

## 2.2 Specification

**Table 3: SUVM6 functions and features**

Function	Description
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	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.992.5 Annex B, Annex M
Support of SELT, DELT	SELT: ITU-T G.996.2 DELT: ITU-T G.993.2
Maximum number of units in a sub-rack	Depending on selected profile and number of VDSL units - a separate calculation utility is available on request. Please contact your SPOC.
Enhanced security features:	
Broadcast filtering	BroadBand 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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Enhanced PPPoE tag options	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Additional support for subscriber VLANs (service separation); up to 8 sub-interfaces (EFM, VLAN tagged) per port	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
PSD Spectrum shaping through profiles	
Ethernet transport VDSL2 (Ethernet in the First Mile, EFM)	IEEE 802.3-2008 (Revision of IEEE Std 802.3-2005)
Support of dying gasp	G.992.1, G.992.3, G.993.2
Support of VDSL2 profiles 8a, 8b, 8c, 8d, 12a, 12b, 17a	ITU-T G.993.2
Retransmission for improved impulse noise protection.	ITU-T G.998.4
Bit swapping, virtual noise	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 <a href="#">Table 10: "Transmission parameters"</a> (on page 19))	ITU-T G.993.2
Support of DPBO, UPBO	ITU-T G.993.2

**Table 3: SUVM6 functions and features (continued)**

Function	Description
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
Non-blocking performance	wire speed
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)	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006" 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), BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of 1:1 VLAN mode	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of N:1 VLAN mode	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of Private Line Service (PLS)	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of Transparent LAN Service (TLS)	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of MAC address translation	
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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
PPPoE intermediate agent	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"

**Table 3: SUVM6 functions and features (continued)**

Function	Description
IPoE on VDSL2 lines	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
DHCP relay option 82	IETF RFC 2131 IETF RFC 951 IETF RFC 3046, DHCP Relay Agent Information Option, January 2001
Tunnelling 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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Packet logger for protocol packets, for improved debugging support	
Board report for improved debugging support	
Fault Management	ITU-T X.733
Support of SNMP Alarm-MIB (RFC 3877), Entity-MIB (RFC 4133) IF-MIB (RFC 2863), KM-DIAGNOSTIC-MIB (proprietary)	RFC 3877 RFC 4133 RFC 2863

**Table 4: Power consumption**

Power	Amount
Power supply range	refer to <a href="#">[201] System Description "MileGate R5B"</a>
Maximum current consumption (all DSL lines activated with maximum output power), $V_{bat} = -48\text{ V}$	1.66 A
Maximum total power requirement from battery, $V_{bat} = \text{nominal voltage}$	80 W
Basic power consumption (all ports disabled), $V_{bat} = \text{nominal voltage}$	24 W
Maximum power dissipation on unit, $V_{bat} = \text{nominal voltage}$	72 W

**Table 5: Mechanical parameters**

Feature	Comment
Construction practice	19 inches
Height of the unit	6 HU (1 HU = 44.45 mm)
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	approx. 630g

**Table 6: Reliability**

Calculated MTTF at 35 °C (MIL-HDBK-217F)	> 41 years
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For additional information and functional contents or limitations, refer to [\[012\] Release Note "MileGate R5B"](#).

## 2.2.1 Features in ADSL operation mode

**Table 7: ADSL over ISDN specific functions and features**

Function	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
Interworking with MileGate SUPCx without CO splitter	

**Table 8: Functions and features common in ADSL mode**

Function	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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Enhanced DHCP logon options	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Enhanced PPPoE tag options	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
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
Support of Metallic Line Test (MELT)	ITU-T G.996.2
Allows up to 960 ADSL2plus ports per MileGate 2500/2510 subrack	

**Table 8: Functions and features common in ADSL mode**

Function	Rating or standard
Security features: - MAC address aging (with DHCP) - Multicast group address filtering	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
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	BroadBand 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.992.5
Up to 8 VCs per line	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006", ITU-T I.361 (02/99)
PPPoE on ADSL lines	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
IPoE on ADSL lines	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
VLAN support	IEEE 802.1Q, Virtual Bridged Local Area Networks, 1998
Support of 1:1 VLAN mode	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Support of N:1 VLAN mode	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
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)	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006", 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), BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
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	

**Table 8: Functions and features common in ADSL mode**

Function	Rating or standard
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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006", 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	BroadBand Forum TR-101, "Migration to Ethernet Based DSL Aggregation, April 2006"
Fault Management	ITU-T X.733

### 2.2.2 Other standards

Please refer to [\[201\] System Description "MileGate R5B"](#) for standards concerning:

- Emission
- Immunity
- Safety
- Ambient conditions

### 2.2.3 VDSL2 line interface characteristics

**Table 9: Transmission medium**

Minimum requirements	Twisted copper pair no loading coils no bridged taps
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**Table 10: Transmission parameters**

Number of VDSL2 interfaces with profiles 8a, b, c, d; 12a, b; 17a	48
Line rate downstream range with profiles 8a, b, c, d; 12a, b; 17a, depending on CPE	64 ... 110'000 kbit/s
Line rate upstream range	64 ... 50'000 kbit/s
Line code	DMT ITU-T G.993.2
One way transfer delay for channel type "Interleaved"	Configurable maximum 1 ... 63 ms, actual value from status

**Table 10: Transmission parameters (continued)**

One way transfer delay for channel type "Fast"	According to VDSL2 standard
Maximum output power	20.5 dBm

**Loss of Service likely**

*Frequency bands as defined in vectoring profile on a connected vectoring unit and this service unit (VDSL profile) have to match. Otherwise interruptions of services are likely.*

→ Define profiles with matching settings.

**Table 11: Valid Combinations of Bandplan and Profile**

Short Name	Bandplan	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							ok
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	
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

The combination of bandplan and profile and whether US0 is enabled is defined in a profile, see [Table 22: "Create New Profile, VdslPortProfile, section VDSL2 Transmission Parameters"](#) (on page 53).

**Table 12: Transmission performance**

Feature	Standard
VDSL2	BBF TR-114

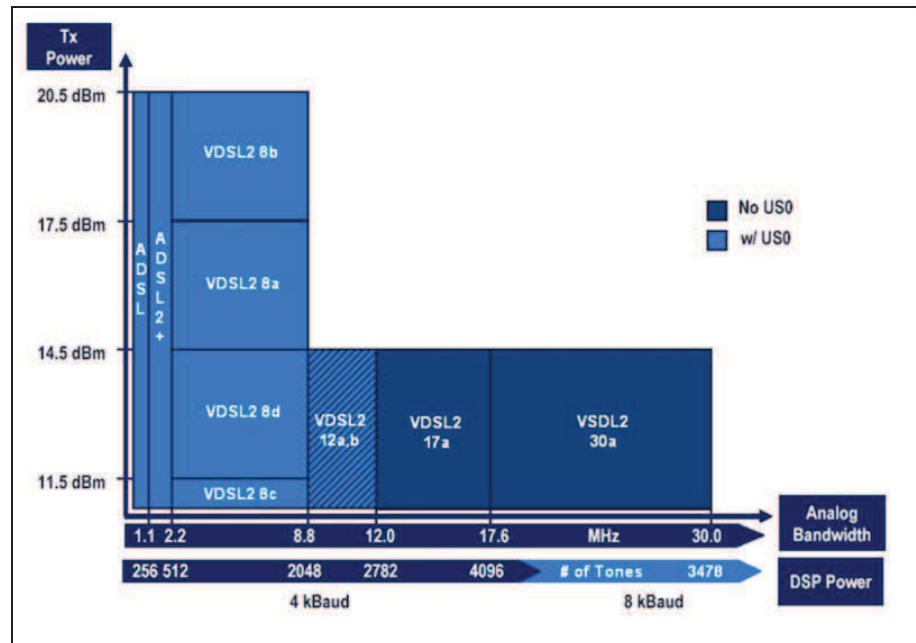


Figure 1: Characteristics of VDSL2 standard profiles

The following diagrams show the rate & reach behaviour of the SUVM6 ports in the case of 0.4 mm wires and white noise (-140 dBm/Hz) applied to VTU-O and VTU-R.

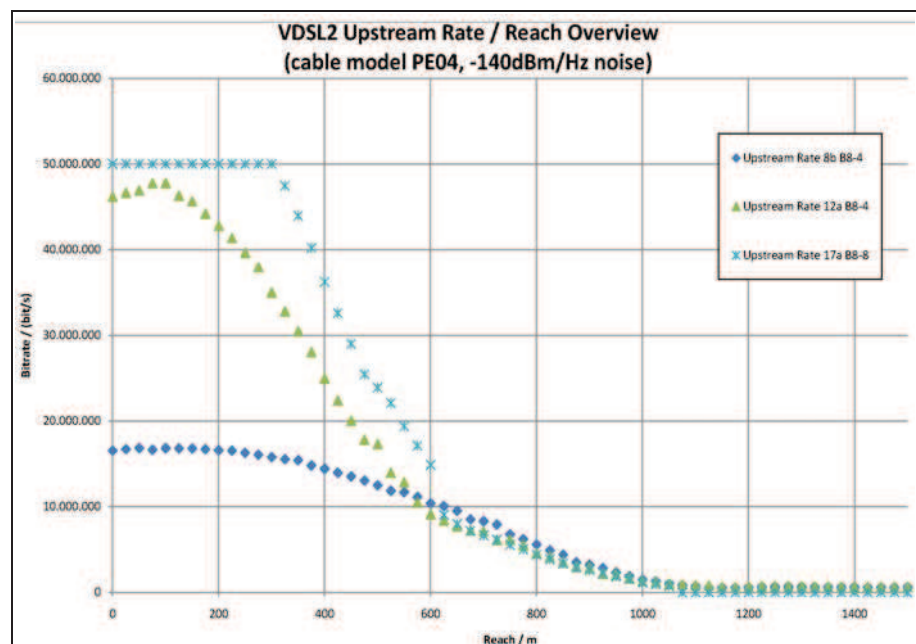


Figure 2: SUVM6 upstream reach, various profiles



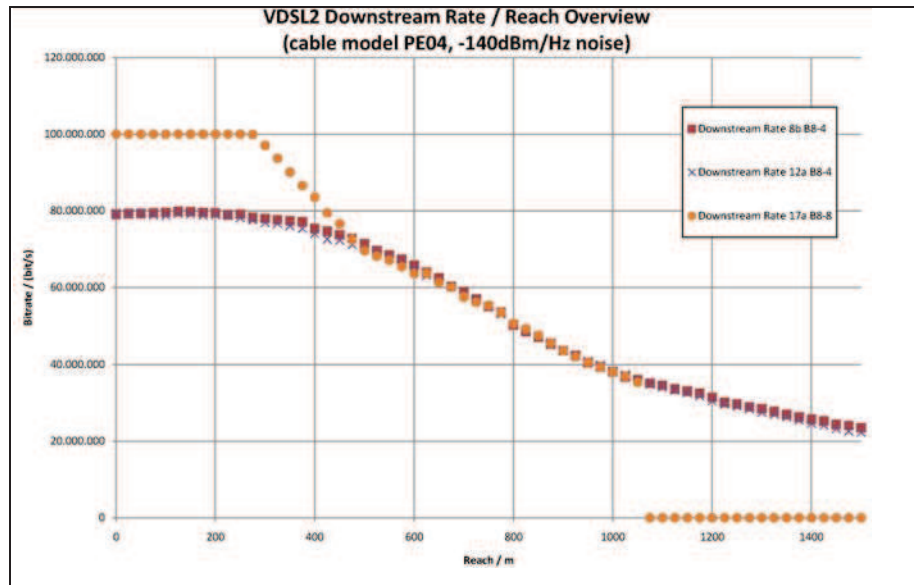


Figure 3: SUVM6 downstream reach, various profiles

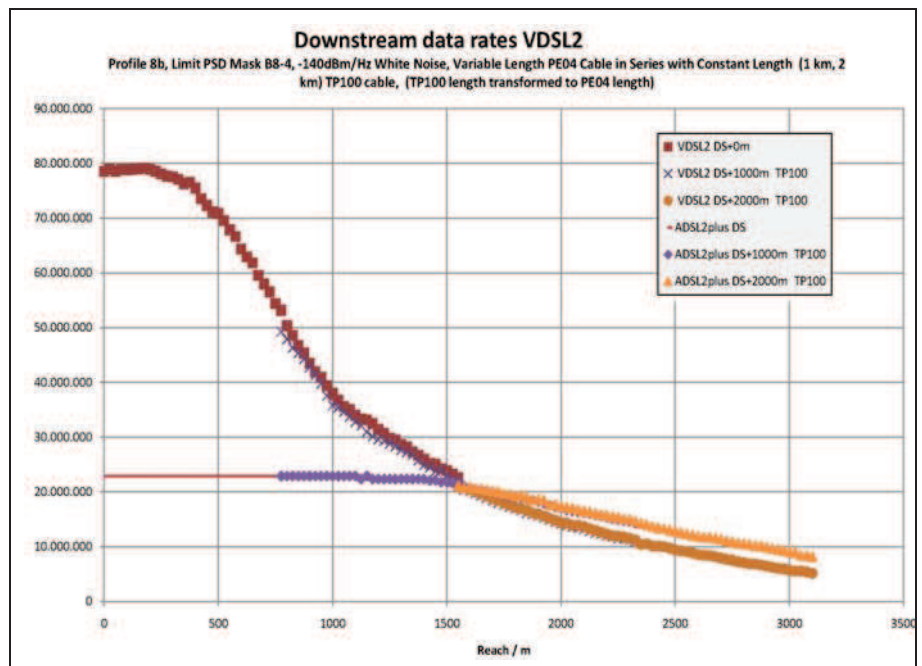


Figure 4: Downstream data rates (examples)

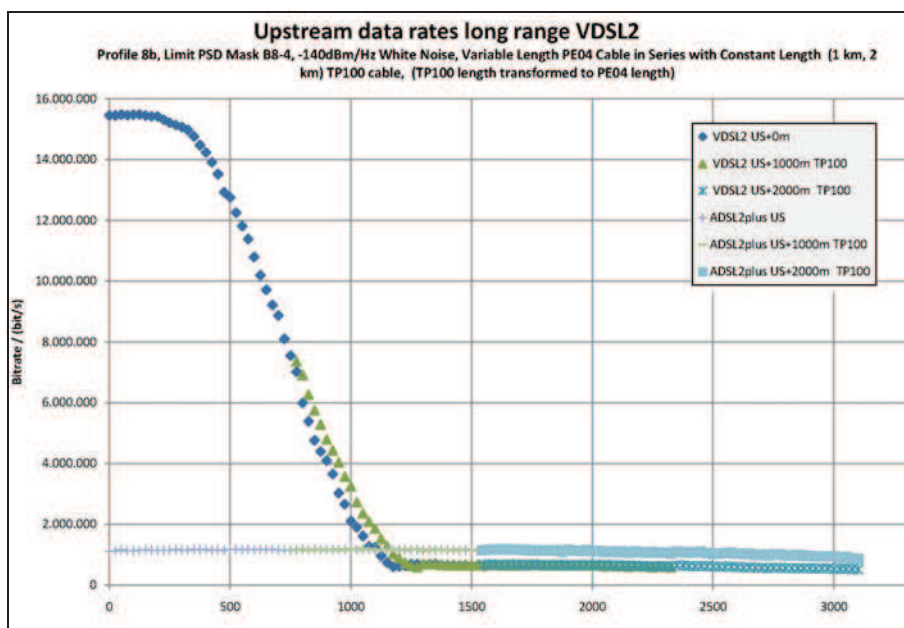


Figure 5: Upstream Data rates (examples)