Specifications

BUSINESS VLL

and

BUSINESS VPLS

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Reference to gender-neutral formulations: In order to improve legibility, this contractual document intentionally refrains from adopting any gender-specific differentiations. All references to individuals apply similarly to all genders (male, female and non-binary).
We would like to emphasize that equality and inclusion are important issues for us. The style employed in this document is solely aimed at linguistic simplification and does not imply any judgement or exclusion.

1. Basic service

Wien Energie GmbH (hereinafter Wien Energie) offers the products BUSINESS VLL (point2point) and BUSINESS VPLS (multipoint) via its IP-based MPLS (Multiprotocol Label Switching) network. These specifications (*Leistungsbeschreibung / LB*) apply to both of the above products. Any exceptions will be referred to explicitly. The fundamental differences are explained under Sections 1.1 and 1.2.
The option exists of redundant connections of customer sites.
All of the details provided in this document refer to implementation exclusively relying on Wien Energie network infrastructure. These specifications (*Leistungsbeschreibung* or *LB*) apply exclusively to contracts concluded with business customers as defined by Article 1 of the Austrian Consumer Protection Act (*KSchG*).

1.1. BUSINESS VLL

BUSINESS VLL (Virtual Leased Line) provides Ethernet-based point-to-point connections via the MPLS network. If a customer orders multiple BUSINESS VLL connections, it is possible to activate these as a bundle (refer to Figure 2: BUSINESS VLL with centralised transfer).

1.2. BUSINESS VPLS

BUSINESS VPLS (Virtual Private LAN Service) provides Ethernet-based multipoint-to-multipoint connections via the MPLS network. This allows multiple distributed customer sites to share an Ethernet broadcast domain. The connection of the customer sites is based on connections to the MPLS network, with the MPLS network simulating a switch, resulting in a single-bridged LAN.

1.3. Access bandwidths

The following access bandwidths are available:

- 50 Mbit/s
- 100 Mbit/s
- 200 Mbit/s
- 300 Mbit/s
- 400 Mbit/s
- 500 Mbit/s
- 1,000 Mbit/s (= 1 Gbit/s)
- 2,500 Mbit/s (= 2.5 Gbit/s)
- 5,000 Mbit/s (= 5 Gbit/s)
- 10,000 Mbit/s (= 10 Gbit/s)
- 25,000 Mbit/s (= 25 Gbit/s) on a project basis
- 40,000 Mbit/s (= 40 Gbit/s) on a project basis
- 100,000 Mbit/s (= 100 Gbit/s) on a project basis

The selected access bandwidth is available to the customer in both directions (send and receive) at the same time (full duplex).

1) The bandwidths 25 Gbit/s, 40 Gbit/s and 100 Gbit/s are implemented via a 100-Gbit/s interface.

1.4. Examples

1.4.1. BUSINESS VLL: 100 Mbit/s

The customer has a BUSINESS VLL connection with an access bandwidth of 100 Mbit/s

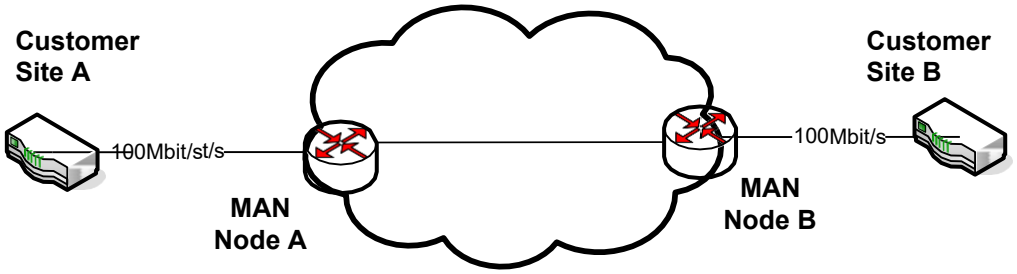


Figure 1: BUSINESS VLL

1.4.2. BUSINESS VLL: Standalone BUSINESS VLLs with centralized transfer

The customer has multiple, standalone BUSINESS VLL connections with various access bandwidths. Data transfers take place centrally. The required bandwidth for the centralized transfer of data is determined by the cumulative access bandwidths of the individual BUSINESS VLLs. The VLLs are assigned VLAN IDs for identification purposes. These can be freely selected by the customer in consultation with Wien Energie.

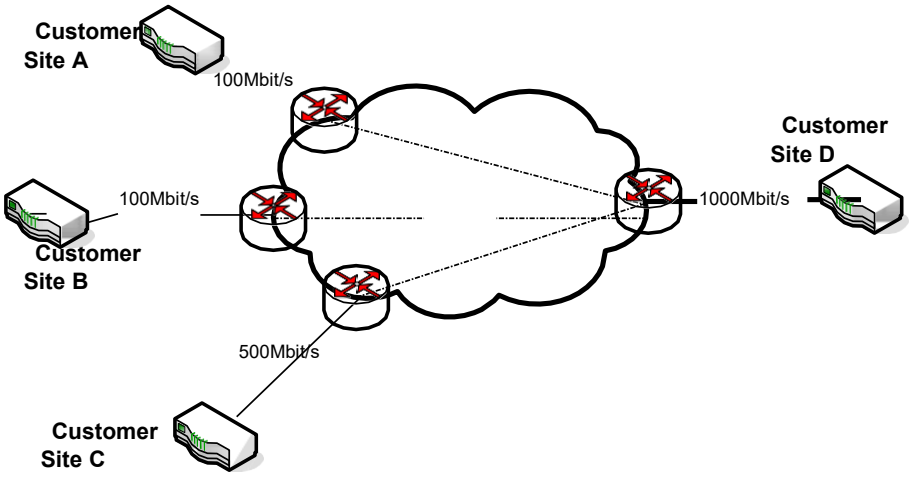


Figure 2: BUSINESS VLL with centralised transfer

1.4.3. BUSINESS VPLS

The following chart illustrates BUSINESS VPLS with differing access

bandwidths. Access points in the context of BUSINESS VPLS relates to the connection of the various sites to the common network solution.

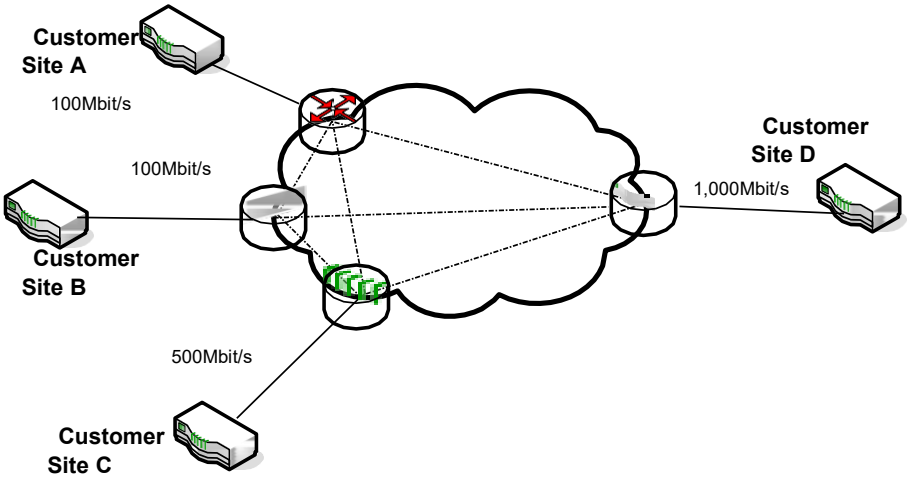


Figure 3: BUSINESS VPLS

2. Preconditions

2.1. Physical availability

BUSINESS VLL and VPLS are available for sites at which Wien Energie can technically and commercially provide the necessary fibre optic infrastructure.

2.2. Construction-based preconditions

The installation site for the equipment provided to the customer by Wien Energie must be clean, dry, secure and adequately ventilated. In particular, the customer is required to ensure at its own expense that the following conditions exist if a customer edge (CE) is used:

- Power supply: 230 V ~ / power input max. 150W
- Two power connections are recommended (for two separate voltages)
- Two RU (rack units) in a 19” server rack cabinet are recommended for the router and the patch panel
- Ambient temperature: 0°C to +50°C
- Relative humidity: 5% to 95% (non-condensing)
- Connections possible (possibly via in-house cabling) to the CE

2.3. Applicable legal provisions

Details of these provisions are set out in the general terms and conditions of Wien Energie relating to B2B telecommunication products in their most recent versions (**AGB BUSINESS**, downloadable (in German) at https://www.wienenergie.at/agb/).

3. Access

Access to the Wien Energie equipment / network access point at the customer site is defined in the general terms and conditions (AGB BUSINESS).

4. Network access point (NAP)

Transfer to the customer takes place at an active component. This relates to a CE (customer edge). In special cases, the transfer can also take place at a MAN node. The network access point (NAP) or service transfer point (STP) is the connection socket (jack) at the customer site. All network equipment upstream of this point is the responsibility of Wien Energie. Any components and connections (e.g. in-house cabling) provided by the customer are excluded from the above.

5. Implementation deadlines

The implementation times are dependent on the requested site and will therefore be defined in the relevant offer. Details are provided in the AGB BUSINESS document.

6. Service transfer

Once implemented, the customer will be provided a service transfer notification (*Serviceübergabemeldung*) by Wien Energie. This document includes at least the following parameters:

- Confirmation of the parameters defined being met
- Implementation date
- Start date of billing
- Connection and service number(s)

7. Monitoring

The network operation center (NOP) monitors the Wien Energie network 24/7, 365/366 days a year. The CE is also integrated into the centralised fault management monitoring undertaken by Wien Energie. This center monitors operations and ensures uninterrupted service.

7.1. Web interface for service monitoring

At https://monitoring.blizznet.at, the customer has access to a password-protected web interface. This provides comprehensive information and statistics about all contracted customer connections. For example, customers can review the access cable capacity utilization over various time periods.

For example:

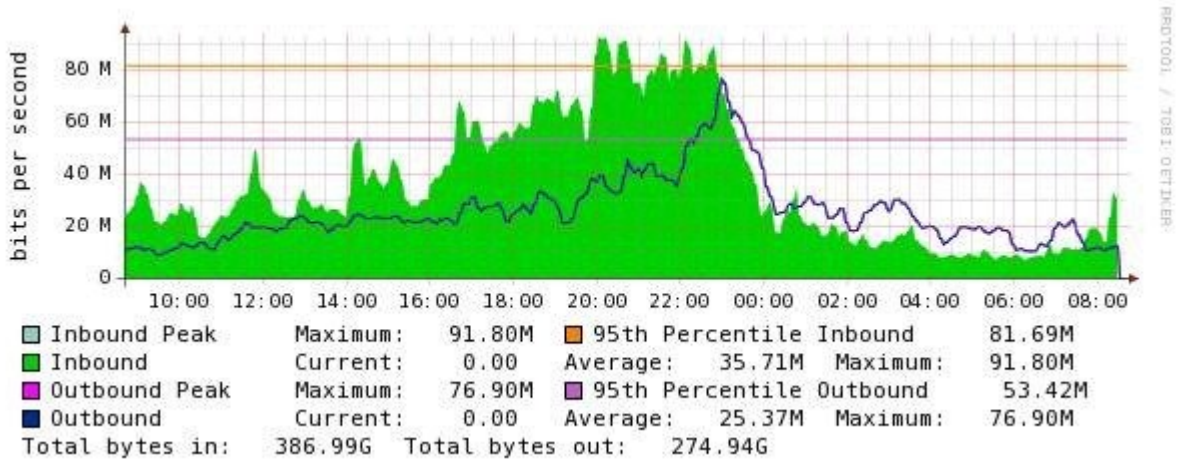


Figure 4: Example of monitoring results

8. Service management & SLA

Information about service interruptions, maintenance work, guaranteed service levels, contact persons and escalation levels can be found in the B2B service level agreement (hereinafter SLA BUSINESS) for telecommunication products.

Unless otherwise explicitly offered, the SLA class STANDARD is considered to have been agreed.

9. Technical service data

Access - LAN customer	**IEEE standard**
100Base-TX; RJ45	802.3u
1000Base-T; RJ45	802.3ab
Optional:	
1000Base-SX; LC socket; multi mode (850nm)	802.3z
1000Base-LX; LC socket; single mode (1310nm)	802.3z
1000Base-LHA; LC socket; single mode (1550nm)	802.3z
10GBase-LR; LC socket; single mode (1310nm)	802.3ae
10GBase-ZR; LC socket; single mode (1550nm)	802.3ae
25GBase-SR; LC socket; multi mode (850nm)	802.3by
25GBase-LR; LC socket; single mode (1310nm)	802.3by
25GBase-ER; LC socket; single mode (1310nm)	802.3cc
100GBase-SR4; MPO/MTP socket; multi mode (850nm)	802.3bm
100GBase-LR4; LC socket; single mode (1310nm)	802.3ba
100GBase-ER4; LC socket; single mode (1310nm)	802.3ba
EVC	**Parameters**
CIR-100	CIR = 100% EVC; EIR 0% EVC

Details	
Mode	Full duplex
MAC layer	IEEE 802.3
Maximum number of MAC addresses	250 pro VPLS (increase possible if required and after consultation) / VLL transparent
Unicast service frame delivery	Transparent
Multicast service frame delivery	Transparent
Broadcast service frame delivery	Transparent
Flooding unknown MAC addresses	Transparent
MACSec	802.1AE (transparent)
VLAN trunk	802.1q (transparent)
CoS tags	802.1p (transparent)
DSCP	Transparent
Frame delay	≤ 5ms for CIR (128Byte frame size)
Frame loss	≤ 0.1% for CIR
Jitter	≤ 1ms for CIR
VC restore	≤ 1s
max. frame size	max. MTU 9.000[1]
Layer 2 protocols	
STP, RSTP	Transparent
HSRP	Transparent
CDP	Transparent
GARP	Transparent
GVRP	Transparent
IGMP	Transparent
LACP	Optional

Table 2: Technical Data

These technical data relate to a packet size of 1,500 bytes.
Lower/higher packet sizes may lead to deviations in the guaranteed bandwidth and latency.

[1] The maximal size is MTU 9,216. A max. of 9,000 is usable by the customer.