MAC address aging (with DHCP) - Multicast group address filtering	DSL Forum TR-101
Handshaking procedures	ITU-T G.994.1 (05/03), Handshake procedures for digital subscriber line (DSL) transceivers
Support of L2 (low power) and L0 (Full On)	ITU-T G.992.3
PSD (Power Spectral Density) shaping	ITU-T G.997.1
Downstream power backoff	ITU-T G.997.1
ADSL2 / ADSL2plus performance according to	DSL Forum TR-100, ADSL2 / ADSL2plus Performance Test Plan
Support of single latency mode (fast and interleaved with selectable latency)	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.993.2, ITU-T G.992.5
Up to 8 VCs per line	DSL Forum TR-101, ITU-T I.361 (02/99) B-ISDN ATM layer specification
PPPoE on ADSL lines	DSL Forum TR-101
IPoE on ADSL lines	DSL Forum TR-101
VLAN support	IEEE 802.1Q, Virtual Bridged Local Area Networks, 1998
Support of 1:1 VLAN mode	DSL Forum TR-101
Support of N:1 VLAN mode	DSL Forum TR-101
VLAN tagging in upstream direction and VLAN filtering in downstream direction (frames from subscribers are not tagged or priority tagged, except for Transparent LAN services)	DSL Forum TR-101, IEEE 802.1D, Part 3: Media Access Control (MAC) Bridges, 1998
Support of VLAN QoS with Class of Service (CoS) handling	IEEE 802.1p, Traffic Class Expediting and Dynamic Multicast Filtering (in 802.1D-1998), DSL Forum TR-101
IGMP snooping with IPoE, IGMP proxy with report message suppression	IETF RFC 2236, Internet Group Management Protocol, Version 2, November 1997; IETF RFC 3376, Internet Group Management Protocol, Version 3, October 2002
Multicast stream preview	

Table 13: Functions and features common in ADSL mode (continued)

Feature	Rating or Standard
Multicast pre-join and post-leave intervals	
Multicast bandwidth allocation per port and per stream	
DHCP relay option 82	IETF RFC 2131, IETF RFC 951, IETF RFC 3046, DHCP Relay Agent Information Option, January 2001
PPPoE intermediate agent	DSL Forum TR-101, IETF RFC 2516, A Method for Transmitting PPP Over Ethernet (PPPoE), February 1999
Security features: - Broadcast handling - Prevention of L2 peer to peer (hair pin) forwarding - Prevention of source MAC spoofing - Prevention of source MAC flooding - MAC address filtering	DSL Forum TR-101
Fault Management	ITU-T X.733

3.2.3 VDSL2 line interface characteristics

Table 14: Transmission medium

Feature	Rating or Standard
Minimum requirements	Twisted copper pair no loading coils no open wires

Table 15: Transmission parameters

Feature	Rating or Standard
Number of VDSL2 interfaces	32
Line rate downstream range	64 ... 110'000 kbit/s
Line rate upstream range	64 ... 50'000 kbit/s
Line code	DMT ITU-T G.992.1, ITU-T G.992.3, ITU-T 993.2, ITU-T G.992.5
One way transfer delay for channel type "Inter-leaved"	Configurable maximum 1 ... 63 ms, actual value from status
One way transfer delay for channel type "Fast"	According to VDSL2 standard
Maximum output power	20.5 dBm

Table 16: SUV D3: Valid Combinations of Bandplan and Profile

Short name	Bandplan	Profile						
		8A	8B	8C	8D	12A	12B	17A
B7-1	997-M1c-A-7			OK				
B7-2	997-M1x-M-8	OK	OK	OK	OK			
B7-3	997-M1x-M					OK	OK	
B7-4	997-M2x-M-8	OK	OK	OK	OK			

Table 16: SUVD3: Valid Combinations of Bandplan and Profile (con-

Short name	Bandplan	Profile						
		8A	8B	8C	8D	12A	12B	17A
B7-5	997-M2x-A	OK	OK	OK	OK	OK	OK	
B7-6	997-M2x-M					OK	OK	
B7-7	HPE17-M1-NUS0							OK
B7-8	HPE30-M1-NUS0							
B7-9	997E17-M2x-A							
B7-10	997E30-M2x-NUS0							
B8-1	998-M1x-A	OK	OK	OK	OK	OK		
B8-2	998-M1x-B						OK	
B8-3	998-M1x-NUS0						OK	
B8-4	998-M2x-A	OK	OK	OK	OK	OK		
B8-5	998-M2x-M	OK	OK	OK	OK	OK	OK	
B8-6	998-M2x-B							
B8-7	998-M2x-NUS0						OK	
B8-8	998E17-M2x-NUS0							OK
B8-9	998E17-M2x-NUS0-M							OK
B8-10	998ADE17-M2x-NUS0-M							OK
B8-11	998ADE17-M2x-A							OK
B8-12	998ADE17-M2x-B							
B8-13	998E30-M2x-NUS0							
B8-14	998E30-M2x-NUS0-M							
B8-15	998ADE30-M2x-NUS0-M							
B8-16	998ADE30-M2x-NUS0-A							OK

The combination of bandplan and profile and whether US0 is enabled is defined in a profile, see [Table 35: "VdslPortProfile_x.yy.zz, section VDSL2 Transmission Parameters"](#) (on page 75).

Table 17: SUVM4: Valid Combinations of Bandplan and Profile

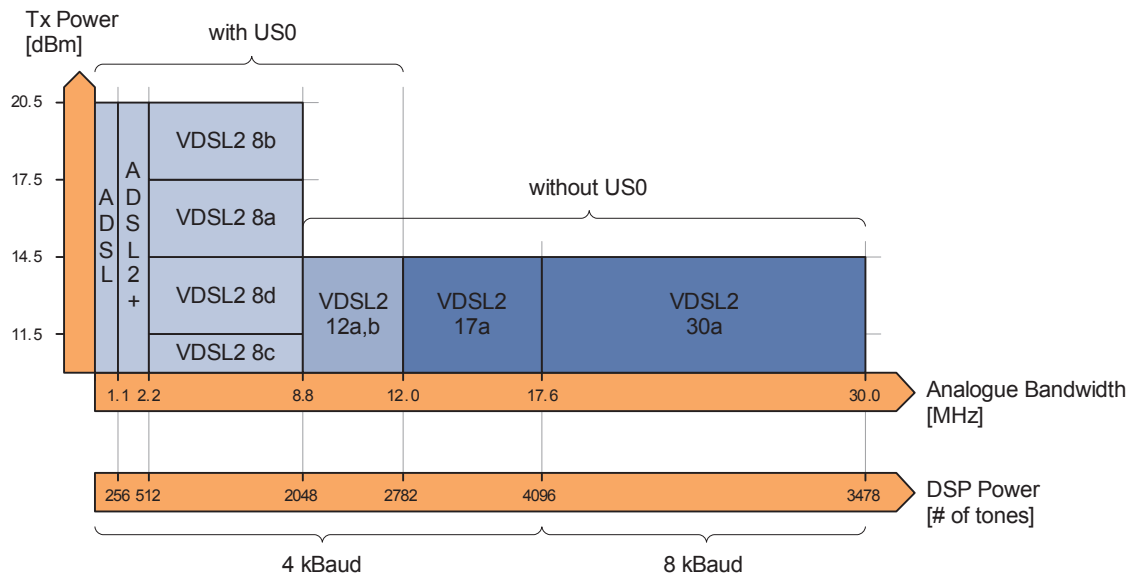
Short name	Bandplan	Profile						
		8A	8B	8C	8D	12A	12B	17A
B7-1	997-M1c-A-7							
B7-2	997-M1x-M-8							
B7-3	997-M1x-M						OK	
B7-4	997-M2x-M-8							
B7-5	997-M2x-A						OK	
B7-6	997-M2x-M						OK	
B7-7	HPE17-M1-NUS0							OK
B7-8	HPE30-M1-NUS0							
B7-9	997E17-M2x-A							
B7-10	997E30-M2x-NUS0							
B8-1	998-M1x-A							
B8-2	998-M1x-B	OK	OK	OK	OK	OK	OK	
B8-3	998-M1x-NUS0	OK	OK	OK	OK		OK	

Table 17: SUV M4: Valid Combinations of Bandplan and Profile (con-

Short name	Bandplan	Profile						
		8A	8B	8C	8D	12A	12B	17A
B8-4	998-M2x-A							
B8-5	998-M2x-M						OK	
B8-6	998-M2x-B	OK	OK	OK	OK	OK		
B8-7	998-M2x-NUS0	OK	OK	OK	OK		OK	
B8-8	998E17-M2x-NUS0							OK
B8-9	998E17-M2x-NUS0-M							OK
B8-10	998ADE17-M2x-NUS0-M							OK
B8-11	998ADE17-M2x-A							
B8-12	998ADE17-M2x-B							OK
B8-13	998E30-M2x-NUS0							
B8-14	998E30-M2x-NUS0-M							
B8-15	998ADE30-M2x-NUS0-M							
B8-16	998ADE30-M2x-NUS0-A							OK

Table 18: Transmission performance

Feature	Standard
VDSL2	BBF TR-114

**Figure 2: Characteristics of VDSL2 standard profiles**

3.2.3.1 Rate and reach

The following diagrams show the rate and reach behaviour of the SUVx3/4 ports in the case of 0.4 mm wires and white noise (-140 dBm/Hz) applied to VTU-O and VTU-R.

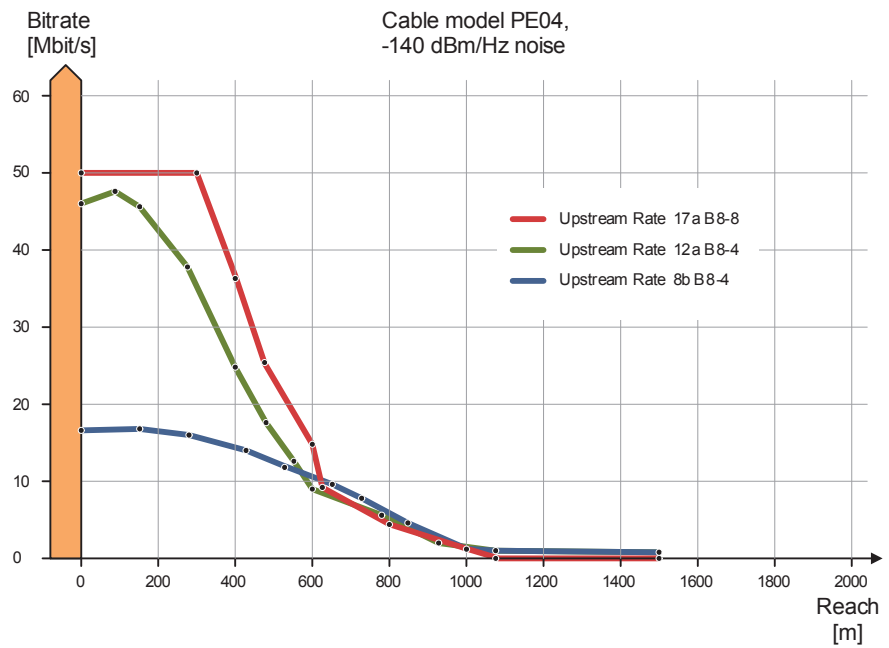


Figure 3: VDSL2 upstream rate / reach, various profiles

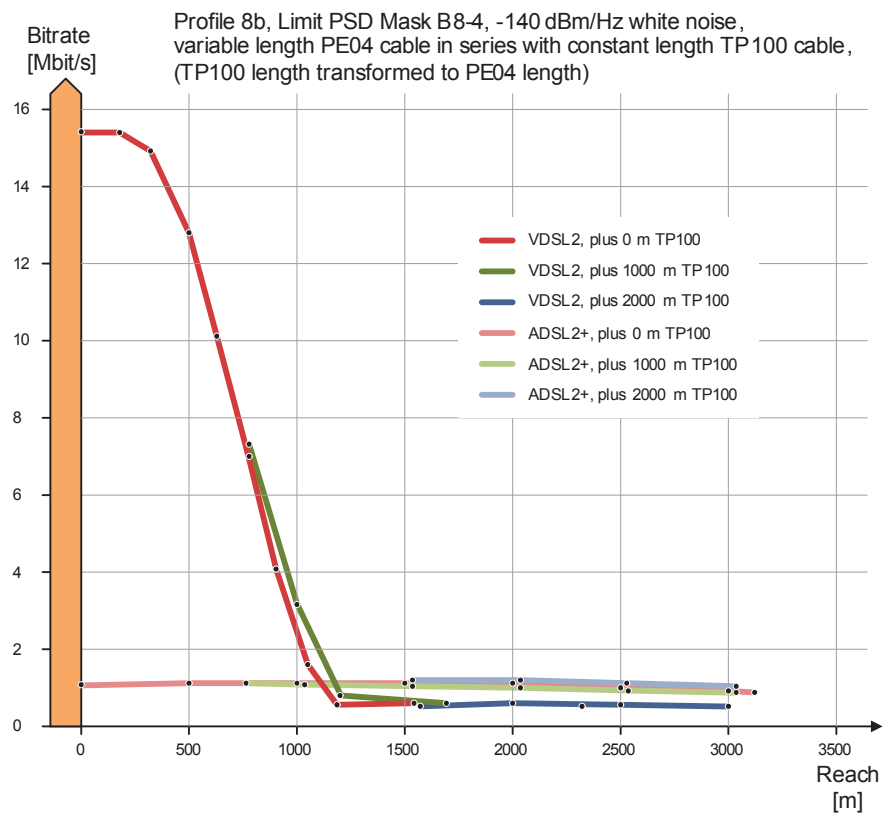


Figure 4: Upstream data rates (examples)

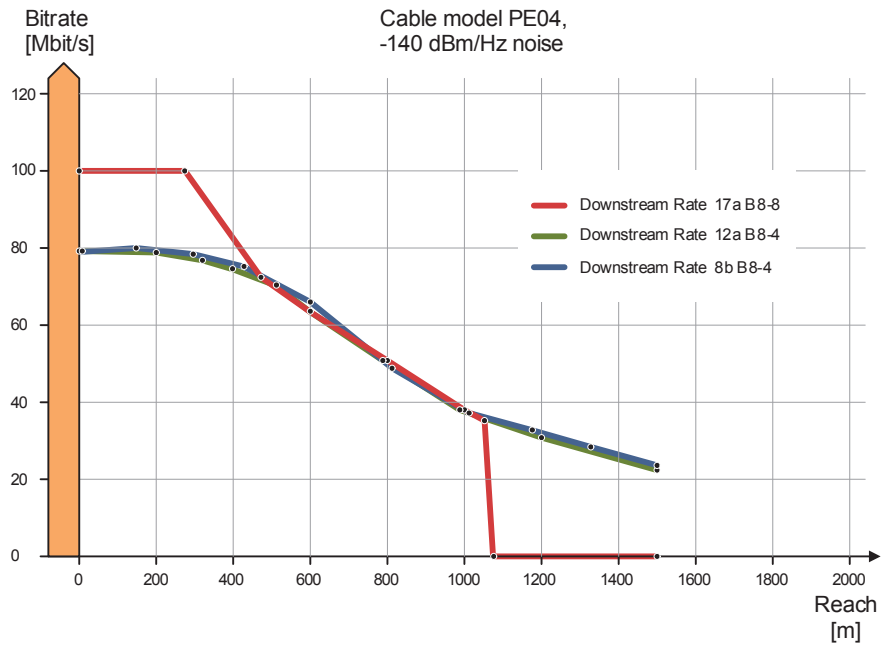


Figure 5: VDSL2 downstream rate / reach, various profiles

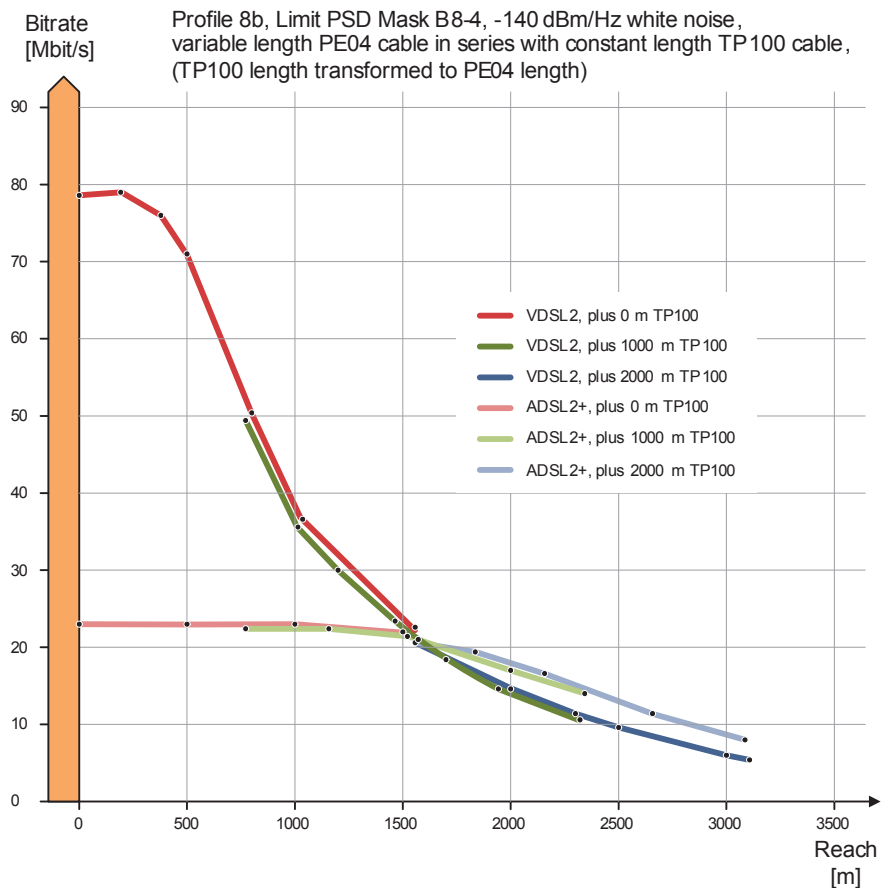


Figure 6: Downstream data rates (examples)

3.2.3.2 Power Spectral Density (PSD)

The following diagram shows an example of a PSD diagram of the VDSL2 transmission signals on the SUVx3/4 unit.

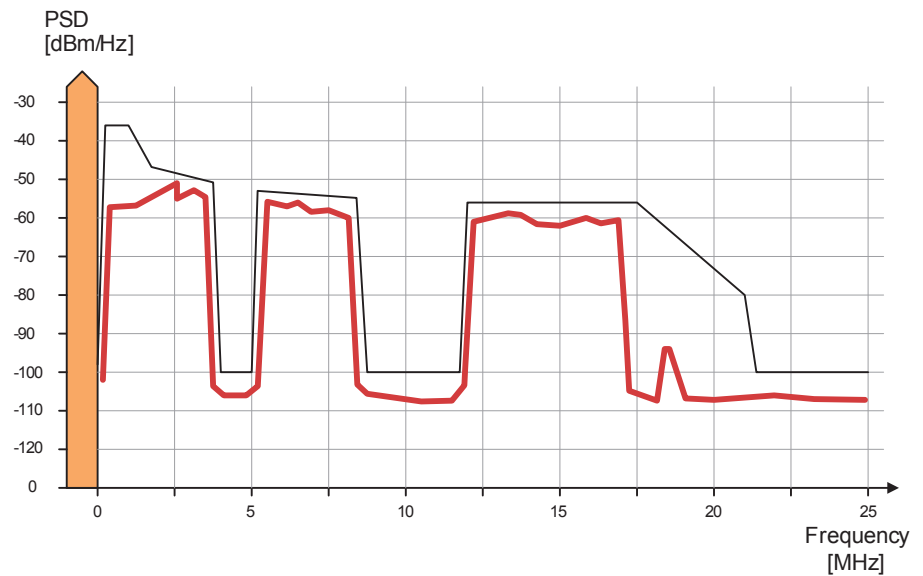


Figure 7: Power Spectral Density for profile 17a operation