



Industrial Power over Ethernet Products

PoE Overview

Power over Ethernet (**PoE**) is a technology that utilizes an RJ-45 copper port to support connections up to 100 meters and speeds up to 10Mbps, 100Mbps, and 1,000Mbps over a single twisted pair Ethernet cable. A PoE port provides data transmission and utility just like any standard Ethernet port, but it also supplies electrical power over the same cable. Antaira's industrial PoE switches meet IEEE standards 802.3af (PoE), 802.3at (PoE+), and 802.3bt (PoE++). The more recent PoE standards are backwards compatible with the older standards. These PoE standards create a regulated level playing field for productization allowing more product options and companies to be compatible with one another.

PoE devices can be one of two types - one where the device injects or transmits power (Power Sourcing Equipment (**PSE**)) and the other where a device requires power to be drawn (Powered Device (**PD**)). Typically, PSEs are industrial networking switches and common PDs are VoIP phones, wireless access points, and IP cameras. The PSE and PD devices are networked/powered together by a sub-standard of IEEE 802.3af called **Mode A** (Endspan) and **Mode B** (Midspan). Mode A utilizes an Ethernet switch as the PSE and combines data and power onto an Ethernet cable while only utilizing pins 1,2(+ voltage) and 3,6(- voltage). Mode B is used in the design of injectors to add PoE power to an Ethernet cable connecting a PD device to a non-PoE network device. Mode B only utilizes pins 4,5(+ voltage) and 7,8(- voltage) which are also known as "spare pairs". In Mode B, the PSE supplies the positive and negative voltage for the pin assignments. In order for a PD to be compliant with IEEE 802.3af/at, it must be able to accept Mode A or Mode B. Keep in mind, IEEE 802.3bt does not have a Mode A or Mode B, because it uses all four wires all the time. Antaira has a wide array of standardized industrial PoE switches that can be used as the PSE to fit into any application.



Active vs Passive PoE

	Active PoE	Passive PoE
Switch/Media Converter	Negotiates with PD devices to deliver requested power	Sends current to all connected ports, regardless of the device
End/PD Device	Negotiates with switch/media converter to receive requested power	Assumes switch/media converter will deliver power
Pins Used to Deliver Power	Mode "A" - 1,2,3,6 Mode "B" - 4,5,7,8	Mode "B" - 4,5,7,8
Voltage Used	48VDC	24VDC
IEEE Standard	802.3af/at/bt	None
Maximum Distance for Power	100 meters	40 meters

Active PoE utilizes IEEE 802.3af/at/bt providing 48VDC in outgoing power and will automatically do a "handshake" to negotiate the correct power between the switch and Powered Device (PD). Passive PoE is not compatible with IEEE standards and it provides 24VDC of constant outgoing power regardless of the voltage requirements at the end device. Passive PoE is proprietary to manufacturers who create their own PoE standard. Antaira only offers active PoE switches to support the industry standard for higher security. Implementing active PoE switches into applications allows for better networking communication with other PoE devices that follow the same standards.

PoE Opportunities



Fiber Connectivity

Fiber optic cables are made of thin glass to carry digital information over long distances. It is the backbone of the fastest and most reliable connectivity technology. Antaira offers industrial Power over Ethernet (PoE) unmanaged and managed switches with fiber connectivity to give users a reliable fiber network for long distance communication and noise immunity.

- ▶ SC/ST connector and SFP port fiber
- ▶ Up to 28 ports of fiber connectivity
- ▶ Network Redundancy: STP/RSTP/MSTP and G.8032 ring protection <50ms (Managed ONLY)

Unmanaged models available in 5, 6, 7, 8, 10, 12, 16, 18, 20, and 26 ports

Managed models available in 5, 6, 7, 8, 10, 12, 18, 20, 26, and 32 ports

Low Voltage Technology

(Look for model names with a -24)

The powering of Power over Ethernet (PoE) devices is critical. Since most PoE networking applications utilize DC power due to its reliability, the typical voltage supported is 48V. Sometimes an obstacle arises when a Powered Device (PD) only has 12V, 24V, or 36V of power available but needs 48V of PoE power to operate equipment in an application. This issue typically requires a switch and booster to be installed for the networking connectivity to function properly. Antaira Technologies specializes in an industrial PoE low voltage (input range of 12-36VDC) line with an internal voltage booster to support a standard 48VDC PoE power output.

Antaira's industrial low voltage PoE unmanaged and managed switches are the most economical and efficient solution. Antaira offers a wide array of low voltage (12-36VDC) PoE switches that will accept low voltages between 12 to 36 volts to power on and supply the full IEEE 802.3 af/at/bt PoE in a single device. This eliminates the need for a separate step-up transformer and saves the much-needed networking space in an enclosure by using just one small form factor device.

- ▶ Internal voltage booster
- ▶ Low power input (12-36VDC)
- ▶ Adheres to active PoE standards
- ▶ IEEE 802.3 af/at compliant up to 30 Watts of power
- ▶ IEEE 802.3bt compliant up to 90 Watts of power are separate models

****Unmanaged models available in 5, 7, 8, 10, and 12 ports****

****Managed models available in 5, 6, 7, 8, 10, and 12 ports****



Unmanaged PoE

Unmanaged Ethernet switches are basic plug-and-play devices with no remote configuration, management, or monitoring options. These switches are cost-effective and typically are used in field level or small networks where management is unnecessary. Antaira offers a wide range of Power over Ethernet (PoE) plug-and-play models that boast a variety of port counts, fiber connectivity, and wide temperature ratings perfect for industrial PoE applications.

- ▶ 10/100/1000TX Ethernet speed options
- ▶ High power PoE IEEE 802.3af/at/bt compliant
- ▶ Wide operating temperature (-40°C to 75°C)
- ▶ Compact layer 2 industrial Ethernet switches
- ▶ Surge and ESD protection
- ▶ Plug-and-play functionality

****Models available in 5, 6, 7, 8, 10, 12, 16, 18, 20, and 26 ports****

Managed PoE

Managed Ethernet switches enable network managers to remotely access a wide range of capabilities to configure, manage, and monitor a local area network. Antaira offers a wide range of Power over Ethernet (PoE) models that provide light layer 3 network management software and fiber connection support. Built-in event handling functions allow users to have immediate event notices to improve remote monitoring and management. Antaira's industrial-grade managed PoE switches are ideal for harsh environments where real-time performance is critical.

- ▶ 10/100/1000TX Ethernet speed options
- ▶ High power PoE IEEE 802.3af/at/bt compliant
- ▶ Layer 2 network management support: PoE Ping Alive, SNMP, VLAN, IGMP, and QoS
- ▶ Wide operating temperature (-40°C to 75°C)

****Models available in 5, 6, 7, 8, 10, 12, 16, 18, 20, and 26 ports****



802.3bt Technology

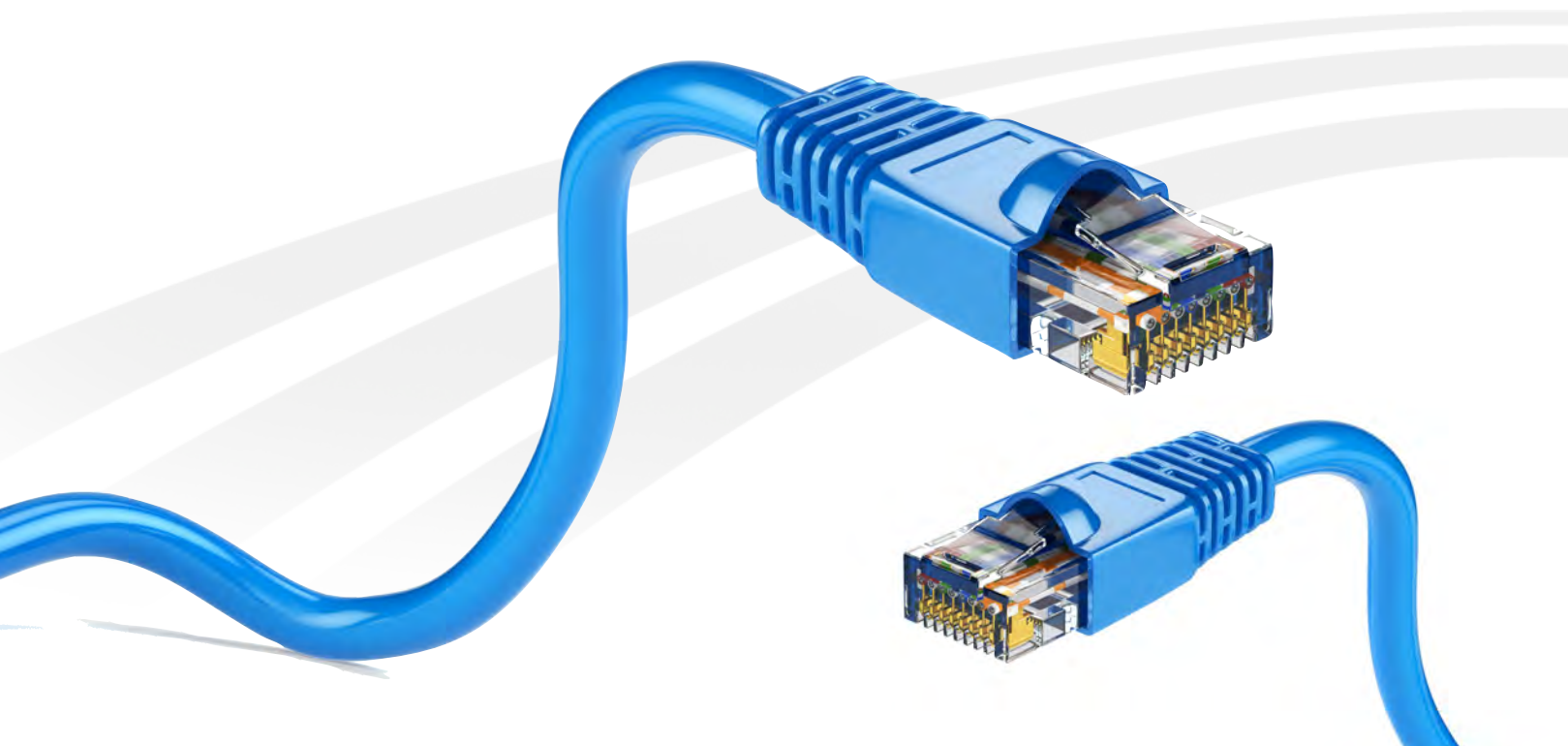
802.3bt Products

Ethernet Switches, Injectors & Media Converters

While the transition from 802.3af PoE (15 watts per port) to 802.3at PoE (30 watts per port) is somewhat simple to implement, the transition to 802.3bt requires quite a bit more engineering, especially on the part of the PSE designer. In order to achieve 30 watts per port from the original 15 watts per port, we need to increase the minimum voltage from 44VDC to 50VDC and to increase the maximum current from 350 mA to 600 mA. Both the 802.3af and 802.3at standards only require two of the four pairs available on a CAT 5 cable to be used for power injection, so the PSE supplier is free to choose to support Mode A (endspan) or Mode B (midspan). This makes the migration from 802.3af to 802.3at seamless.

This is not the case with the new 802.3bt standard. To start, there are two different versions manufacturers can choose to support. One will allow for up to 60 watts to be supplied by a port and the other will allow for up to 90 watts to be supplied by a port. As with the previous standards, the actual power available will depend on the losses in the cable, so PD suppliers will need to consider this when deciding which standard to follow. The major difference is that PSE manufacturers will no longer be able to only use two of the four pairs of conductors in a CAT 5 cable, but will need to use all four pairs. Effectively, the power is being split between what was Mode A and Mode B, so that both channels can carry half the power. In order to achieve the full power that the specification allows, the minimum supply voltage has been raised to 52VDC and the maximum current has been raised to 960 mA.

The other great feature of the new 802.3bt specification is the ability for each power channel to request different levels of power. For example, an IP camera with PTZ control, heater/blower, and also an IR source can have the camera and PTZ controller powered from one channel, and the heater/blower and IR source powered from the other channel.



IMP-C1000 Series
Compact Industrial Gigabit IEEE 802.3bt Ethernet-to-Fiber Media Converters



INJ-C200G Series
Industrial Gigabit IEEE 802.3bt PoE++ Injectors



INJ-C201G Series
Industrial Gigabit IEEE 802.3bt PoE++ Injectors with 1 PoE PSE Port



LMP-0702G Series
7-Port Industrial Gigabit IEEE 802.3bt PoE++ Light Layer 3 Managed Ethernet Switches



LMP-1204G Series
12-Port Industrial Gigabit IEEE 802.3bt PoE++ Light Layer 3 Managed Ethernet Switches



LNP-0500G Series
5-Port Industrial Gigabit IEEE 802.3bt PoE++ Unmanaged Ethernet Switches



LMP-C602G Series
6-Port Industrial Gigabit IEEE 802.3bt PoE++ Managed Ethernet Switches

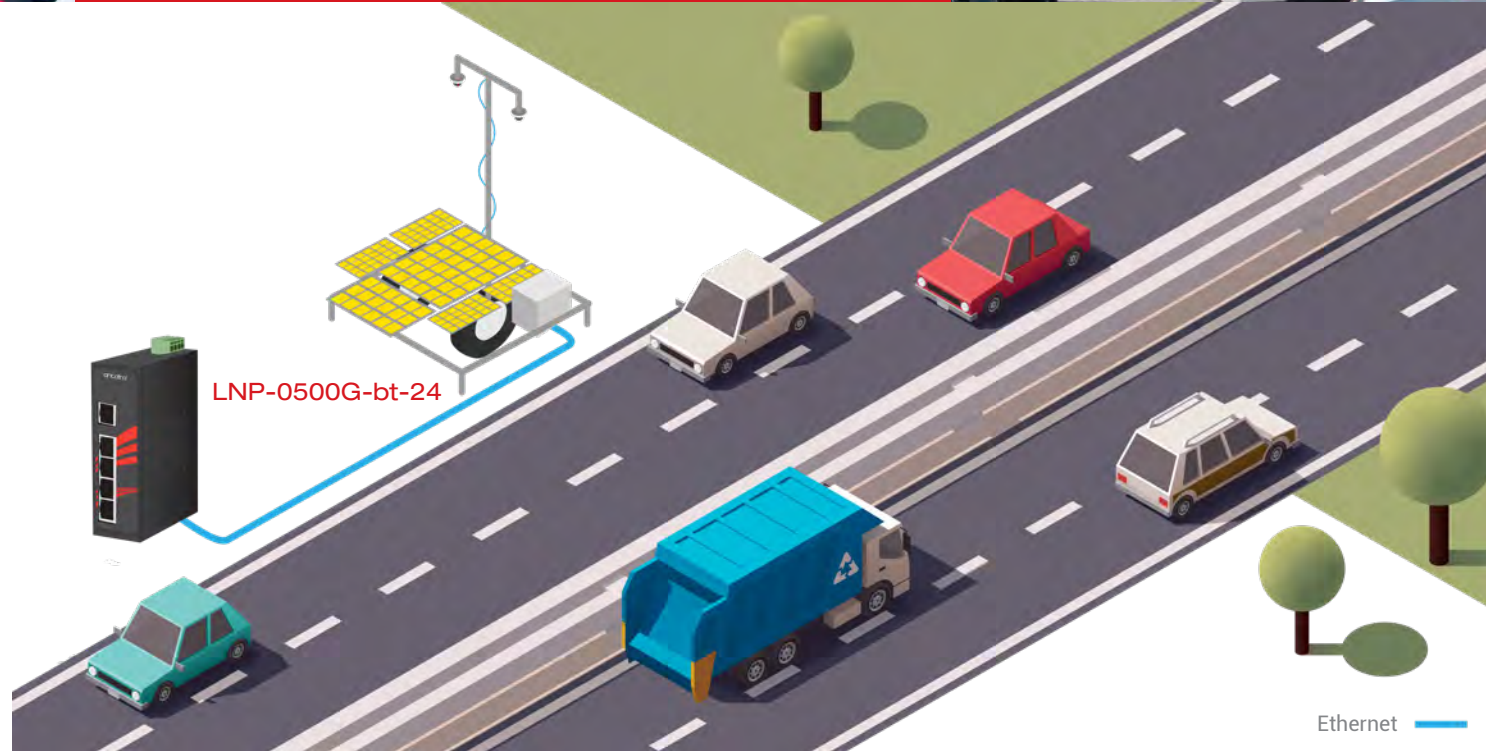


LNP-C501G Series
5-Port Industrial Gigabit IEEE 802.3bt PoE++ Unmanaged Ethernet Switches

Property	802.3af (802.3at Type 1) "PoE"	802.3at Type 2 "PoE+"	802.3bt Type 3 "4PPoE"	802.3bt Type 4
Power Available at PD	12.95 W	25.50 W	51 W	71 W
Maximum Power Delivered by PSE	15.40 W	30.0 W	60 W	90 W
Voltage Range (at PSE)	44.0–57.0 V	50.0–57.0 V	50.0–57.0 V	52.0–57.0 V
Voltage Range (at PD)	37.0–57.0 V	42.5–57.0 V	42.5–57.0 V	41.1–57.0 V
Maximum Current I _{max}	350 mA	600 mA	600 mA per pair	960 mA per pair
Maximum Cable Resistance Per Pairs	20 Ω (Category 3)	12.5 Ω (Category 5)	12.5 Ω	12.5 Ω
Power Management	Three power class levels (1-3) negotiated by signature	Four power class levels (1-4) negotiated by signature or 0.1 W steps negotiated by LLDP	Six power class levels (1-6) negotiated by signature or 0.1 W steps negotiated by LLDP	Eight power class levels (1-8) negotiated by signature or 0.1 W steps negotiated by LLDP
Derating of Maximum Cable Ambient Operating Temperature	None	5 °C (9 °F) with one mode (two pairs) active	10 °C (20 °F) with more than half of bundled cables pairs at I _{max}	10 °C (20 °F) with temperature planning required
Supported Cabling	Category 3 and Category 5	Category 5	Category 5	Category 5
Supported Modes	Mode A (endspan), Mode B (midspan)	Mode A, mode B	Mode A, mode B, 4-pair mode	4-pair mode

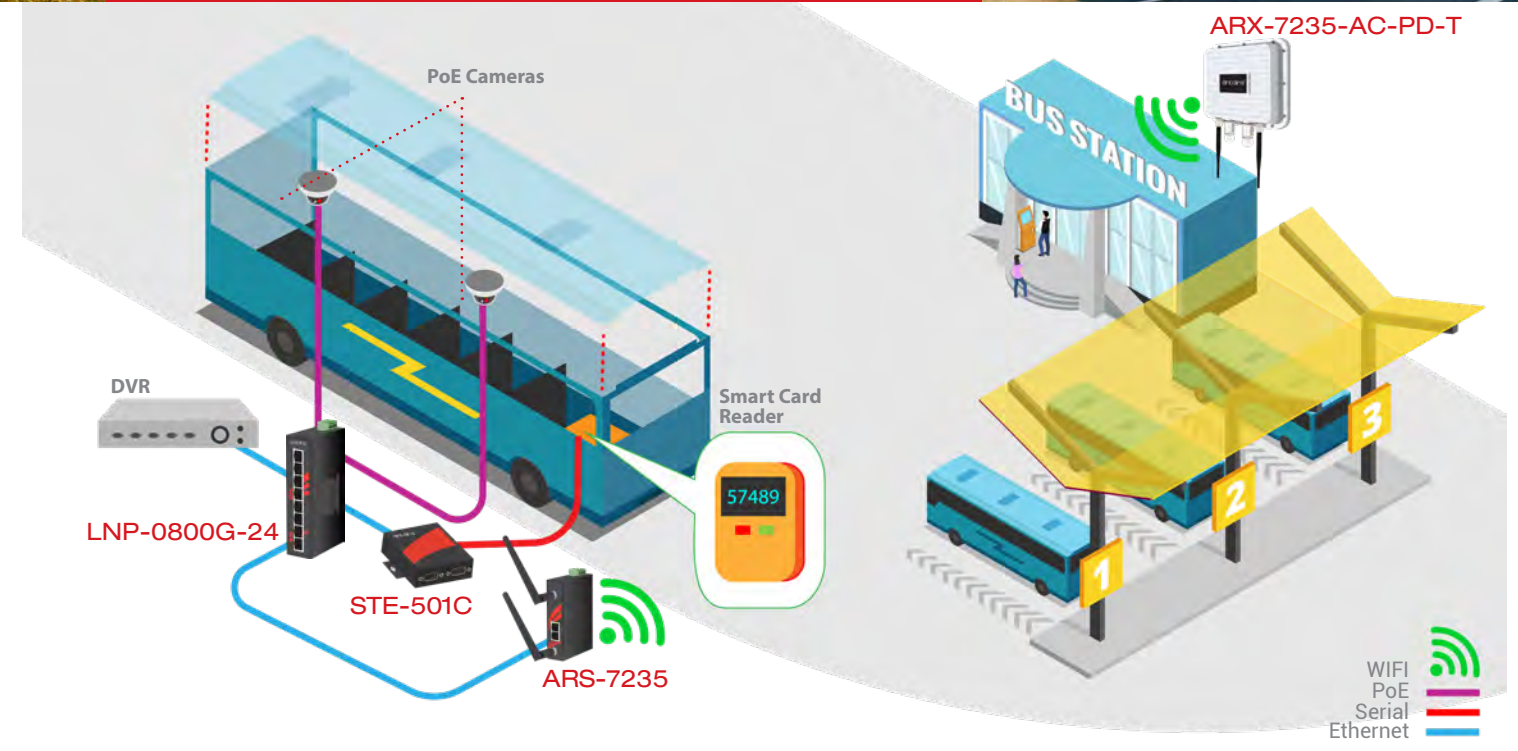
Law Enforcement

License Plate Recognition



Surveillance

Public Bus



Application

As the budgets of local law enforcement agencies are stretched thin, there is a need to operate more efficiently. Investing in a license plate recognition system can assist in many areas including providing enhanced security, fighting crime, enforcing toll collection, comparing license plates to a list, providing parking revenue management, providing access control, and more. Because of the nature of the deployment, ruggedized equipment is necessary for a system to be successful.

Application Requirements

- ▶ Wide operating temperature equipment to withstand environmental conditions
- ▶ PoE switches/injectors to power surveillance cameras and network other equipment like PCs and modems
- ▶ Ability to power from a 12VDC solar battery and still be IEEE 802.3af/at/bt compliant on the power output

Solution

LNP-0500G-bt-24: Industrial bt switch capable of powering the newer surveillance cameras that use 60 watts or more. It also has the ability to power from a 12VDC solar battery and still inject 802.3bt compliant power to the devices. The wide operating range of -40C to 75C allows it to withstand any environment.

Key Product



LNP-0500G-bt-24
5-Port Industrial Gigabit IEEE 802.3bt PoE++
Unmanaged Ethernet Switch

Application

More and more municipal transit agencies are upgrading their fleets with modern technology such as IP cameras for better security and with automated fare collection systems. The security aspect typically involves installing a number of IP cameras along with a DVR for storage, while the fare collection system will often require various types of card or token readers to log each rider. All of this equipment requires networking by a ruggedized PoE switch that can power from 12VDC or 24VDC.

Application Requirements

- ▶ Minimum 8 port Gigabit PoE switch to power cameras and network entire system together
- ▶ Serial device server to allow card reader to communicate via IP network
- ▶ 802.11AC Wifi client to allow for fast downloads when the bus comes back into the depot
- ▶ All equipment must be able to withstand shocks and vibration and power from 12VDC

Key Products



LNP-0800G-24
8-Port Industrial PoE+
Unmanaged Ethernet Switch



STE-501C
1-Port RS-232/422/485 To Ethernet
Device Server



ARS-7235
Industrial 802.11a/b/g/n/ac
WiFi Access Point/Client/
Bridge/Repeater



ARX-7235-AC-PD-T
Industrial Outdoor IP67 Metal Housing
IEEE 802.11 a/b/g/n/ac Dual Radio
Wireless AP/Client/Bridge/Repeater/
Router with PoE PD; EOT: -40 °C to 70°C

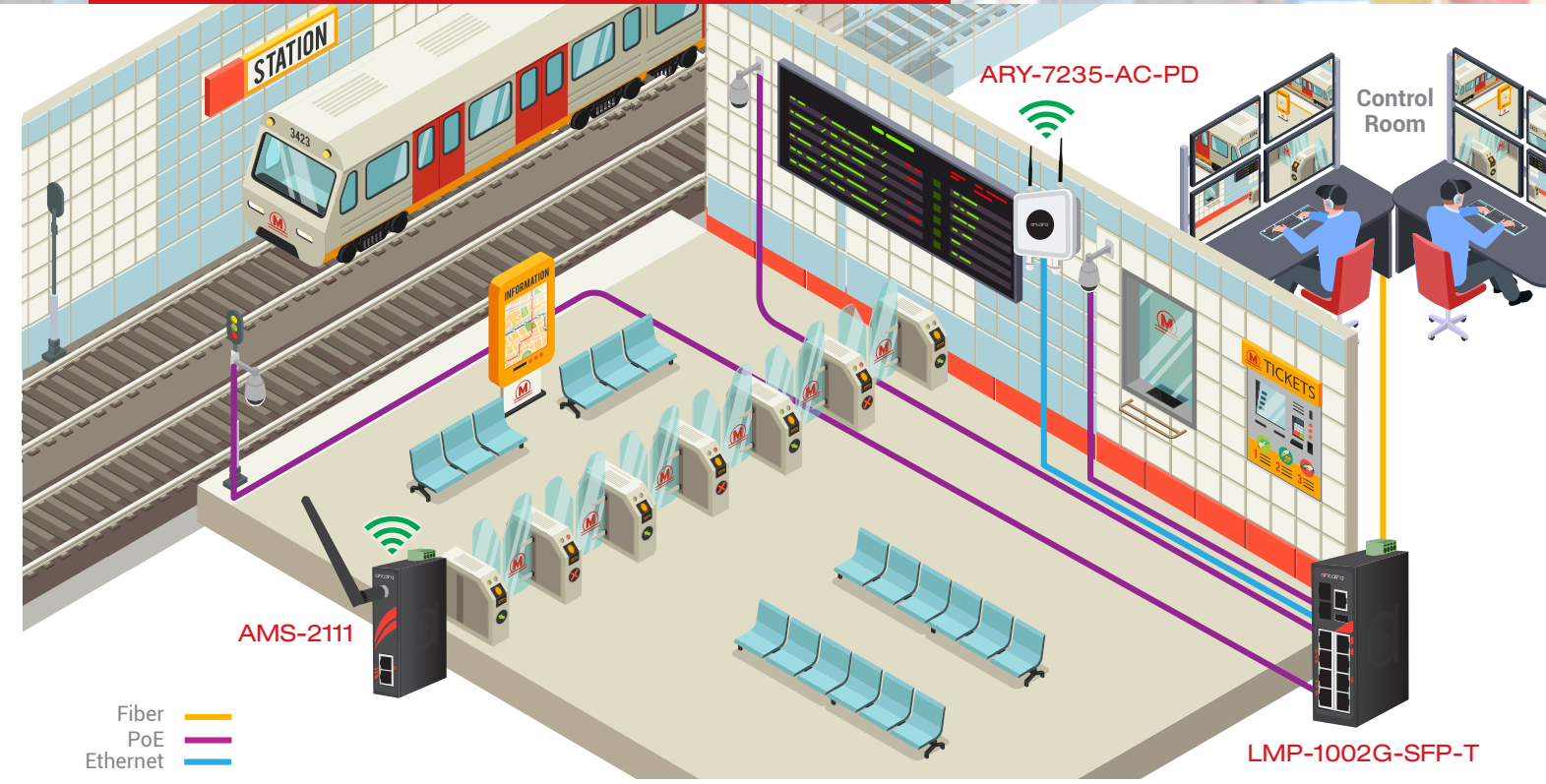
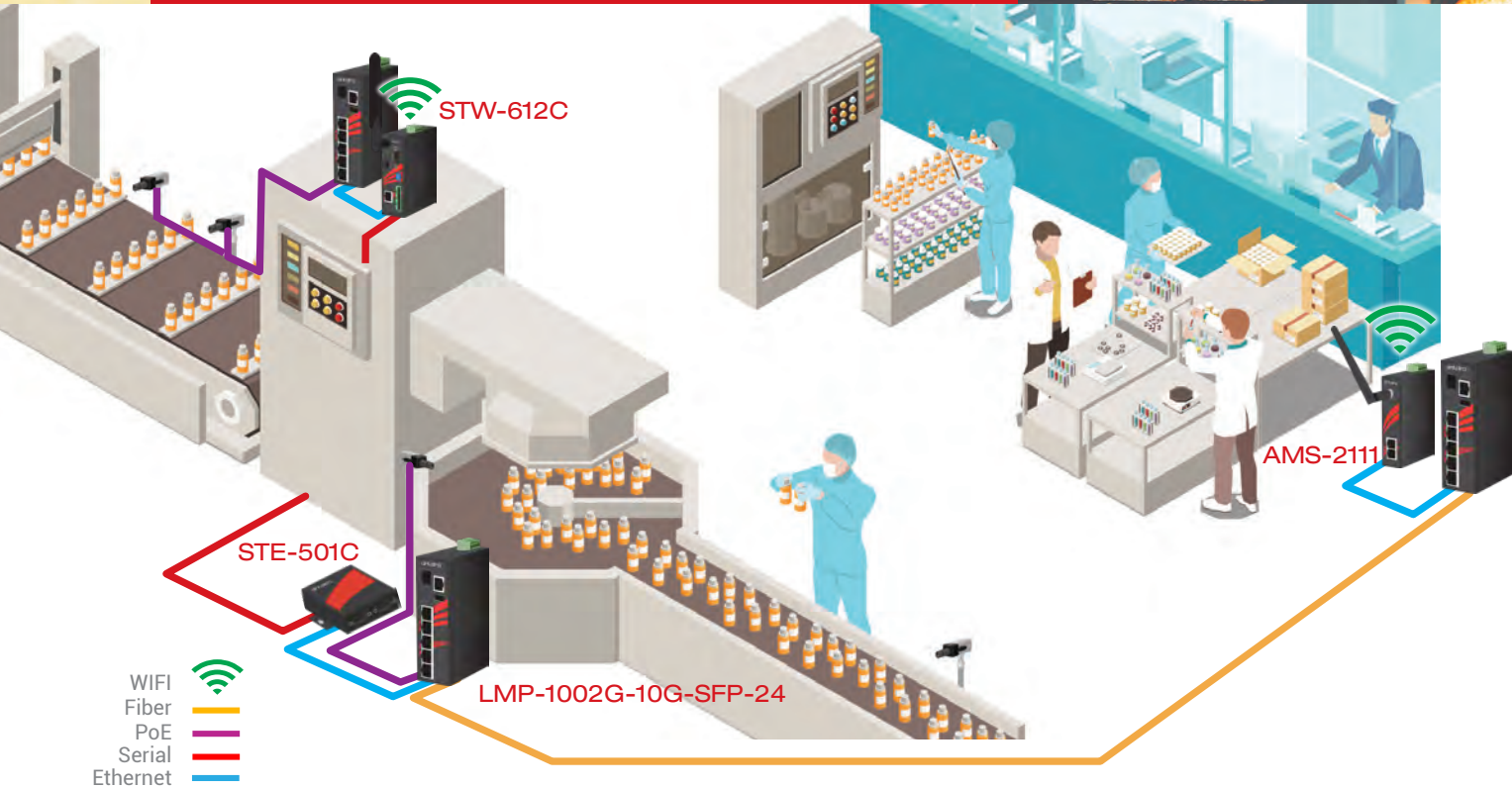
Machine Vision

Pharmaceutical Production



Surveillance

Platform Monitoring



Application

Processing plants often require filling bottles to specified levels. To verify that the criteria are being met special cameras are used to view these levels at high speeds. The images from the cameras are transferred back to a processor that can determine if a bottle has not been filled enough for maybe too much.

Application Requirements

- ▶ PoE power may be needed to deliver power to the vision cameras
- ▶ High-speed data is required to transfer data from the cameras to the processor
- ▶ The need to communicate across a wide variety of media and tie in the latest communication with existing legacy devices.

Key Products



LMP-1002G-10G-SFP-24
10-Port Industrial PoE+ Light Layer 3 Gigabit Managed Ethernet Switch



STE-501C
1-Port RS-232/422/485 To Ethernet Device Server



AMS-2111
Industrial IEEE 802.11b/g/n Wireless (Wi-Fi) LAN Access Point/Bridge/Client/ Repeater

Solutions

LMP-1002G-10G-SFP-24: These industrial switches not only provide PoE power to the vision cameras but also have a 10Gig high-speed fiber backbone that can be used to transfer large amounts of data being generated by the machine vision cameras.

STE-501C: Provides connectivity between serial and Ethernet networks to allow modern Ethernet-based products to work with legacy serial devices. A high-speed Ethernet network is required for the machine vision cameras to get the data to the processor.

AMS-2111: When cabling isn't an option wireless devices can be used to make connections quickly and economically.

Application

Public transportation entry and exit points where ticket transactions occur, are often places where safety is a critical concern. Modern surveillance systems are capable of comprehensive coverage of an area at a fraction of the cost of older systems. Industrial Ethernet switches and Wifi devices are found at the heart of these modern surveillance systems.

Application Requirements

- ▶ PoE power may be needed to deliver power to the surveillance cameras and wireless access points.
- ▶ Wireless communication for systems where it may be more convenient and economic than traditional twisted pair communications.
- ▶ Fiber optic cable can transport the information collected in an area back many kilometers/miles to a control room.

Key Products



LMP-1002G-SFP-T
12-Port Industrial PoE+ Gigabit Managed Switch



AMS-2111
Industrial IEEE 802.11b/g/n Wireless (Wi-Fi) LAN Access Point/Bridge/Client/ Repeater



ARY-7235-AC-PD
Industrial Outdoor IP67 Plastic Housing IEEE 802.11a/b/g/n/ac Wireless Access

Solutions

LMP-1002G-SFP-T: This ruggedized industrial switch is capable of powering all the cameras and wireless access points but also allows the engineers to remotely restart any PoE device connected if needed.

AMS-2111: Having a small economical wireless device will give wireless capabilities to devices that would not ordinarily have that feature. Here it allows the data collected from the entry gate to be connected to the wireless network.

ARY-7235-AC-PD: Enclosed in a plastic housing, this wireless access point is impervious to damage that can be caused by the buildup of dust, often seen in train stations.

Unmanaged PoE Switches

Standard Voltage (48-55VDC)

Unmanaged PoE Switches

Low Voltage (12-36VDC)



INJ-C201G Series
Industrial Gigabit IEEE 802.3bt PoE++ Injectors with 1 PoE PSE Port



LNP-0500 Series
5-Port Industrial PoE+ 10/100TX Switches



LNP-0500G Series
5-Port Industrial PoE+ Gigabit Switches



LNP-0501 Series (SC/ST Connector)
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port



INJ-C201G-24 Series
Industrial Gigabit IEEE 802.3bt PoE++ Injectors with 1 PoE PSE Port



INJ-0200G-60-24-T
Industrial IEEE 802.3bt Gigabit Type 3 4PPoE Injector



LNP-0500-24 Series
5-Port Industrial PoE+ 10/100TX Switches



LNP-0500G-24 Series
5-Port Industrial PoE+ Gigabit Switches



LNP-0602 Series (SC/ST Connector)
6-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports



LNP-0702C-SFP Series
7-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit SFP Ports



LNP-0702G-SFP Series
7-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LNP-0800 Series
8-Port Industrial PoE+ 10/100TX Switches



LNP-0501-ST-M-24 Series
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port; ST Connector



LNP-0501-S3-24 Series
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port; SC Connector



LNP-0702C-SFP-24 Series
7-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit SFP Ports



LNP-0702G-SFP-24 Series
7-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LNP-800AGH Series
8-Port Industrial PoE+ Gigabit Switches



LNP-0802C-SFP Series
8-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit SFP Ports



LNP-1002C-SFP Series
10-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit RJ45/SFP Ports



LNP-1002G-SFP Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LNP-0800-24 Series
8-Port Industrial PoE+ 10/100TX Switches



LNP-800AGH-24 Series
8-Port Industrial PoE+ Gigabit Switches



LNP-800AGH-24-T-CC*
8-Port Industrial PoE+ Gigabit Switches w/ Conformal Coating



LNP-0802-M-24 Series
8-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports



LNP-1002G-10G-SFP Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 10G SFP Ports



LNP-1202G-SFP Series
12-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LNP-2602G-SFP Series
26-Port Industrial PoE+ Gigabit Switches w/ 2 RJ45/SFP Ports



LNP-0802C-SFP-24 Series
8-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit SFP Ports



LNP-1002C-SFP-24 Series
10-Port Industrial PoE+ 10/100TX Switches w/ 2 Gigabit RJ45/SFP Ports



LNP-1002G-SFP-24 Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LNP-1002G-10G-SFP-24 Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 10G SFP Ports

* Antaira offers conformally coated products to prevent corrosion from gases, moisture, and debris found in toxic environments.

Managed PoE Switches

Standard Voltage (48-55VDC)

Managed PoE Switches

Low Voltage (12-55VDC)



LMP-0501 Series (SC/ST Connector)
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port



LMP-0600 Series
6-Port Industrial PoE+ 10/100TX Switches



LMP-0601G-SFP Series
6-Port Industrial PoE+ Gigabit Switches w/ 1 SFP Port



LMP-0602 Series (SC/ST Connector)
6-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports



LMP-0501-M-24 Series
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port; Multi-Mode



LMP-0501-ST-M-24 Series
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port; ST Connector



LMP-0501-S3-24 Series
5-Port Industrial PoE+ 10/100TX Switches w/ 1 Fiber Port; Single-Mode



LMP-0600-24 Series
6-Port Industrial PoE+ 10/100TX Switches



LMP-0702G-SFP Series
7-Port Industrial Gigabit PoE+ Managed Ethernet Switches



LMP-0800G Series
8-Port Industrial PoE+ Gigabit Switches



LMP-0804G-SFP Series
8-Port Industrial PoE+ Gigabit Switches w/ 4 SFP Ports



LMP-1002G-SFP Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LMP-0601G-SFP-24 Series
6-Port Industrial PoE+ Gigabit Switches w/ 1 SFP Port



LMP-0602-M-24 Series
6-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports; Multi-Mode



LMP-0602-ST-M-24 Series
6-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports; ST Connector



LMP-0602-S3-24 Series
6-Port Industrial PoE+ 10/100TX Switches w/ 2 Fiber Ports; Single-Mode



LMP-1202M-SFP Series
12-Port Industrial PoE+ Light Layer 3 Managed Ethernet Switches



LMP-1202G-SFP Series
12-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LMP-1204G-SFP Series
12-Port Industrial PoE+ Gigabit Switches w/ 4 SFP Ports



LMP-2602G-SFP Series
26-Port Industrial PoE+ Gigabit Managed Ethernet Switches



LMP-0702G-SFP-24 Series
7-Port Industrial Gigabit PoE+ Light Layer 3 Managed Ethernet Switches



LMP-0800G-24 Series
8-Port Industrial PoE+ Gigabit Switches



LMP-1002G-SFP-24 Series
10-Port Industrial PoE+ Gigabit Switches w/ 2 SFP Ports



LMP-1202M-SFP-24 Series
12-Port Industrial PoE+ Light Layer 3 Managed Ethernet Switches



LMP-2804GN-SFP-T
28-Port Industrial PoE+ Gigabit Switch w/ 4 RJ45/SFP Ports



Managed Switch Features & Highlights

- Network Redundancy: RSTP/MSTP, G.8032
- IGMP
- Quality of Service
- IEEE 802.1Q VLAN
- SNMP
- PoE Ping Alive
- Event Scheduling
- System Warning
- USB Data Load & Backup
- Port Mirroring
- Port Statistics & Control



About Antaira

Antaira Technologies is a leading developer and manufacturer of high-quality industrial networking and communication product solutions. Since 2005, Antaira has offered a full spectrum of product lines that feature reliable Ethernet infrastructures, extended temperature tolerance, and rugged enclosure designs. Our product lines range from industrial Ethernet switches, to, industrial wireless devices, Ethernet media converters, industrial serial communications. Our vast professional experience has allowed us to deploy a wide array of products worldwide in mission-critical applications across various markets, such as, automation, transportation, security, oil and gas, power/utility and medical.



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