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# BreezeACCESS VL 900 Technical Specification

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Release 5.5M

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## Radio & Modem

### General Parameters

Parameter	Value
Frequency Band	<u>900MHz</u> : 902 – 928 MHz;
Central frequencies:	905-925 MHz
Radio Access Method	OFDM Time Division Duplex (TDD)
Standard Compliance	FCC Part 15.247
Channel bandwidth	5MHz
Central frequency resolution	1MHz
SU Antenna	10.5 dBi minimum in the 902-928 MHz band. 55° AZ x 60° EL, vertical/horizontal polarization, RoHS compliant
AU Antenna	<ul style="list-style-type: none"> <li>○ Ant-0.9G-V/H-10-90: 2x10dBi typical, 902-928 MHz, dual vertical/horizontal polarization, 90° AZ x 16° EL for Vpol, 90° AZ x 19° EL for Hpol.</li> <li>○ 16dBi typical, 902-928 MHz, vertical polarization, 65° AZ x 16° EL. DIN716 connector</li> <li>○ AU-Ant-0.9G-7-Omni: 7dBi typical, 902-928 MHz, 360° AZ x 17° EL, vertical polarization.</li> </ul>
Antenna Port	<u>AU-ODU, SU-E-ODU</u> : N-type, 50 ohm
No. FFT points	64
FEC	Inside modulations BPSK 1/2 BPSK 3/4 QPSK 1/2 QPSK 3/4 QAM16 1/2 QAM16 3/4 QAM64 2/3 QAM64 3/4
Max Output power <sup>1</sup> (At antenna port)	<u>BST</u> AU: 27dBm±1dB <u>CPE</u> SU: 27dBm±1dB
Max Input PWR	HW Revision F: -25dBm typical HW Revision G: -25dBm typical
CPE ATPC Dynamic Range	-20dBm to Max Output Power
EIRP	36dBm (achievable with antenna of 9dBi or higher)

<sup>1</sup> Dependant on country based regulations.

### Maximum Tx Power Per Modulation

Max Mod	TX power per modulation							
	8	7	6	5	4	3	2	1
8	19 dBm	20 dBm	22 dBm	24 dBm	24 dBm	24 dBm	24 dBm	24 dBm
7		20 dBm	22 dBm	24 dBm	25 dBm	25 dBm	25 dBm	25 dBm
6			22 dBm	24 dBm	26 dBm	27 dBm	27 dBm	27 dBm
5				24 dBm	26 dBm	27 dBm	27 dBm	27 dBm
4					26 dBm	27 dBm	27 dBm	27 dBm
3						27 dBm	27 dBm	27 dBm
2							27 dBm	27 dBm
1								27 dBm

### Sensitivity

Sensitivity values measured @ PER=12.1%		Channel Spacing 1MHz		
Modulation		Bit Rate	Typical Sensitivity	Minimum SNR
			@ -120 dBm Noise Floor	
1	BPSK 1/2	1.5 Mbps	-96.6	5.4
2	BPSK 3/4	2.25 Mbps	-96.6	5.4
3	QPSK 1/2	3 Mbps	-95.6	6.4
4	QPSK 3/4	4.5 Mbps	-92.6	9.4
5	QAM16 1/2	6 Mbps	-89.6	12.4
6	QAM16 3/4	9 Mbps	-86.6	15.4
7	QAM64 2/3	12 Mbps	-81.6	20.4
8	QAM64 3/4	13.5 Mbps	-80.6	21.4

## Networking

Services	BST
Max number of SUs per AU	512
Max number of MAC addresses in bridging table	1024
Maximum packet size	1600 Bytes

## Voice

Services	BST
Maximum number of DRAP entities	255

Note: DRAP only as maximum Number of Calls (without channel reservation)

## Data Communications

Data	IEEE 802.3 CSMA/CD	
VLAN support	IEEE 802.1Q, QinQ 802.3ad	
Traffic Classification	Layer 2	IEEE 802.1p
	Layer 3	IP TOS according to RFC791, DSCP according to RFC2474
	Layer 4	UDP/TCP destination port range
Traffic Prioritization	WLP – Wireless Link Prioritization, supporting two types of services (high/low priority)	
Security	WEP 128-bit authentication AES 128 FIPS-197	

## Indoor to Outdoor Communications

### Subscriber and Base-Station

Cable Type	Category 5E, Outdoor Data Cable, Double Jacket, 4x2x24# FTP
Maximum Length (PC – ODU)	100 meter ( Maximum 90m of IDU-ODU cable)

### Interfaces

Unit	Connector	Description
SU-E-ODU	ANT	N-Type jack, 50 ohms, lightning protected
	IDU-COM	<u>CPE</u> : 10/100BaseT Ethernet (RJ-45), protected by a sealing cap
IDU (for SU or BS-SA)	ETHERNET	10/100BaseT Ethernet (RJ-45) Cable connection to a PC: crossed Cable connection to a hub: straight
	RADIO	10/100BaseT Ethernet (RJ-45); NON standard POE
	AC IN	3 pin AC power plug
BS-AU	10/100BaseT	10/100BaseT Ethernet (RJ-45) with 2 embedded LEDs. Cable connection to a PC: crossed Cable connection to a hub: straight
	RADIO	10/100BaseT Ethernet (RJ-45) with 2 embedded LEDs
AU-ODU (Modular BS, or BS-SA)	<u>INDOOR</u>	10/100BaseT Ethernet (RJ-45), protected by a waterproof sealing assembly
	<u>ANT</u>	N-Type jack, 50 ohm, lightning protected
BS-PS-AC	<u>AC-IN</u>	3 pin AC power plug
BS-PS-DC	<u>-48VDC</u>	3 pin DC D-Type 3 power pins plug Amphenol 717TWA3W3PHP2V4RRM6
Antenna	<u>RF</u>	N-Type jack, 7-16 DIN connector

## Electrical

### Subscriber Unit

Unit	Details
Power Consumption (IDU+ODU)	Typical maximum 25W (absolute Maximum 55W)
IDU Power Input	AC power input: 85-265 VAC, 50-60 Hz
ODU Power Input	55 VDC from the IDU over the indoor-outdoor Ethernet cable

### Modular Base Station Equipment

Unit	Details
Power Source	-40.5 to -60 VDC
Max Power Consumption	240W max. for a fully equipped chassis (1 PS, 6 AU)
BS-PS-AC	AC power input: 85-265 VAC, 47-65 Hz DC power output: 55 V; 3.3 V
BS-PS-DC	DC power input: -48 VDC nominal (-34 to -72), 10 A max DC power output: 54 V; 3.3 V
BS-AU	3.3 VDC, 54 VDC from the power supply module(s) via the back plane
AU-ODU	54 VDC from the BS-AU over the indoor-outdoor Ethernet cable
AU-E-BS (IDU+ODU)	Power consumption: 30W

### Stand-Alone Base Station Equipment

Unit	Details
Power Consumption (IDU+ODU)	25W
IDU	AC power input: 85-265 VAC, 50-60 Hz
AU-ODU	55 VDC from the IDU over the indoor-outdoor Ethernet cable

## Mechanical

Product	Dimensions (cm)	Weight (kg)
SU-E-ODU (rev F)	22 x 22 x 7	1.3
IDU	14 x 6.6 x 3.5	0.3
BS-SH	13 x 48.2 x 25.6	4.76
BS-PS-DC	12.9 x 7.0 x 25.3	1.2
BS-PS-AC	12.9 x 7.0 x 25.3	1.2
BS-AU	12.9 x 3.5 x 25.5	0.15
AU-ODU pole or wall mountable	30.5 x 11.7 x 5.7	1.5
AU-Ant-0.9G-V/H-10-90 1.75"-4" pole mountable, up to 15 ° mechanical tilt	122 x 34.3 x 20.3	15.4
AU-Ant-0.9G-7-Omni Pole mountable	244 cm high, 3.3 cm base diameter	1.8
Networking gateway CPE indoor module	11.1 x 2.6 x 19	0.6
Voice Gateway	17.6 x 11 x 2.8	0.23

\* 1U=44.45 mm (1.75")

## MTBF

Product	Description	MTBF
<b>Base Station</b>		
BS-SH	Modular Base Station Shelf. 19" rack (3U) or desktop	N/A
BS-PS-DC	Base Station DC Power Supply Unit	
BS-PS-AC	Base Station AC Power Supply Unit	254,120
BS-AU	Base Station Indoor Access Unit	1,667,502
AU-ODU	Base Station Outdoor Unit, Pole or wall mountable	418,600
<b>CPE</b>		
IDU	Subscriber Indoor Module with one 10/100 Base-T Data Port	1,119,151
SU-E-ODU	Subscriber outdoor unit, Diamond shaped metal box plus a plastic enclosure, pole or wall mountable	418,600
Network Gateway	Networking Gateway Indoor module with four 10/100 Base-T Ports + 802.11g wireless interface	>300,000
Voice Gateway	Voice Gateway Indoor module with one 10/100 Base-T Data Port + one or two RJ11 POTS Port (H.323 or SIP P/N).	> 300,000

## Environnemental

	Indoor Unit	Outdoor Unit
Operating Temperature	0°C to 40°C	-40°C to 55°C
Operating Humidity	5%-95% non condensing	5%-95% non condensing, weather protected

## Standard Compliance

Type	Standard
EMC	FCC Part 15 class B
Safety	UL60950-1
Environmental	ETS 300 019 2-1 class 1.2E – storage 2-2 class 2.3 - transportation part 2-3 class 3.2E for indoor part 2-4 class 4.1E for outdoor
Radio	FCC Part 15.247
Lightning Protection (outdoor Antenna connection)	EN 61000-4-5, Class 3 (2kV)
MTBF	Bellcore SR332 Issue 1

## Networking Gateway CPE

General Features	
Routing	Static Route, Dynamic Route (RIP1/2)
Firewall	NAT Firewall with SPI mode
NAT Functionality	NAT, Virtual Server, Special Application DMZ Host
VPN	IPSec, PPTP & LT2P Pass-Through
DHCP	DHCP server for LAN and WLAN clients. DHCP client for WAN
Wireless Features	
Standard	IEEE 802.11b / 802.11g
Data Rates	6/12/18/24/36/48/54Mbps in 802.11g mode 1/2/5.5/11Mbps in 802.11b mode
Operating Frequency	0.9GHz
Range Coverage	Indoors - approx. 35-100 meters
Number of Channels	America/ FCC: 905~925MHz (16 Channels)
Security	WEP, AES, FIPS

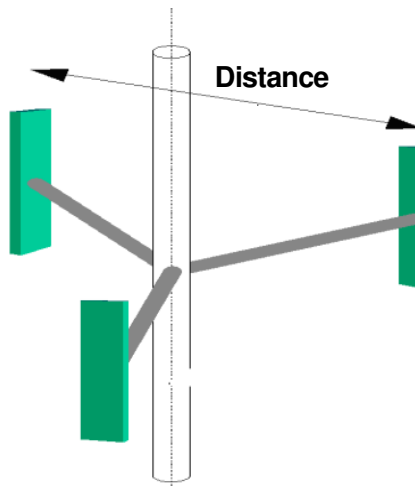
## Voice Gateway CPE

<b>Interfaces</b>	
Ethernet LAN	1 10/100 Base-TX RJ45 connectors
Telephony	1 or 2 RJ11 connectors for analog telephones
Ethernet WAN (copper)	10/100 Base-TX RJ45 connector
<b>Security</b>	
VLAN	Separates data, management and telephone traffic
Authentication per call	H235
<b>Telephony and fax services</b>	
VoIP Protocol	H.323, SIP
Internal Class 5 services	Call Waiting, 3-party call, call alteration, differentiated ringing tones
External Class 5 services	Activation of class 5 services supported by the IP-telephony system
G3 Fax	T.38
Calling number identification	FSK, DTMF
3rd party initiated pause and rerouting	External rerouting of media stream during speech, e.g. for pre-paid calling card and record announcement
DTMF	In-band and out-band using H245 and H225 bi-directional
<b>QoS for real-time services</b>	
Speech Codecs	G711(support alaw & ulaw), G729ab
DiffServ	Level 3 (IP) mechanism for handling QoS
Class of Service	Level 2 (Ethernet) mechanism for handling QoS
General	Adaptive Jitter buffer, echo cancellation, speech sampling 10-60 ms, silence suppression with comfort noise.
<b>Flexibility &amp; Service differentiation</b>	
Daisy chaining	Up to 3 DRG units can be connected in series by daisy chain
Number of telephones	Up to 5 analog telephones can be connected in series to each telephone port
Regional Settings Properties	Telephony signals, tones and cadences
<b>Protocols and Standards</b>	
Complies with the following standards	IPv4, TCP, UDP, RTP, DHCP, RTCP, SNMP, IEEE 802.1D, IEEE 802.1Q, IEEE 802.1P, IEEE 802.2, IEEE 802.3, ICMP, HTTP, TFTP, NTP, H323v2/4, SIP (RFC3261), G.711, G.729ab, G.723.1, G.165, G.167, G.168, G3, FSK, DTMF

## Radio Network Planning

### 3 Sector Installations

- Typical 3 sectors tower installation:
  - must be minimum 10m above the ground or from any formation, that may interfere excluding the mast / antenna tower



- The collocated units must work with minimum Noise Floor levels like in the table bellow

Antenna	Horizontal Separation		
	Distance 2m	Distance 3m	Distance 5m
<b>Guard Band</b>	<b>10Mhz</b>	<b>10MHz</b>	<b>10MHz</b>
Andrew 65° VP	-102	-102	-102
Tiltek 90° VL	-94	-98	-102
Tiltek 90° HP	-92	-96	-100

Minimum Noise Floor Settings [dBm]