

Specifier's Guide for Network Communication

A major benefit of Baseline's products is their ability to connect and communicate over a network. When your irrigation controllers are connected to the Internet, you can manage them remotely and do everything you normally have to do at the controller from the convenience of any Internet connected device. Even if you don't need Internet connectivity, you can still take advantage of Baseline's network communication functionality to enable the BaseStation 3200 to communicate with performance components such as the FlowStation and/or the SubStation.

The communication network between Baseline products can either be wired or wireless. All Baseline products have built-in Ethernet ports for wired connectivity, but cable length is limited. When the distance between network nodes exceeds the maximum cable length, wireless communication modules must be used. Baseline supports the following communication modules: Wi-Fi, Ethernet Radio, and Cell modem.

Note: When you use a wireless service with your Baseline irrigation equipment, Baseline enables our equipment to connect to and transmit information over a network owned, maintained, and serviced by a third party. Baseline has no control over the status of the network and is not liable for any damages related to a network outage.

Ethernet Cable

If your Baseline irrigation controller is installed in a location that is within 328 ft (100 meters) of a live Ethernet port, you can connect the controller to the network with an Ethernet cable. An Ethernet cable is also known as Cat 5 or Cat 6 cable. This cable is standard for Ethernet technology.

When the Baseline controller is connected directly with an Ethernet cable, no other communication equipment is required for that controller.



Wi-Fi

Wi-Fi technology establishes a wireless local area network over a radio signal. Wi-Fi wavelengths work best when there is a direct line of sight between the source and the receiver. The actual range of operation depends on a number of factors including the frequency, the power output of the Wi-Fi access point, the sensitivity of the receiver, the antenna gain, and the antenna type.

Baseline Wi-Fi modules connect to an existing Wi-Fi network at a site and establish Internet communication. When you order a Wi-Fi module with your Baseline equipment, the module is installed at the factory.

All Baseline Wi-Fi modules come with a 3dB "salt shaker" antenna and cables, mounting hardware, and installation guide. Optional omnidirectional high gain antenna kit, or directional high gain antenna kit are also available. Refer to the Antenna section for more information.

BaseStation 3200 Wi-Fi Modules	
BL-3200WF-X	2.4 GHz Wi-Fi module for BL-3200 controllers in large wall mount cabinet
BL-3200WF-P	2.4 GHz Wi-Fi module for BL-3200 controllers in stainless-steel pedestal
BL-3200WF-P-16SS	2.4 GHz Wi-Fi module for BL-3200 controllers in SB-16SS VIT pedestal
BL-3200WF-P-CSSE	2.4 GHz Wi-Fi module for BL-3200 controllers in Calsense SSE pedestal
BaseStation 1000 Wi-Fi Module	
BL-1000WF-X	2.4 GHz Wi-Fi module for BL-1000 controllers in large wall mount cabinet
BL-1000WF-P	2.4 GHz Wi-Fi module for BL-1000 controllers in stainless-steel pedestal
BL-1000WF-P-16SS	2.4 GHz Wi-Fi module for BL-1000 controllers in SB-16SS VIT pedestal
BL-1000WF-P-CSSE	2.4 GHz Wi-Fi module for BL-1000 controllers in Calsense SSE pedestal
FlowStation Wi-Fi Module	
BL-FLOWSTNWF-X	Wi-Fi module for the FlowStation in large metal wall mount cabinet
SubStation Wi-Fi Module	
BL-SUBSTNWF-X	2.4 GHz Wi-Fi module for the SubStation in large metal wall mount cabinet
BL-SUBSTNWF-P	2.4 GHz Wi-Fi module for the SubStation in stainless steel pedestal

Ethernet Radio

Ethernet radios are a good solution for wireless communication at a large site with multiple controllers that do not have access to another type of Internet connection. Ethernet radios establish a wireless network across a large site, and all Baseline controllers can use this network to send and receive data.

The typical configuration for a large site is one Gateway radio in its own enclosure and an Endpoint radio in each BaseStation controller. In cases where a controller does not have adequate signal strength to connect to the rest of the network, an additional Gateway radio can be configured as a Repeater to boost the signal to the outlying controller. Keep in mind, however, that using a Repeater will reduce the data speed on the network by 50 percent or more.

After the network for the radios is set up and communicating, the Gateway radio unit is connected via Ethernet to the site's local area network (LAN). Then, the radio network can send and receive data over the Internet.

Baseline strongly recommends that a site survey is done before you order Ethernet radio equipment or install the components. Contact your Baseline representative to arrange a site survey.

Ethernet Radio Communication Modules	
BL-ER-C	Ethernet radio module (factory configured as a Gateway) in metal wall mount cabinet with 3dB integrated antenna for BL-1000 and BL-3200 controllers. Can also be configured as a Repeater.
BL-ER-X	Ethernet radio module for X/XS cabinet with 3dB integrated antenna for BL-1000 and BL-3200 controllers
BL-ER-P	Ethernet radio module for pedestal with 3dB antenna and stainless-steel antenna mount for BL-1000 and BL-3200 controllers
BL-ER-P-16SS	2.4 GHz Wi-Fi module for BL-3200 controllers in SB-16SS VIT pedestal
BL-ER-P-CSSE	2.4 GHz Wi-Fi module for BL-3200 controllers in Calsense SSE pedestal
External Antenna Options for ER Radio Modules (compatible with all Ethernet modules)	
BL-ER-OMNI	Omnidirectional high gain antenna kit for BL-ER modules with BL-1000 and BL-3200 controllers
BL-ER-YAGI	YAGI directional high gain antenna kit for BL-ER modules with BL-1000 and BL-3200 controllers

Cell Modem

Using a cell modem is another option for wireless Internet communication. The cell modem sends and receives data over a wireless carrier's network. Where the other communication options supported by Baseline have a limited range, cellular connectivity doesn't.

A SIM card is also known as a subscriber identity module or subscriber identification module. It stores data that is used to authenticate subscribers and enable devices (such as Baseline's cellular modem module) to connect to the correct network.

When a controller is connected to a network, data is transferred back and forth across the network. The transferred data includes information such as network connection status updates, commands sent between the controller and BaseManager, and status updates from the controller to BaseManager. Because wireless carriers charge for data transfer, you need to have a cellular data service plan associated with your irrigation controllers that are communicating over a cell modem.

When you choose a cell modem communication package from Baseline, we provide the cell modem hardware, the SIM card from the wireless carrier, the firmware that activates the connection from your controller, and a 1-year subscription to a data plan with the wireless carrier.

Note: Valid billing information is required to activate cell data service. Baseline will bill customer directly at the end of the first term for the next year's service.

Cell Modem Gateway

Baseline's cell modem gateway allows you to share an Internet connection with multiple BaseStation 1000 or 3200 irrigation controllers or other communication devices such as Ethernet radios. The cell modem gateway sends and receives data over a wireless carrier's network.

A wireless carrier's data plan is NOT included with the cell modem gateway because you need to select an appropriate plan for the number of connected devices.

4G Cellular Modem Modules - includes one year of data service bundled with each module	
BL-CM4G-X-VZ	4G Verizon cell modem module for BL-1000 and BL-3200 controllers in X or XS cabinet. First year's data service included.
BL-CM4G-X-AT	4G AT&T cell modem module for BL-1000 and BL-3200 controllers in X or XS cabinet. First year's data service included.
BL-CM4G-P-VZ	4G Verizon cell modem module for BL-1000 and BL-3200 controllers in pedestal. First year's data service included.
BL-CM4G-P-AT	4G AT&T cell modem module for BL-1000 and BL-3200 controllers in pedestal. First year's data service included.
BL-CM4G-P-16SS-VZ	4G Verizon cell modem module for BL-1000 and BL-3200 controllers in SB-16SS VIT pedestal. First year's data service included.
BL-CM4G-P-16SS-AT	4G AT&T cell modem module for BL-1000 and BL-3200 controllers in 16SS VIT pedestal. First year's data service included.
BL-CM4G-GW-VZ	4G Verizon cell modem module installed in large 16-gauge powder-coated metal wall mount cabinet (X Cabinet) with a BL-ETH-SW 5-port Ethernet Switch. Does NOT include Data Service.
BL-CM4G-GW-AT	4G AT&T cell modem module installed in large 16-gauge powder-coated metal wall mount cabinet (X Cabinet) with a BL-ETH-SW 5-port Ethernet Switch. Does NOT include Data Service.
Cellular Data Service Plan Part Numbers	
BL-CM-SVC1	1 year pre-paid standard data service for one BL-CM4G module
BL-CM-SVC1-EXT5	1 year pre-paid extended 5-controller data service for one BL-BLCM4G
BL-CM-SVC1-EXT20	1 year pre-paid extended 20-controller data service for one BL-CM4G
External Antenna Options for Cellular Modules (compatible with all Cellular Modem Modules)	
BL-CM-OMNI	Omnidirectional high gain antenna kit
BL-CM-DIR	Directional high gain antenna kit

Additional Equipment & Services

Ethernet Switch

When there are multiple devices that require an Ethernet connection, an Ethernet switch should be specified along with the BaseStation 3200 or the FlowStation. To determine whether an Ethernet switch is required, count the number of devices in an enclosure that have an Ethernet Port. If there is more than one device that has an Ethernet port and only one Ethernet connection is available, an Ethernet switch is required. The FlowStation, BaseStation 3200 controllers, Ethernet Radios, and Wi-Fi modules all have Ethernet ports. When a FlowStation is specified for a BaseStation 3200 controller in a stainless-steel pedestal (BL-FLOWSTN-P) an Ethernet switch is included.

Part Number: BL-ETH-SW

Antennas & Surge Arrestors

When you order a communication module from Baseline it comes with a 3dB "salt shaker" antenna, the antenna mount, and the required cable. In some locations, you might need to use a different type of antenna to increase the signal strength.

Baseline sells omnidirectional high gain antenna kits and directional high gain antenna kits that are compatible with our communication modules. Refer to the communication module sections for the specific part numbers.

The high gain antenna kit includes the antenna, mounting brackets, and internal N-type bulkhead adapter. You need to supply a BL-CX or compatible LMR-400 low loss cable.

Also remember that you need to install a lightning arrestor and ground appropriately following all manufacturer's installation guidelines and precautions. Refer to the BL-CX-LA High Gain Antenna Lightning Arrestor Installation Guide found on the Baseline website.

Antenna Cables and Surge Arrestors	
BL-CX-CBL10	10' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter
BL-CX-CBL25	25' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter
BL-CX-CBL50	50' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter
BL-CX-CBL75	75' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter

BL-CX-CBL100	100' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter
BL-CX-CBL125	125' coaxial antenna cable -- Includes low-loss (3.9dB/100' @ 900 MHz), poly-jacketed, outdoor, direct burial, LMR-400 cable with N-type connectors, and bulkhead adapter
BL-CX-LA-X	In-line surge arrester for external antennas for installation in X or XS cabinets. Compatible with all CM4G, ER, WF communication modules -- Includes surge arrester unit, ground wire, and installation guide. Connects to case ground lug in X cabinets. Can be installed by factory when specified on a PO.
BL-CX-LA-P	In-line surge arrester for external antennas for installation in Pedestals, and 16SS and CSSE Kits. Compatible with all CM4G, ER, WF communication modules -- Includes surge arrester unit, ground wire, and installation guide. Connects to case ground lug in P Pedestals, and 16SS and CSSE Kits. Can be installed by factory when specified on a PO.

Site Survey

As with any radio frequency-based wireless system, many factors can prevent the radio frequency (RF) signal from reaching all parts of the site. A site survey helps determine where each radio and antenna should be located and helps select the proper equipment in order to ensure the most robust communications. A radio site survey is a crucial step in the deployment of a wireless radio network for an irrigation system.

Baseline recommends that a radio site survey be specified as part of a site plan whenever Ethernet radios are expected to be used. The radio site survey helps ensure the best possible outcome and can save a significant amount of support costs later on. The radio site survey documentation serves as a guide for designers and installers. We also recommend that the installation contractor be required to demonstrate that post installation results match the results of the radio site survey.

While a radio site survey dramatically improves the chances of a quick and painless installation, it does not guarantee long term success because conditions are likely to change on a site over time. For example, if a building is built in a radio's line of sight, that location may cease to communicate and changes may need to be made. Baseline recommends that all such considerations be taken into account when planning and implementing a radio project.

A radio site survey is a contracted service offered by Baseline. For pricing information, or to schedule a radio site survey, please contact your Baseline representative or distributor.