
BreezeACCESS VL

BreezeACCESS VL 900 Release 5.5M

Version 5.1.25

Release Notes

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1 Scope

This document details the main features, known limitations, and other important notifications with respect to BreezeACCESS VL 900 product release 5.5M. It corresponds to software versions:

- VL-900-AU software version 5.1.25
- VL-900-SU software version 5.1.25

BreezeACCESS VL 900 release 5.5M is supported starting from Device Driver version 2.6.0.13 of AlvariSTAR and AlvariCRAFT.

AlvariSTAR DD 2.6.0.13 version has to be installed on AlvariSTAR infrastructure platform version 3.2.3.5

2 Introduction

BreezeACCESS VL 900 release 5.5M introduces enhanced product capabilities in the 900 MHz frequency band in accordance with FCC regulations, as well as some new features. This document provides a summary of the new products and features. For detailed information please refer to the applicable sections in the System Manual and Country Codes documents.

3 Frequency Band and Country Code (Regulatory Domain)

The products introduced in this release (HW Revision F for SU, HW Revision G for AU) uses Country Code - FCC 900 MHz, supporting operation in the 900 MHz frequency band (902-928 MHz) with 5 MHz channels and frequency resolution of 1 MHz.

For compliance with regulatory requirements, the Maximum EIRP in this band is 36dBm, for details of maximum output power per modulation at antenna port please refer to section 4.5.

4 Available Products

With Release 5.5M, enhanced HW capabilities are introduced in the BreezeACCESS VL 900 family, (for more details please refer to following sections), these implies the following PN replacement and new PN introduction as listed below:

4.1 Modular Access Units:

New P/N	Replaced P/N	Name	Description
809810	809710	AU-E-BS-900-VL	BreezeACCESS VL Access Unit. Package includes stand alone Indoor Network Interface for chassis + Outdoor radio unit, 902-928 MHz supporting 5MHz channel OFDM. Antenna, antenna jump cable and indoor to outdoor CAT-5 cable are NOT INCLUDED (cable PN: 811593).
809811	809711	AUS-E-BS-900-VL	BreezeACCESS VL Access Unit. Limited to 8 SUs (SU-3 and/or SU-8). Fully upgradeable to standard AU. Complete access unit kit, includes: stand alone Indoor Network Interface for chassis, Outdoor radio unit, 902-928 MHz supporting 5MHz channel OFDM. Antenna, antenna jump cable and indoor to outdoor CAT-5 cable are NOT INCLUDED (cable PN: 811593).

4.2 Stand-Alone Access Units:

New P/N	Replaced P/N	Name	Description
809812	809712	AU-E-SA-900-VL	BreezeACCESS VL Access Unit. Package includes stand alone Indoor Network Interface + Outdoor radio unit, 902-928 MHz supporting 5MHz channel OFDM. Antenna, antenna jump cable and indoor to outdoor CAT-5 cable are NOT INCLUDED (cable PN: 811593).
809813	809713	AUS-E-SA-900-VL	Standalone access unit base station. Limited to 8 SUs (SU-3 and/or SU-8). Fully upgradeable to standard AU. Complete access unit kit, includes: stand alone indoor network interface, outdoor radio unit, 902-928 MHz supporting 5MHz channel OFDM. Antenna, antenna jump cable and indoor to outdoor CAT-5 cable are NOT INCLUDED (cable PN: 811593).

4.3 Subscriber Unit:

New P/N	Replaced P/N	Name	Description
809702	809701	SU-E-900-3-BD-VL	Outdoor Subscriber Unit for detached antenna. Includes: Indoor Network Interface Unit, Power supply, Outdoor radio unit with N type antenna port, 902-928 MHz OFDM, Full Data Bridge 3Mbps upgradeable to 8Mbps with PN 858178. Antenna, antenna jump cable and indoor to outdoor CAT-5 cable are NOT INCLUDED.

4.4 License Upgrade:

P/N	Name	Description
858178	SU-3 to SU-8 upgrade	Upgrade SU-3 to SU-8

4.5 Base Station Antennas:

Part Number	Antenna	Description	Deployment Scenario
990008	Omni-7-900	Omni, 7dBi typical, 902-928 MHz, 360° AZ x 17° EL, vertical polarization , N female connector, mounting hardware included	<ul style="list-style-type: none"> ○ Single sector full coverage
300710	ANT.BS, 806-960 MHz, 65V, 16dBi	Sectorial Antenna, 65 deg. Vertical polarity. 902-928 MHz. 62° AZ x 15.5° EL, Terminating connector: DIN716	<ul style="list-style-type: none"> ○ Single sector partial coverage ○ Two sectors partial coverage ○ Three sectors full coverage
300712	ANT.BS, 870-960 MHz, 120V, 13dBi	Sectorial Antenna, 120 deg. Vertical polarity. 870-960 MHz. 120° AZ x 14° EL, Terminating connector: DIN716	<ul style="list-style-type: none"> ○ Single sector partial coverage

4.6 Subscriber Antenna:

P/N	Name	Description
300711	ANT.SUB, 902-928M, 10dBi, FLAT	Subscriber Antenna, 902-928 MHz, 10dBi Flat panel, V/H Polarization, 50° AZ x 60° EL, N female connector

5 New Features and Improvements

5.1 Improved AU HW to support better channel separation

With release 5.5.M a new AU HW revision is introduced for the VL-900 family

The new AU HW (Rev G) brings improved collocation capability by introducing an internal filter for channel separation. On HW rev G the Alternate Channel Rejection was improved by 24dB (from 38dB to 62dB) allowing a simple installation of 3-sector base station using 65 degrees antennas without changing any other parameter of the unit.

The ACI values for HW rev F and HW rev G are:

ACI	HW rev F	HW rev G
Adjacent channel (5Mhz)	29dB	29dB
Alternate channel (10Mhz)	38dB	62dB

5.2 Extended tolerance in HW (AU and SU) to support larger input signals

For both AU (rev G) and SU (rev F) the immunity to high level input signals was improved.

5.3 Improved Adaptive Modulation (Multi-Rate) Mechanism

The new mechanism for Adaptive Modulation is designed to always pick the modulation that will improve the throughput. The new concept is based on statistics on different modulations and picking the highest rate with highest probability for success.

The new mechanism enhances the previous adaptive mechanism (which was based on RSSI/SNR only), by introducing statistics collection and maximizing performance function without introducing additional packet or frames drops.

The new Multi-rate has several tuning parameters that control the adaptation speed. More details can be found in the System Manual

5.4 Clear Channel Selection and Noise floor Selection

With release 5.5M a new channel selection mechanism is implemented on VL-900

The mechanism is designed to offer the user the capability of selecting the right operating channel and to set the right noise floor, hence simplifying significantly the installation process experience (previously based only on spectrum analyzer)

The new feature is collecting the channel occupancy and the interference level for each channel and selects the optimal solution based on two criteria:

- Optimizing the Performance for a given distance (i.e. 1.4Km)
- Optimizing the Distance for a given throughput (i.e. 3Mbps)

Optimization process is using a basic default configuration which is generating the maximum performance at 1.4Km or the longest possible distance for 3Mbps

For normal operation of the feature, the user is required to configure the deployment scenario:

Non Line Of Sight (NLOS)	When there is no direct visibility between the AU and SU in most of the deployed SUs in the sector
Near Line Of Sight (nLOS)	When visibility between the AU and SU is partially blocked in most of the deployed SUs in the sector
Line Of Sight (LOS)	When there is clear visibility between the AU and SU in most of the deployed SUs in the sector

As a result, the feature will choose one channel and a matching value of the Noise floor which meets the desired criteria. Additionally the unit will report recommended values for all other channels.

Advanced configuration is available for expert control over these values, it is recommended to practice caution when altering the advanced configuration as manipulation of advance settings may resolve in non-optimal conditions

On SU side the same mechanism will generate only recommended Noise Floor values for the CPE on all available channels. However, this feature is not so important for SU side, as in most cases CPEs are being installed at lower heights, thus exposed to less interferences

5.5 New Maximum TX power rules versus Maximum Modulation

Version 5.1.25 is improving the overall system performance by introducing a new Maximum TX power control mechanism based on the configured Maximum Modulation. The new mechanism insures that the Tx power difference does not exceed the maximal 5dB difference imposed by HW and thus eliminating the need of RTS, resulting in maximizing the sector throughput in all modulations while still maximizing the TX power.

The relation between the "Maximum Modulation", and resulting maximum TX power per modulation is presented in the table below

Max Mod	TX power per modulation							
	8	7	6	5	4	3	2	1
8	19 dBm	20 dBm	22 dBm	23 dBm	23 dBm	23 dBm	23 dBm	23 dBm
7		20 dBm	22 dBm	24 dBm	24 dBm	24 dBm	24 dBm	24 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

6 Documentation

BreezeACCESS VL documentation includes the System Manual for BreezeACCESS VL version 5.1.25 and related documents, installation support documents, and this release notes. For the most updated documentation please refer to the customer service section of the Alvarion web site.

Note that although the documentation covers all BreezeACCESS VL bands and Country Codes, SW Version 5.1.25 is currently available only for units in the 900 MHz band using FCC 900 MHz Country Code.

7 Important Notes

- Although minimum output power is defined as -10 dB when configuring the Tx Power manually, when ATPC is enabled the SU's output power may be less than this minimum.
- Extra care should be taken when configuring VLAN management and management IP filtering in order not to lose connectivity with unit. In case of connectivity loss, use the "restore default parameters" application to reset to factory values.
- In case data encryption is used, the maximum number of SUs that can be served by an AU is limited to 124 (512 when data encryption is not used). Note that when data encryption is needed, it must be used by all SUs served by the same AU, as well as by the AU itself. The Maximum Number of Associations in the AU must be set to 124 or lower to enable data encryption. As long as data encryption is enabled, the Maximum Number of Associations cannot be set to a value higher than 124.
- When Wireless Link Prioritization feature is activated the prevention of Low Priority Traffic Starvation is automatically disabled.
- Remote changes of the Maximum Modulation Level in an SU while Adaptive Modulation is disabled may lead to loss of connectivity with the unit. The recommended workaround is to enable Adaptive Modulation, reset the unit to apply the change, and then change the Maximum Modulation Level.
- Adaptive Modulation may not converge to best modulation in some setups with high variance in noise levels. In these cases better performances may be achieved with manual modulation settings (Adaptive Modulation Disabled).
- When using the Q-in-Q feature the units can be managed by a management station behind the AU only if the following conditions are met:
 - The unit can be managed only with tagged frames: VLAN ID – Management must be other than 65535 (None).
 - To enable proper management, all units in a cell (the AU and all SUs served by it) must use the same VLAN ID - Management.
 - The VLAN ID – Management must differ from the Customer's VLAN ID - Data.

- Using FTP to put/get some files into/from the units might fail. However, the operation will succeed after several trials. In such cases it is recommended to use TFTP for the same file transfer.
- SNMP management was checked with SNMPC version 5.1.11e.
- AlvariCRAFT configuration tool is available on the CD.
- If upgrading from SW 5.1.7 to 5.1.25 or higher, it is recommended to use the following procedure:
 - Upgrade the unit using the usual procedure
 - Re-apply the Country Code (see the document “BreezeACCESS Family Country Codes” available on the CD)
- When upgrading a VL-900 unit from SW version 5.1.7 to 5.1.25
 - Although Country Code needs to be re-applied to benefit on all changes, using the old Country Code definition (0.5Mhz channel separation) has the following result: frequency configured would be rounded down
 - The RTS threshold on AU is not automatically changed from 60 to 4096. It is recommended to do it manually
 - The Maximum TX power will automatically be updated to the new rules considering Maximum Modulation level.
- With version 5.1.25 the RTS/CTS frames are exchanged in modulation 1
- Starting with version 5.1.25, the Wireless Link Prioritization (WLP) menu is available by default and without any additional license.
- Spectrum Analysis might display NF values of 0 on channels with very high continuous interference, because the unit is not able to calibrate the NF. This might occur together with unusually high values of Signal Width (over 200 microseconds).
- Adaptive Noise Immunity - unlike other VL family products, the VL900 Noise Immunity State Control is set to Manual by default and Automatic setting is not available.

- Unlike other VL family products, the VL900 Noise Floor Calculation Mode cannot be set to Fully Automatic and is set by default to Automatic with Minimum Value.

Interference Mitigation

- Interference Mitigation (automatic noise floor and channel selection) introduced with release 5.1.25 may result in suboptimal results as per the selected optimization parameters and their match to actual deployment scenario. Therefore, the algorithm, while it offers good results in most setups, is not guaranteed to make the best decision in each and every condition. It is recommended to use the Interference Mitigation results as a good starting point, but subsequent tuning may be necessary to achieve the maximum possible performance.
- Interference Mitigation default values are selected in order to give optimal results in typical setups. Therefore, it is recommended to run Clear Channel Select and/or Noise Floor Select using the default values. Proceed with care if modifying any of the values and make sure the affect of the change is well understood.
- When running Clear Channel Selection on VL-900 AU units with values other than Default, the result may be picking a channel with very low noise floor or one with very high noise floor depending on the parameters configured.
- It is not recommended to use either very high or very low values for Minimum Desired Performance or Minimum Desired Distance, as this can result in suboptimal results or no suitable solution.
- Reading the Event Log after each Interference Mitigation run can be useful, because it displays the details and conclusion of the CCS/NFS process.
- While Interference Mitigation is active, the Spectrum Analysis results table in AlvariCRAFT starts displaying irrelevant values. This behavior ends once the Interference Mitigation process is over, after which Spectrum Analysis in AlvariCRAFT resumes display of the values stored in the results table prior to running Interference Mitigation. This behavior is only present in AlvariCRAFT and it does not occur when accessing via telnet.
- For channels where no suitable solution was found because of high noise levels, the displayed values for NF, Distance and Performance will be 0.
- During Interference Mitigation, if more than 100.000 events are picked up on one channel, the scanning process will automatically move to the next channel in the Frequency Subset list, regardless of the duration configured in Channel Scan Period option.

- If the unit finds over 100.000 events on most or all channels, the outcome might be unreliable, because it does not perform a fair comparison between different channels. This means that the entire spectrum is heavily interfered. In this case, it is recommended to decrease the Channel Scan Period and re-run Interference Mitigation.
- Interference Mitigation should not be activated on the AU when Active Scanning is enabled on the SUs. Otherwise, this will generate unwanted interference to the AU performing the scan, resulting in lower estimated performance and distance.
- When using AlvariCRAFT, the Interference Mitigation menu is only available on the AU. The reason is that, on the SU side, it should only be used in special cases, like, for example, when the DL SNR is good but the performance is low only for a particular SU in the sector.

8 Limitations

- Sensitivity may change slightly as a function of frequency (+/-2dB).
- Transmission power accuracy is +/-1dB above 8dBm @ antenna port (typical condition). At lower levels the accuracy is +/-3dBm, never contradicting regulations. At very low levels the use of ATPC may cause significant fluctuations in the power level of the transmitted signal. When operating at such low levels, it is recommended to disable the ATPC Option in the SU and to set the Transmit Power parameter to the average Tx Power level before the ATPC was disabled.
- When encryption is used by the Authentication Algorithm (Shared Key option), in large cells (more than 80 SUs) the association process may be relatively long.
- The Country Code Learning by SU feature does not function with the default ESSID (ESSID1).
- MAC Address Deny/Allow List supports maximum 100 entries.
- Calculated distance in 5MHz channels might not be accurate when very long ESSID strings are used. The presented distance may be higher than the real one. It is preferred to keep the ESSID short (up to 10 characters).
- The character “;” (semicolon) is a reserved character. It should not be used in defining any string parameters (unit name, ESSID, etc) since the string will be cut before the semicolon.
- If you are using the Feature Upgrade option in Telnet to enter a license string using copy and paste operation, check carefully that the string is copied properly. You may have to enter it manually due to potential problems in performing copy/paste in Telnet.
- It is not recommended to force the Noise Floor to more than 15-20dB above the measured value. This might affect the SNR calculation (showing much higher values) for signals that are up to 10dB above the new Noise Floor Forced Value.
- When operating in noisy environments it is recommended to manually tune the Noise Immunity Control mechanism.

- ANI – unlike other VL family products, the VL900 ANI register are disabled by default.
- Attempting to set the Noise Immunity State Control to Automatic using AlvariCRAFT will return an Agent Exception error.
- BreezeACCESS VL 900 system is designed to operate in clear line-of-sight link conditions. However, operation in near-line-of-sight or non-line-of-sight conditions can be achieved at shorter distances and certain favorable path propagation conditions; given link performance degradation is accepted. Signal quality at longer distances and/or through severe obstructions can be seriously degraded, up to the point where a link cannot be obtained.
- If Noise Floor Level setting on the AU is high, an SU might not be able to associate even if the downlink SNR is good. This is because higher the NF value in the AU will result in shorter coverage distance. ($RSSI=SNR+NF$)
- Combining Best AU and Automatic Noise Floor Selection should be done cautiously since Best AU selected (max RSSI) may not be in the SNR range as implied by the Automatic CCS/NFS Noise Floor level.
- Cold start – When starting the VL system in extremely low temperature ranges (close to -40°C), the units might achieve maximum performance after a period of time of about 5 minutes. In rare cases, some VL units might require a restart for the radio to operate, 5 minutes after starting up in extremely cold weather.
- Detailed review of the *VL 900 Installation Application Note* is mandatory in order to perform a correct and efficient unit installation.