



# Power/mation®

*Innovative Automation Solutions / Exceptional Customer Service*

## **Connecting Buildings and Remote Monitoring at Distances Up to Two Miles**

**September 10, 2020**

Working in the automation industry we receive many requests for more flexible options for remote connectivity. In most cases, locations are served by high speed internet. Making this connection with available VPN hardware products has become a simple solution. The bigger problem arises when a network does not exist. In these cases, customers have been faced with few options.

The most popular options involved installing a fiber optic link between locations or using a cellular VPN. These choices have advantages and disadvantages for the user. While fiber offers a high-speed low maintenance connection, the installation costs can be very high. With some application restrictions, running the cable is not feasible. Cellular VPN has become more affordable and flexible to install, however the annual charges can be expensive if the application requires a constant data feed.

To avoid these obstacles, many have chosen a wireless solution using 900MHz radios. These solutions offer point to point distances up to 5 miles, and further with repeaters. One downside is the data rate. Typical industrial 900 MHz systems offer 125, 250 and 500 kbps options. The attainable speed is reliant on signal strength and integrity. A better solution is needed.

This is where long distance WiFi becomes an attractive alternative. Phoenix Contact has introduced the WLAN 4321 a new paired WLAN radio system capable of transmitting from 100 feet to 2 miles. The system offers a maximum data rate of 300 Mbps. This is 600 times more data than a 900 MHz system.

At Power/mation we have assisted customers with hundreds of wireless applications. These ranged from systems reaching many miles with repeaters to ones that spanned a few feet. Each of these applications had potential challenges to overcome. Our team works through the design stage ensuring that each application applies the correct technology to ensure success.

The following pages describe the WLAN 4321 wireless bridge set for extended range Wi-Fi applications. The set is completely plug-n-play, with preconfigured encryption, and mounting hardware; just select and add ethernet cables. The WLAN 4321 is LLW eligible. Contact your Power/mation sales representative for a demonstration.

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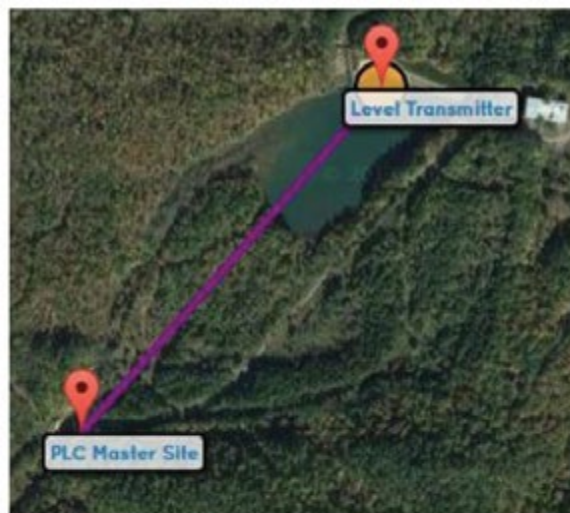
## Connecting Buildings and Remote Monitoring at Distances Up to Two Miles with Phoenix Contact



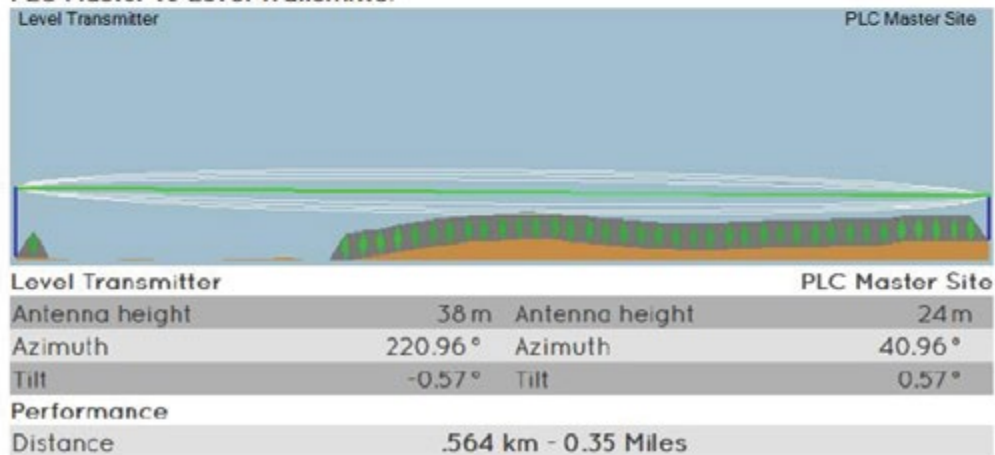
Any new wireless installation requires a careful study of the site. Often a site may appear to be rather flat. However, with a closer study of the environment obstacles tend to appear that will dramatically reduce signal strength and throughput. Software tools now exist to simplify performing a site survey and eliminate the guess work.



Depicted below is one such study. GPS coordinates were acquired for the transmitter device that needed to be monitored and the control location site. Entering these in a standard mapping tool will assist in determining directional aiming. What is missing is the ground contours between the locations. Advanced software tools incorporate geologic survey data that will fill in the critical details.





PLC Master to Level Transmitter



Once the survey process is complete the height, direction, and tilt for each antenna is determined. This is important, as the WLAN 4321 system uses directional antennas to achieve the extended range and throughput. Our second image shows the result including a depiction of beam spread over a distance. This approximates the spread as the antenna gain and will determine the actual degree of signal attenuation.

Examples of antennas that we have used for various applications are shown below. These indicate the many beam patterns and variances for omni directional antenna and include a directional for comparison. Note that the vertical band width typically narrows as the gain increases. Proper antenna selection is crucial for any successful wireless installation.

Picture							
Frequency	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz	2.4 GHz
Gain	2 dBi	3 dBi	2.5 dBi	6 dBi	>3 dBi	6 dBi	9 dBi
Polarization	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical	Vertical
HPBW horizontal	 360°	 360°	 360° (2.4/5 GHz)	 360°	 360°	 360°	 75° (2.4 GHz) 55° (5 GHz)
HPBW vertical	 75°	 85°	 30°	 30°	 30°	 20°	 55° (2.4 GHz) 55° (5 GHz)

The WLAN 4321 wireless bridge kit from Phoenix Contact eliminates the need to select your own antenna. The kit contains two directional radio units, mounting hardware and two PoE adaptors.

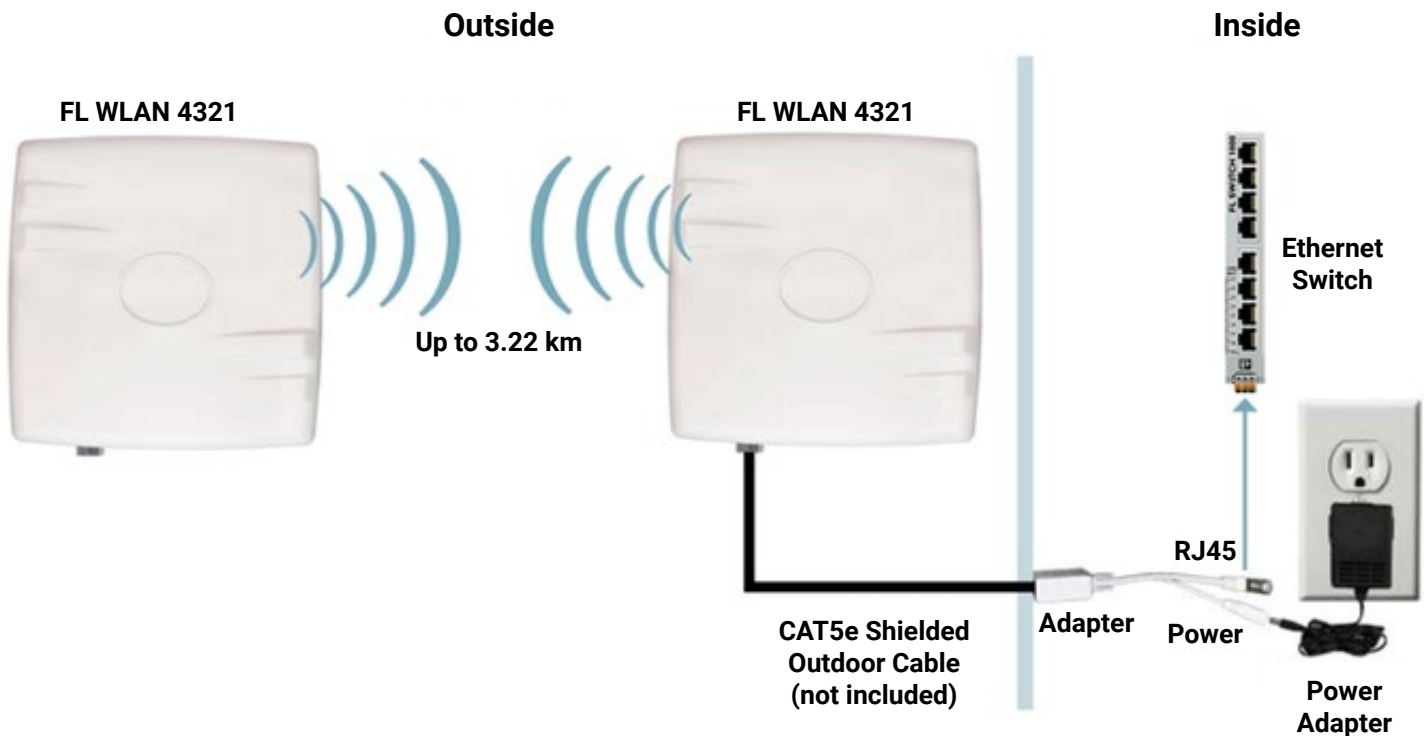
A non-booted ethernet cable is required to fit the grommet adaptor in the kit. Several outdoor rated cable lengths are available from Phoenix Contact.



WLAN 4321 Wireless Bridge Kit

Available Cables from Phoenix Contact		
	Description	Part number
Shielded outdoor CAT6 cable: RJ45-to-RJ45	25 feet	1226168
	50 feet	1226164
	150 feet	1226166
	300 feet	1226167
Shielded outdoor cable: RJ45-to-open-end	25 meters	1211706*
	50 meters	1211705*
	Custom length	1411838/94D/...*
Unmanaged Switches	5-port	1085039
	8-port	1085256

Once antenna mounting criteria are established the connection and installation may be completed. Mount the antenna and run your ethernet cable to the provided PoE adaptor. Plug the power unit into a wall outlet and wait for the radio to boot. Indicator LEDs provide feedback on power, link, and signal strength.



Our experts are Power/mation are available to help you solve all your remote connection needs. No matter if the gap is a few feet or a few thousand, we have a wireless technology to connect you to your application endpoints.

Power/mation is a Phoenix Contact Automation Elite distribution partner.



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