



Frequently Asked Questions about the MBW Series





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Q How far can the MBW series cover?

A Since MBW devices use the unlicensed 2.4 GHz and 5 GHz spectrums, the coverage depends upon the environment at the mounting location. The following tables list the average coverage for both the 2.4 GHz and 5 GHz spectrums by environment type, assuming a noise level of -95 dBm or greater and an LOS connection:

Table 1: 2.4 GHZ and 5 GHz Coverage

Environment	Average Coverage
Dense urban	200 meters (650 feet)
Urban	300- 500 meters (950 -1600 feet)
Suburban	600-800 meters (2000 – 2500 feet)
Rural	800- 1200 meters (2500 – 4000 feet)

Q Which channels does the MBW series support?

A The following tables list which 2.4 GHz channels are supported by the MBW series' access interface and which 5 GHz channels are supported by the MBW series' mesh interface. Channels are listed by channel number and by minimum, central, and maximum frequencies.

Table 2: 2.4 GHz (Access) Channels Supported

Channel	Minimum Frequency (MHz)	Central Frequency (MHz)	Maximum Frequency (MHz)
1	2401	2412	2421
2	2406	2417	2428
3	2411	2422	2433
4	2416	2427	2438
5	2421	2432	2443
6	2426	2437	2448
7	2431	2442	2453
8	2436	2447	2458
9	2441	2452	2463
10	2446	2457	2468
11	2451	2462	2473

Table 3: 5 GHz Channels Supported

Channel	Minimum Frequency (MHz)	Central Frequency (MHz)	Maximum Frequency (MHz)
149	5735	5745	5755
153	5755	5765	5775
157	5775	5785	5795
161	5795	5805	5815
165	5815	5825	5835

Q Is interference likely to be an issue when other 2.4 GHz devices (such as an MW DX transmitter) are mounted near the MBW base stations?

A Yes. If you are mounting MBW base stations nearby to other 2.4 GHz or 5 GHz devices, you need to carefully plan which access and mesh channels to use before installation.

Q If I have multiple devices in close proximity to one another, how far apart should I space their access channels?

A In order to avoid Adjacent Channel Interference (ACI) and Co-Channel Interference (CCI), GO Net Systems recommends configuring the access interfaces of nearby devices for access channels that are 25 MHz (5 channels) apart from one another. Preferably, if you have 3 devices within close proximity, you should configure one device to use channel 1, the second device to use channel 6, and the third device to use channel 11. If that is not possible, any channels that are 5 channels apart from one another are acceptable.

Q How far apart should we separate multiple devices that are mounted in the same tower?

A Since the antenna gain is greatly affected by its horizontal and vertical clearance, GO Net Systems does not recommend mounting multiple devices in the same tower or on the same pole. If you choose to do so, you should adhere to the following minimum requirements. When mounting MBW 2000 series base stations, you should allow at least 1.5 m (5 ft) of horizontal space and at least 5m (25 ft) of vertical space. When mounting MBW 1000 series base stations, you should allow at least 5 m (25 ft) of vertical space, and the base stations should be mounted on the same vertical line (i.e. one above the other). When mounting MBW 500 series base stations you should allow 5 m (25 ft) of vertical space and 5 m (25 ft) of horizontal space.

Q How many mesh nodes can connect to a single mesh gateway?

A Each mesh unit can support up to 10 mesh connections.

Q How many end users can connect to one MBW base station?

A Each access channel supports up to 80 associated end users. The MBW-2000 series is equipped with 2 access channels and it supports 160 associated end users. The MBW-1000 series and MBW 500 series are each equipped with one access channel and they support 80 associated end users.

Q Can an MBW base station operate as a point-to-point (PTP) connection, a point-to-multipoint (PTMP) connection, an Access Point (AP), and as a Client Bridge?

A Yes. MBW base stations transparently pass PTP, PTMP, and AP functionality.

Q Does the MBW series support direct coverage/roaming for client devices?

A The MBW series supports roaming, but performance depends on the capabilities of the client device.

Q How fast is the shift between base stations when roaming?

A Since MBW base stations are L2 devices, the system supports fast roaming. The exact roaming time, however, is difficult to determine. Although, in general, MBW base stations' use of beam-forming technology enables faster roaming than our competitors, since the IEEE has not yet released a standard for roaming, and since roaming is extremely client dependent, the exact roaming time varies widely from scenario to scenario.

Q Are there any plans to support a roaming standard in the near future?

A The roaming standard, 802.11r, is currently under review by the IEEE. When the standard will be released, existing base stations will be enabled to support it via a software upgrade.

Q How can we configure our network to support roaming?

A Client devices using MBW devices can roam between any two devices that share the same SSID. Once the two devices are set to the same SSID, no other configuration or end-user action is required. It should be noted, however, that it is not possible to force a client device to roam from one base station to another; when and to which base station a client device roams is determined entirely by the client-device.

Q Does the MBW series support QoS priority tagging for delay-sensitive data, such as IP-TV or video conferencing?

A Yes. The MBW series supports WMM QoS.

Q Can the MBW series assign higher priority to high-bandwidth applications?

A Yes. The MBW series enables you to allocate bandwidth per client and per SSID. This enables you to vary the services provided based upon the customer's bandwidth requirements.

Q What are the minimum latency, the average latency, and the maximum latency for a client device when communicating with an MBW base station?

A The exact latency depends on the air occupancy and the client device. Field experience has shown that the latency can vary from 1 millisecond to 100 milliseconds.

Q Do MBW base stations provide 360 degree access coverage?

A The MBW 500 and MBW 1000 series are equipped with omni directional access antennas and the MBW 2000 series is equipped with a 120 degree directional access antenna. You can achieve omni directional coverage using MBW 2000 series base stations by mounting 3 base stations on the same roof, each pointing in a different direction.

Q What happens when a client device is in an area of overlapping coverage between two base stations?

A The client will always roam to the best available base station.

Q How many antennas do MBW base stations have?

A The MBW 2000 series comes equipped with 2 internal access radios, including internal antennas, and an external mesh radio with an external R-TNC antenna connector.

The MBW 1000 series comes equipped with 4 external access antennas supporting xRF technology and 1 omni directional mesh antenna. The antenna that comes with the MBW 1000 series can optionally be replaced with a different mesh antenna.

The MBW 500 series comes equipped with 1 external omni directional access antenna and 1 external omni directional mesh antenna. The antennas that come with the MBW 500 series can optionally be replaced with different access and mesh antennas.

Q Are GO Net Systems networks protected from Denial-Of-Service attacks?

A The mesh backhaul is fully protected against non-GO Net Systems units. Regarding the client access, the level of protection depends upon the security method used. When using 802.1x, a base station will not allow frames to pass without successful authentication. When open SSIDs are used, the operator can install a Captive Portal for authentication. When WPA-PSK security is used, any user who does not know the encryption key is denied access.

Q Are GO Net Systems networks protected from Man-in-the-Middle attacks?

A Whether or not a specific network is protected from Man-in-the-Middle attacks depends upon the security scheme and authentication mechanism that is used. 802.1x fully protects against Man-in-the-Middle attacks, as does a Captive Portal mechanism using authentication certificates. When standard open-access Captive Portal techniques are used, the network is not protected from Man-in-the-Middle attacks.

Q Do GO Net Systems networks detect rogue Access Points?

A MBW devices use a secure mesh protocol which utilizes AES encryption. In most cases, this prevents rogue Access Points from connecting to base stations or from using secure VLANs to bypass user authentication.

Q Do GO Net Systems networks support L3 protocols?

A GO Net Systems base stations are L2 only and do not understand L3 protocols. They will, however, forward any L3 protocols packets that are received through the system.

Q When the existing link is subject to interference, does the MBW series automatically select the next best available channel (Smart Auto Channel Selection)?

A At present, the MBW series does not support this feature.

Q When configuring an MBW device, does it automatically select the best available channel (Auto Configuration)?

A Yes. The MBW series supports Auto Configuration.

Q Why does the FCC allow higher output power transmissions when using beam forming techniques?

A FCC part 15.247 has a special clause for beam forming devices.

For non-beam forming devices the maximum output power is 30dBm, assuming an antenna of 6dBi. For each added 1dB of antenna gain, the output power must be decreased by 1dB. Since this each +1dB of antenna gain must be offset by losing 1 dB of output power, the maximum EIRP is 36dBm.

For beam forming devices the maximum power is 30dBm, assuming an antenna of 6dBi. For each added 3dB of antenna gain, the output power must only be decreased by 1dB, allowing a net EIRP increase of 2 dB (3 dB-1 dB) for each 3 dB of antenna gain added. Consequently, the maximum EIRP for beam forming devices may surpass 36 dBm.

Note: According to the FCC, in beam forming devices the antenna-array gain is defined as the gain of a single antenna element + $10\log(\# \text{ of elements})$.

Q Does the beam-forming mechanism work in the direction of horizon only?

A The beam forming mechanism work only on the horizontal axis. The vertical axis in the MBW2000 series we have 2 antennas, 1 with 24 degrees vertical and the second with 48 degrees vertical beam. (48 degrees means the lobe is +/-24 degrees to horizon)