



BreezeACCESS VL®

Implementation Guidelines v1.0

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Introduction

This document provides an overview of the system planning and design guidelines required to insure a successful implementation and installation of BreezeACCESS VL fixed broadband wireless system. The BreezeACCESS VL is a high capacity system operating in the 5.8 GHz unlicensed spectrum, utilizing OFDM modulation and intended for cellular-like deployment, utilizing flexible and scalable system architecture and network planning scenarios.

General Radio technology parameters

The BreezeACCESS VL utilizes a Half Duplex Time Division Duplex radio access method based on OFDM (Orthogonal Frequency Division Multiplexing) modulation technique with an IEEE 802.11a alike wireless protocol.

The radio spectrum used is 5.725GHz to 5.850 GHz, where each radio channel occupies 20MHz of bandwidth and has 10MHz steps.

The transmit RF output power can be controlled between the range of -10dBm to 21 dBm with 1db resolution.

Modulation level	1	2	3	4	5	6	7	8
Modulation type	BPSK	BPSK	QPSK	QPSK	16QAM	16QAM	64QAM	64QAM
Sensitivity (dBm)	-88	-87	-86	-84	-81	-77	-72	-70



Minimum Distance Restriction

As the OFDM modulation/de-modulation is based on acquiring the amplitude and the phase of the signal, high-end linear RF amplifiers are used. This means that very high power input signal to the receiver of any BreezeACCESS VL unit will cause saturation and should be avoided at all cost.

The RF signal strength at the antenna port should be **lower than -40 dBm or SNR of 50**.

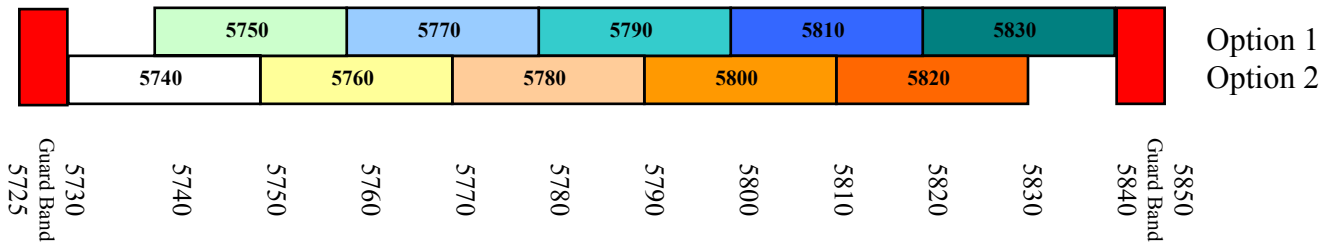
In order to avoid SU saturation the **minimum distance** that SU can be installed is **300 meters or 1,000 ft**. As a rule of thumb, if SU is located at a shorter than the distance stated above, it is recommended to **up-tilt the SU antenna by 10° to 15°** .

LAB or very short distance testing recommendations

- Set the output power of all units to -10 dBm.
- Use external RF attenuator of at least 20 dB on the AU.

Frequency Planning

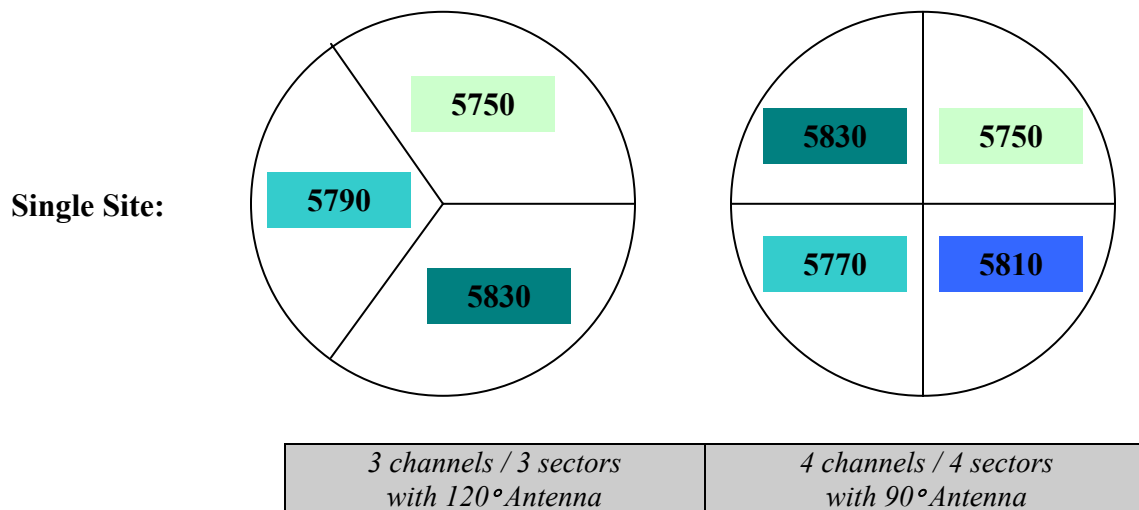
The Diagram below represents the available bandwidth and the supported channel configuration in the BreezeACCESS VL product. The frequency configuration is represented by the central frequency of a channel always occupying 20MHz.



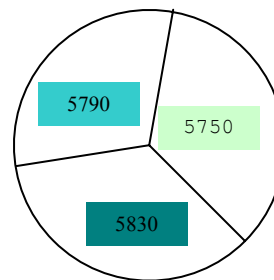
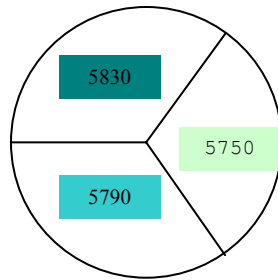
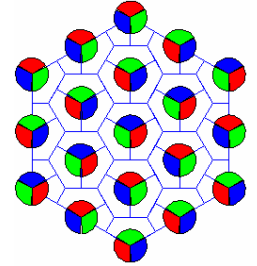
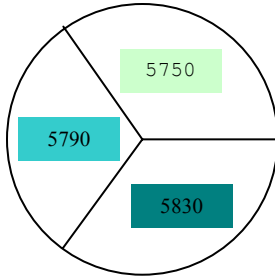
The maximum amount of co-located Access Units in a Base Station with **non-overlapping channels** is **5**. This can be achieved by selecting either option 1 or option 2.

The maximum amount of co-located Access Units in a Base Station with **overlapping channels** is **10**. This can be achieved by selecting both option 1 and option 2. This option will cause degradation in the overall performance.

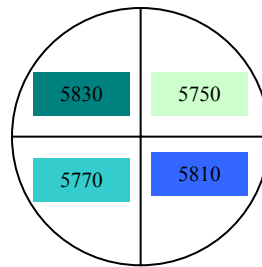
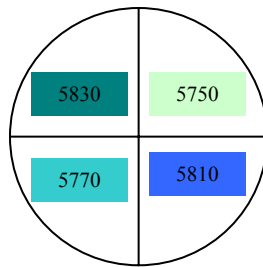
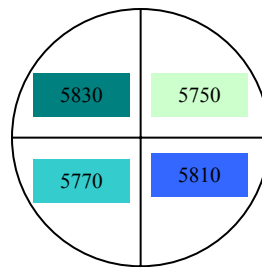
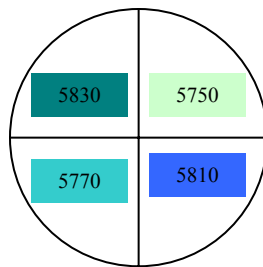
Single Base Station Configurations:



Multiple Base Station Sites:



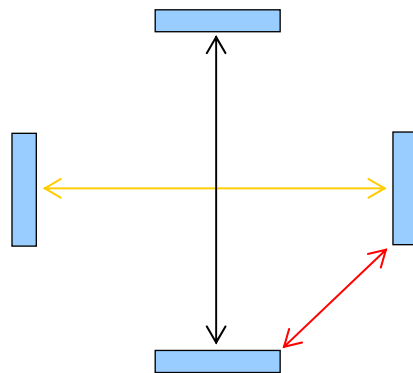
3-sector Base station



4-sector Base station

Deployment Recommendations

- Maintain at least 40 MHz between adjacent sectors if possible.
- Maintain at least 40 MHz between co-located AUs pointing the same direction if possible.
- Maintain at least 2 meters or 6 feet between the edges of adjacent sector antennas.
- Maintain at least 5 meters or 16 feet between the edges of back-to-back antennas.



- When the Best AU feature needs to be used, configure every AU with unique ESSID and set a common Operator ESSID to all Access Units. All SUs should be set with the Common ESSID, all the frequencies should be defined for use and Best AU should be enabled.
- When 1 to 4 Base station sites are deployed it is recommended to use 3 sector/ 3 channels scenario with 120° sector antennas.
- When more than 4 Base station sites are deployed it is recommended to use 4 sector/ 4 channels scenario with 90° sector antennas or the 6 sector/ 6 channels scenario with 60° sector antennas.
- Depending on the terrain and base station height it is recommended to down-tilt the BS antennas in order to concentrate the amount of RF energy only in the serviced area and diminish inter-base station interference. Anywhere from 3 to 10° is commonly used and it directly depends on the intended area of coverage.



Point to Point Recommendations

- Use high-gain antennas in order to concentrate the RF energy to the other point.
- Leave the Compensation parameter to disabled in case no interference is present otherwise set the appropriate distance matching your link distance.
- Set the SU RTS parameter value to 1600.
- Set the AU AIFS parameter value to 1.
- Set the CW parameter on both sides to 0.

Point to Multi-Point Recommendations

- Set the Maximum Cell Distance parameter in the AU according to the longest link. If new SUs are added over time, that exceeds the maximum distance, do not forget to reconfigure the Maximum Cell Distance setting.
- In case all the Subscriber Units are evenly located around the same distance from the AU, setting the Maximum Cell Distance parameter to disabled may improve the maximum achievable performance.
- It is recommended to avoid mixture of SUs located at very long and very short range from the AU, in order to improve the maximum achievable performance.