Waverider Antenna Installation Guide

This document serves as a technical guide to introduce you to the various antennas that may be used with the Waverider system and provide some suggestions for installation of these antennas. It also introduces you to the type of equipment that is provided with each antenna kit. Any additional cabling, connectors, and materials required are the responsibility of the end user.

The following types of antennas are the ***only*** antennas that are approved for use with the Waverider system.

Antenna Type	Pattern	Gain	Make/Model
Dipole-Omni	Omnidirectional	2.15 dBi	Astron PCD09A0V
Dual Dipole w/ diversity	Directional	4.4 dBi	WaveRider EUM3000 Indoor
Pico Cell Patch Antenna	Directional	8.5 dBi	Astron ASTPCG09HD-AML
Yagi (4-element)	Directional	9.1 dBi	Astron 918-4

WARNING: ATTEMPTING TO USE THE EUM3000 MODEM WITHOUT AN ANTENNA OR WITH ANOTHER ANTENNA NOT SPECIFIED IN THE ABOVE LIST CAN CAUSE PERMANENT DAMAGE TO THE MODEM. THE CITY OF BUFFALO ASSUMES NO LIABILITY FOR DAMAGE IN SUCH CASES.

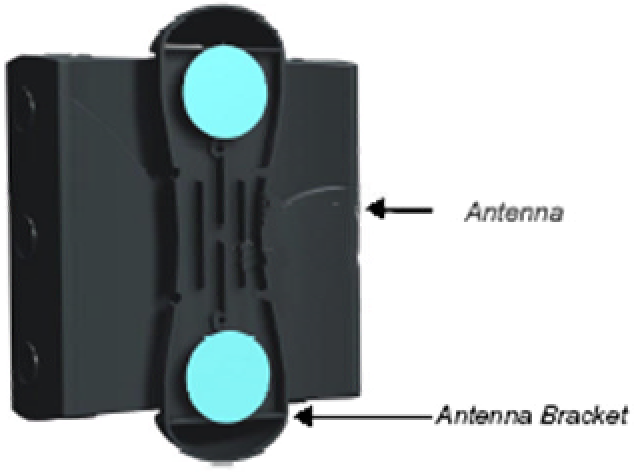
ASTRON Omnidirectional 2.15 dBi Antenna

This antenna is not stocked by the City of Buffalo for use with the Waverider EUM3000, however it is an antenna that is approved for use with the modem.

WaveRider EUM3000 Indoor Antenna

This antenna is the standard indoor antenna the will come with most EUM3000 kits. It has a 9 foot fixed length cable that connects directly to the modem. A mounting kit is included that contains a mounting bracket, 2 suction cups for window mounting, 2 screws and wall anchors for wall mounting.

For maximum reception the concave surface of the antenna should be facing the transmission tower that you have been assigned to. The design of the antenna and mounting bracket make it easy to snap the antenna in and rotate it in such a way that it will face the transmission to which you have been assigned. Polarization of the antenna may be vertical or horizontal depending on which tower you



have been assigned to. Vertical polarization would require that your antenna be mounted in such a way that the cable comes out either the top or the bottom. Horizontal polarization would require that the cable come out either of the sides.

You cannot extend the length of the cable from the antenna to the modem. It is a fixed length with a proprietary connection for hookup to the modem. If you need extra distance between your computer and the modem, you should use a crossover Ethernet cable to bridge this distance.

Astron Pico Cell Patch Antenna

This is a higher gain wall mount antenna that is rated for outdoor use. The kit includes the antenna (9.5" x 9.5") with a short 8" cable terminated with a female N connector, the wall mounting hardware, and a 3 foot pigtail cable with a male N connector at one end and a proprietary connector at the other end for connecting the antenna to the modem. All outdoor installations must include a grounded Polyphaser IS-B50LN-C2 Lightning Arrestor.

This antenna should be mounted so the curved surface of the antenna faces the transmission tower to which you are assigned. The mounting bracket is designed to allow for some rotation if that is necessary.

If you need to extend the distance between the antenna and the modem, you need to use LMR400 cable with a male N connector at the end connecting to the antenna. The other end of the LMR400 cable will be a female N connector for indoor installations, but will vary for outdoor installations that require integrating the Polyphaser Lightning Arrestor. (See the attached section "Extending Cable for Outdoor Antennas") We recommend that any extended cable be 35' or less to avoid significant signal loss.

Astron Yagi 4-element Antenna

This is a higher gain pole mount antenna that is rated for outdoor use. It is designed to mount on a pole directionally pointing toward the transmission tower. The kit includes the antenna with a short cable terminated with a female N connector, the mounting hardware for mounting to a pole, and a 3 foot pigtail cable with a male N connector at one end and a proprietary connector at the other end for connecting the antenna to the modem. All outdoor installations must include a grounded Polyphaser IS-B50LN-C2 Lightning Arrestor.

For maximum reception, the antenna must be mounted in such a way that the front end of the antenna is pointing toward the transmission tower.

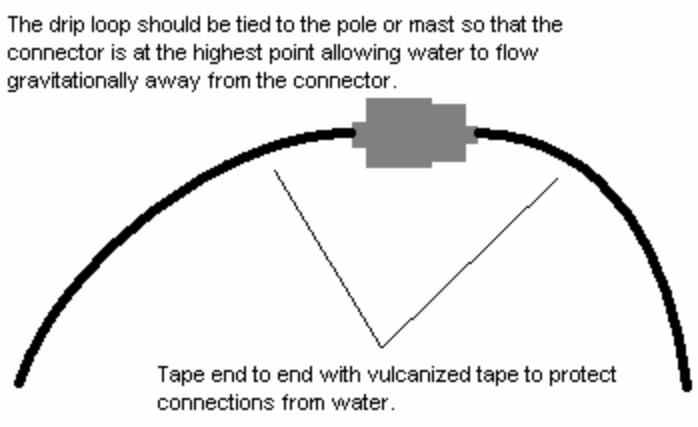
Polarization of the antenna may be vertical or horizontal depending on which tower you have been assigned to. Vertical polarization would require that your antenna be mounted in such a way that the four elements of the antenna would be vertically up and down. Horizontal polarization would require that the antenna be mounted so that the four elements of the antenna would be horizontal.

If you need to extend the distance between the antenna and the modem, you need to use LMR400 cable with a male N connector at the end connecting to the antenna. The other end of the LMR400 cable will be a female N connector for indoor installations, but will vary for outdoor installations that require integrating the Polyphaser Lightning Arrestor. (See the attached section "Extending Cable for Outdoor Antennas") We recommend that any extended cable be 35' or less to avoid significant signal loss.

Extending Cable for Outdoor Antennas

You will need to extend the distance between the antenna on your roof and the modem inside the building. LMR400 cable must be run between the antenna to the PolyPhaser and between the PolyPhaser and the 3' pigtail cable that connects to the modem. We recommend that the total extended length of cable be 35' or less to avoid significant signal loss.

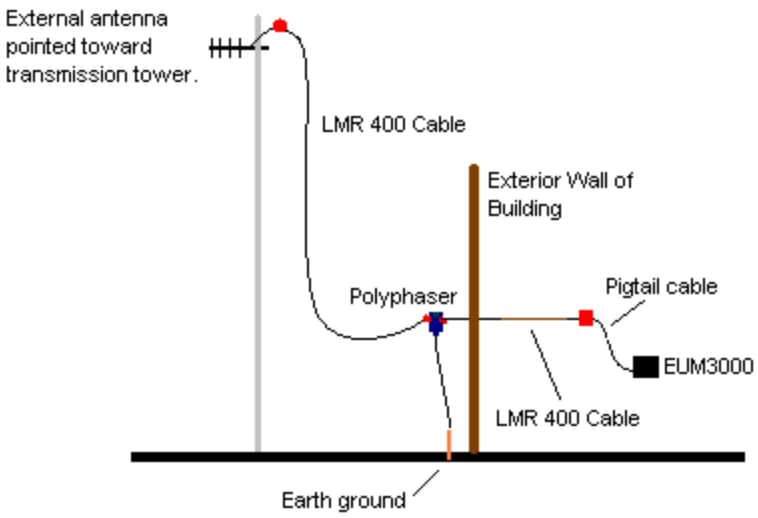
All connections must be protected from water. Tape the connection end to end with vulcanized tape to keep water out. Tie the cable to the mast so as to provide a drip loop so water will flow away from the connection.



The PolyPhaser is a lightning arrestor that protects your modem from damage caused by a lightning strike.

The most important lightning protection is a good low impedance Earth/ground connection to the associated equipment. The Earth ground connection should be a copper plated rod preferably at least 5-8 feet in length driven into the ground. This ground rod should be located as close to the PolyPhaser as possible, typically just outside of a building at the entry point of the antenna feed lines. Greater protection can be provided by using additional ground rods spaced at least 8 feet from and connected to the original rod. ***Substituting plumbing, power ground return and other "so called" grounds for a ground rod is definitely not recommended.*** Finally, there should be a large diameter (#4 AWG or larger) copper wire connecting the PolyPhaser to the Earth ground. The shorter the wire, the better.

FAILURE TO PROPERLY GROUND THE POLYPHASER OR NOT USING A POLYPHASER AT ALL BETWEEN THE ANTENNA AND MODEM VOIDS ANY WARRANTY ON THE EUM3000. THE CITY OF BUFFALO ASSUMES NO LIABILITY FOR DAMAGE CAUSED BY IMPROPER GROUNDING.



EQUIPMENT SPECIFICATIONS

Waverider Indoor Antenna

Size: 6.5" x 6.5"
Cable Length: 9 feet
Connector: RP-SMA-Male
Mounting: Window or wall mount bracket
Gain: 4 dbi

Astron Pico Cell Patch Antenna

Size: 9.5" x 9.5"
Cable Length: 8 inches
Connector: N - Female
Gain: 8 dbi
Mounting: Heavy duty wall mount kit

Astron Yagi 918-4

Size: 16" x 6.5"
Cable Length: 10 inches
Connector N - Female
Gain: 9 dbi
Wind Resistance: 125 mph
Mounting: Pole mount 1.25" – 2" diameter pole

Polyphaser Lightning Arrestor

Connector: N – Female / N – Female
Unit Impedance: 50 ohm

LMR 400 Cable

Outside Diameter: .405 inches
Attenuation: 3.9 dB / 100 feet

N – Connector

Outside diameter: .75 inches