



Altronix®

# IP & PoE+ for Long Distance Applications

Whitepaper



## Introduction

Whether it's a sports stadium, a public park, or a campus of buildings, everyone expects IP, Wi-Fi, and internet connectivity to be available wherever they go. While smartphones and devices use Wi-Fi for communications, monitoring and security devices such as high-resolution IP cameras will need wired Ethernet connections for large-bandwidth applications. Whether it is a Wi-Fi access point or a wired IP device, high-quality connectivity and some form of electrical power are needed for functionality. Both of these types of devices need cabled connections that are capable of long distances, high reliability, and have the power element potentially backed up via UPS or batteries in the event of primary power outage.



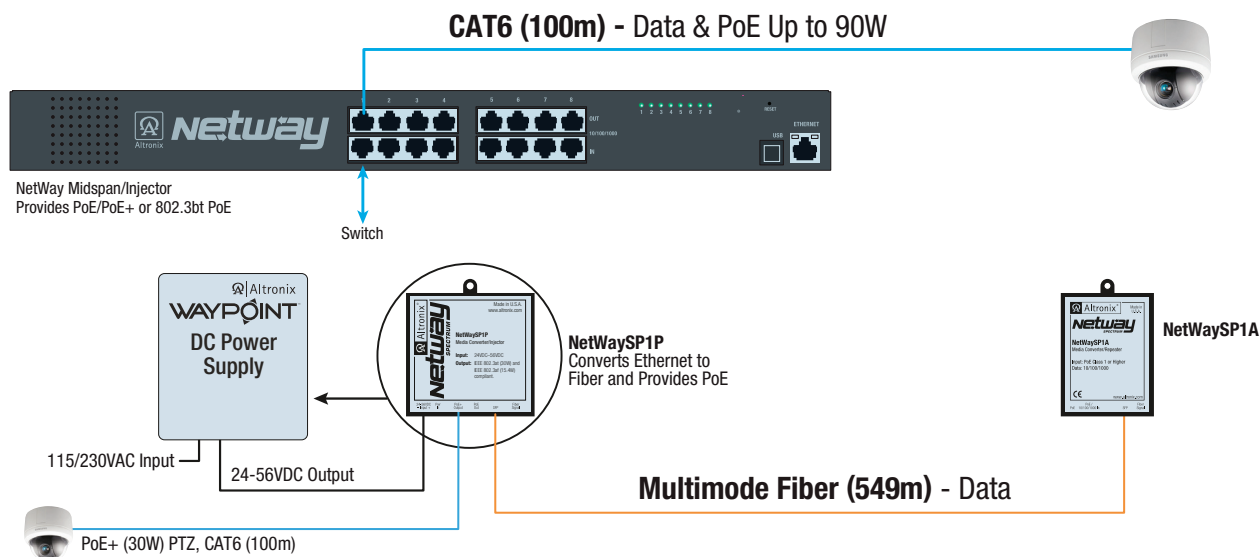
With the new technologies available from manufacturers such as Altronix, the ability to provide long distance and standardized DC power is now available, greatly increasing the potential for connectivity and power to be delivered to remote devices either indoor or outdoor.

## Overview

Every IP device from cameras to Wi-Fi access points requires two types of connections; copper or fiber optic cabling to provide IP data connectivity, and copper cabling to provide power for device operations. The standardization of Ethernet and Power over Ethernet (PoE) cabling such as Cat5e and Cat6 has provided great opportunities for inventive installations of devices remote from the head-end network switching and power supplies. Increasing potential connectivity distances opens up new installation methods that can greatly reduce costs while providing centralized power and IP communications.

## Long Distance Ethernet

While the 328 ft. maximum distance for UTP Ethernet and PoE connections hasn't changed since the late '80s, the manufacturers and standards committees have made great strides in increasing the distances for Ethernet connectivity using fiber optic cables. Fiber optics can provide great distances for 10/100/1000 Ethernet connections, with 50-micron OM3 laser-optimized fiber links rated for up to 550 meters (1804 feet) by the IEEE standards. Singlemode fiber links can readily connect devices at distances over 3280 feet from the head-end to the remote device. There are also manufacturers providing devices that will carry 10/100 Ethernet over coaxial copper cables and standard non-UTP copper cables such as 18-2 and 22-4 cable. By using media adapters existing cabling within buildings and campuses, this can provide high-end connectivity without replacement or new installation of cable, greatly reducing installation time and cost.

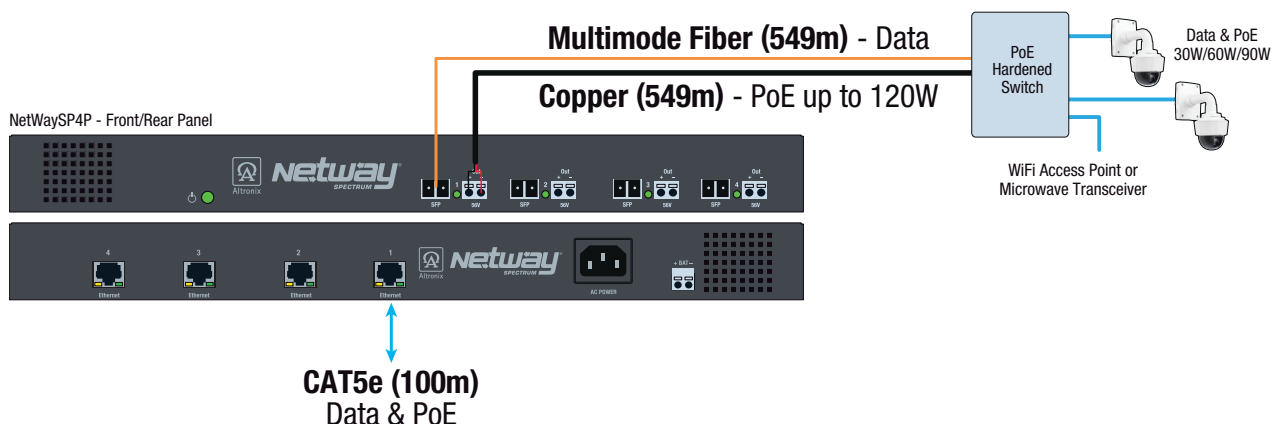


## New Capabilities of Power over Ethernet

Power over Ethernet has been standardized by the IEEE for over a decade. While the initial PoE standard, 802.3af provided for up to 12.95 watts of useable power at the end of a 328 ft. Cat5e/6 link, the next standard 802.3at upped the available wattage to 25 watts of DC power from a PoE switch port or mid-span PoE injector. So, IP devices have become single cable installations, as the Cat5e/6 UTP cable will provide both the power and the connectivity for the remote device.

The newest IEEE PoE standard 802.3bt increases the power output capability, with a maximum of 90 watts of PoE power carried over standard UTP network cabling. This standard almost triples the potential PoE wattage that can be delivered to field devices, easing the installation of devices that have large power requirements.

An offshoot of this new PoE standard is that other types of electrical cables such as coax and non-UTP can be used to deliver power out to great distances while also providing Ethernet connectivity.



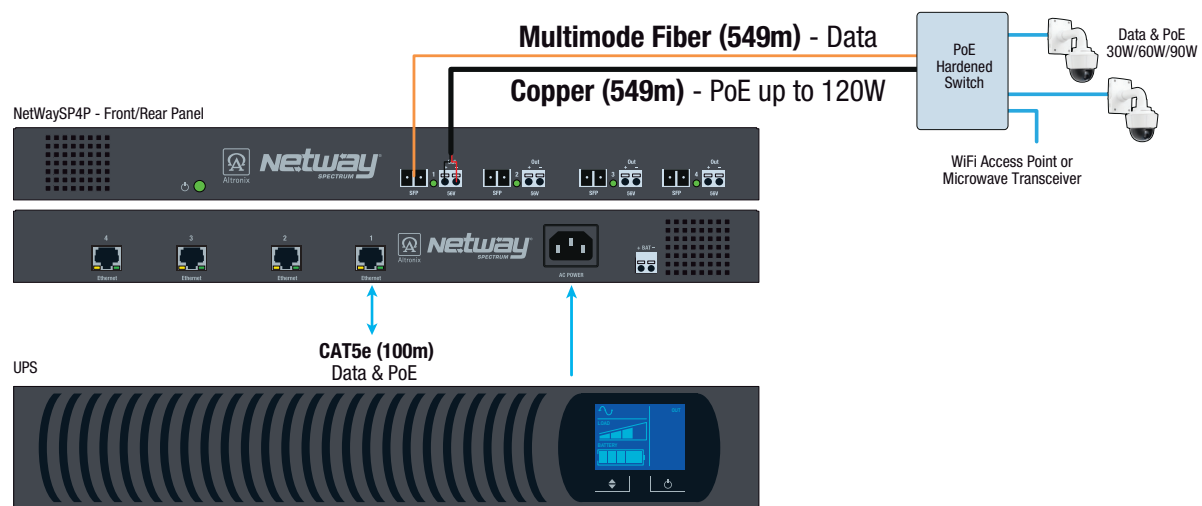
## Power Issues for Life Safety and Security Devices

In the past, many installations required separate remote power supplies to be installed at or near the device to be powered. These separate power supplies always need an AC connection to maintain the proper current, and usually have rechargeable backup batteries that require periodic testing and replacement.



Every remote power supply adds a significant point of potential failure for one or more remote devices, and increases the likelihood of a technician's visit, adding ongoing costs to the operation of any system powered with these remote power supplies. During the installation phase of a system using remote power supplies an electrician will be needed to properly and safely connect the AC to the remote power supply.

## Benefits of Centralized Power



In most cases, remote life safety and security devices such as cameras will require a DC power source to operate. If the power for the devices can be carried via a hybrid cable (usually two copper and two fiber optic links) out to the location of the remote devices, this provides many benefits for both installation companies and end-users.

At the head-end, high wattage power supplies can deliver DC current over long cabling distances for multiple connections, with the size of the head-end power supply being dictated by cable distance and wattage of power required.

## NETWAY SPECTRUM RANGE CALCULATOR

### PoE Distance And Voltage Calculator ?

Total Device Power  Watts

Wire Gauge (PoE)  AWG

PoE+ ? click for PoE or PoE+

Max Distance  Ft

### System Calculations Log Clear

#	Label	Gauge	Power (Watts)	Distance (Ft)	Type	Action
<input type="button" value="Print"/>						

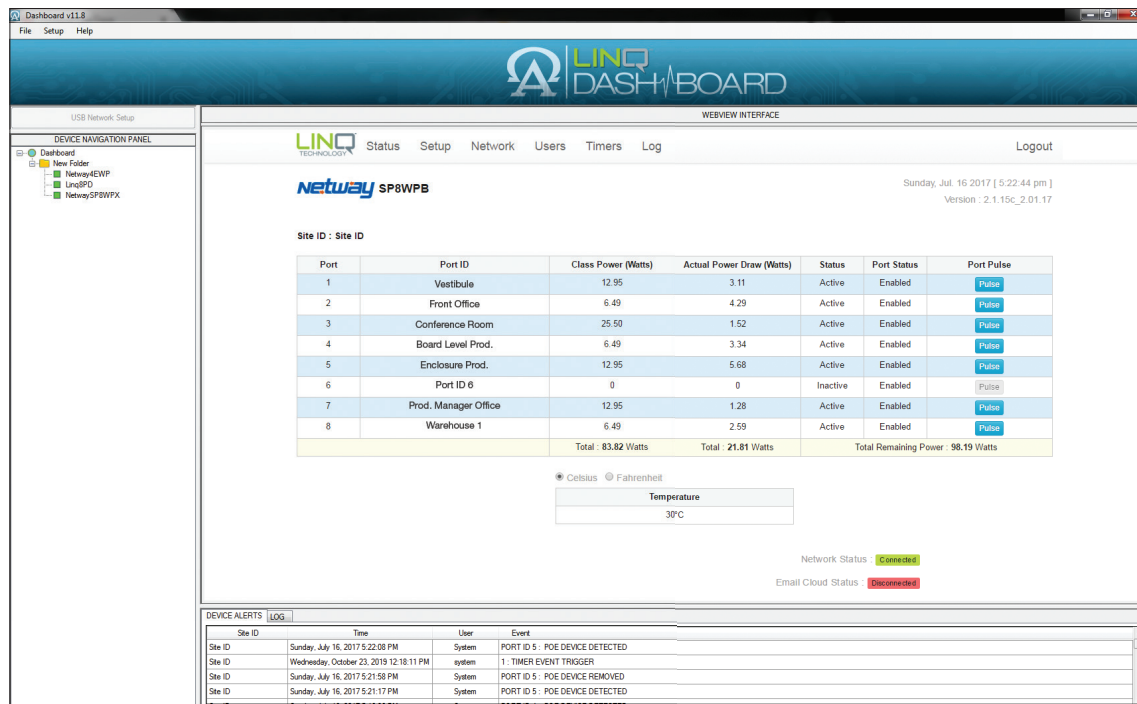
With one source for all power, the ability to “back-up” the power supply can be readily provided by the installation of an appropriately sized Uninterrupted Power Supply (UPS). The testing and replacement of batteries in remote power supplies has been eliminated, greatly reducing potential power problems and servicing calls.

A key cost reduction element when using remote DC power and PoE is that there is no requirement for an electrician to pull AC to one or more remote locations, or to require an electrician to power down devices during servicing. This will provide major cost savings as low-voltage technicians can install and connect the power feeds to the remote boxes at a lower cost than using contracted electricians.





# Remote Control of Device Power



Manufacturers such as Altronix provide power monitoring and control software that if properly configured can allow both local and remote monitoring of power usage and power issues. One key advantage of using power control software such as “LINQ” from Altronix is that individual power feeds can be temporarily interrupted which can often solve the problem of IP devices “freezing” by resetting the device’s power.

## Building Blocks for Remote PoE+ and IP Installations

To plan an installation which will take advantage of these new powering and connectivity methods, engineers and project managers need to understand what’s needed to make specific types of remote connectivity.

## Long Distance Electronic Technology

High wattage 56 vdc power supplies such as the NetWay XYX provide voltage to remote Power Sourcing Equipment (PSE's) and hardened network switches/PoE sources. The DC current is delivered to the remote switch which provides Ethernet connectivity and standardized PoE power to connected devices. Netway data communications are achieved using Small Form factor Pluggable (SFP) modules which can be selected as either singlemode or multimode fiber optic connections, normally using two fiber links from the head end switch to the remote hardened network switch.

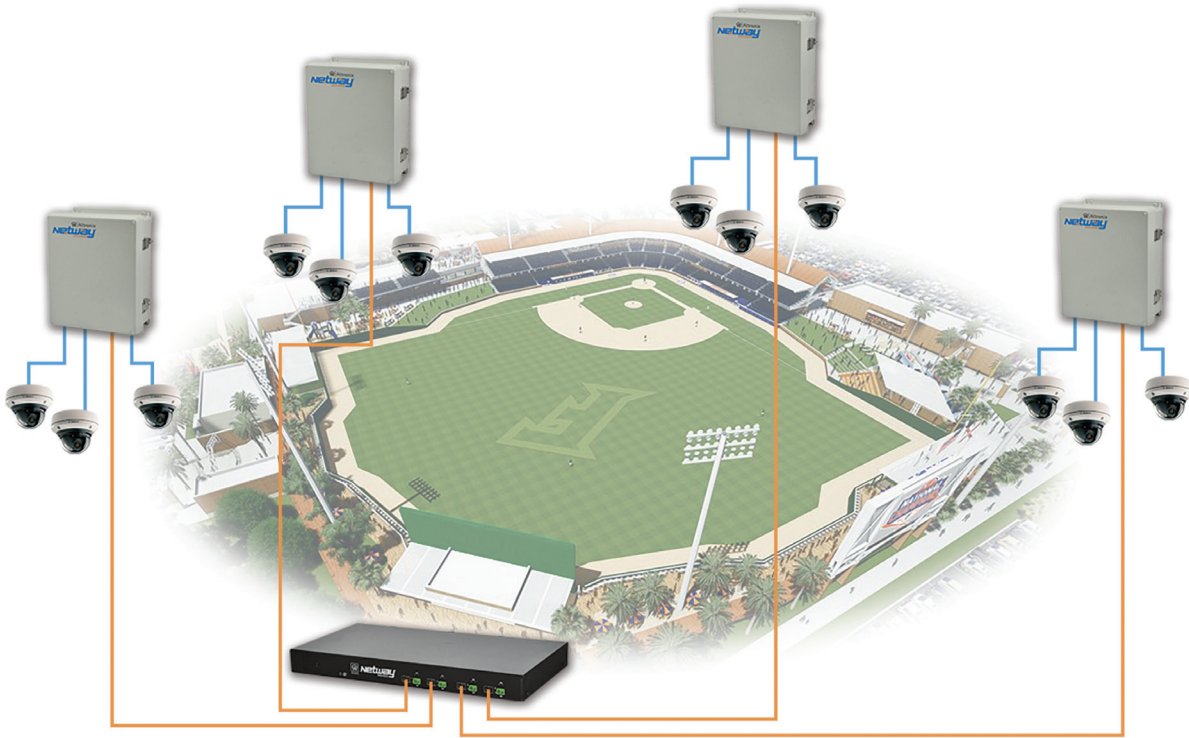
### System Design – Basic Parameters

1. Number and location of planned remote devices
2. Aggregate PoE requirements for all devices to be centrally powered
3. Cabling plan – “ring” or point to point
4. Distance(s) from head-end power to remote IP/PoE switch(es)
5. Environmental Requirements for outdoor devices - waterproof/dust tight- IP66 rated
6. If central powered, selection of power supply output (wattage)
7. Number of SFP modules and connections required
8. Connection to existing IP network/Internet
9. Power backup requirements

Here are three examples of the dynamic usage of hybrid cabling and proper components to provide long distance and/or outdoor IP and PoE connectivity of devices.

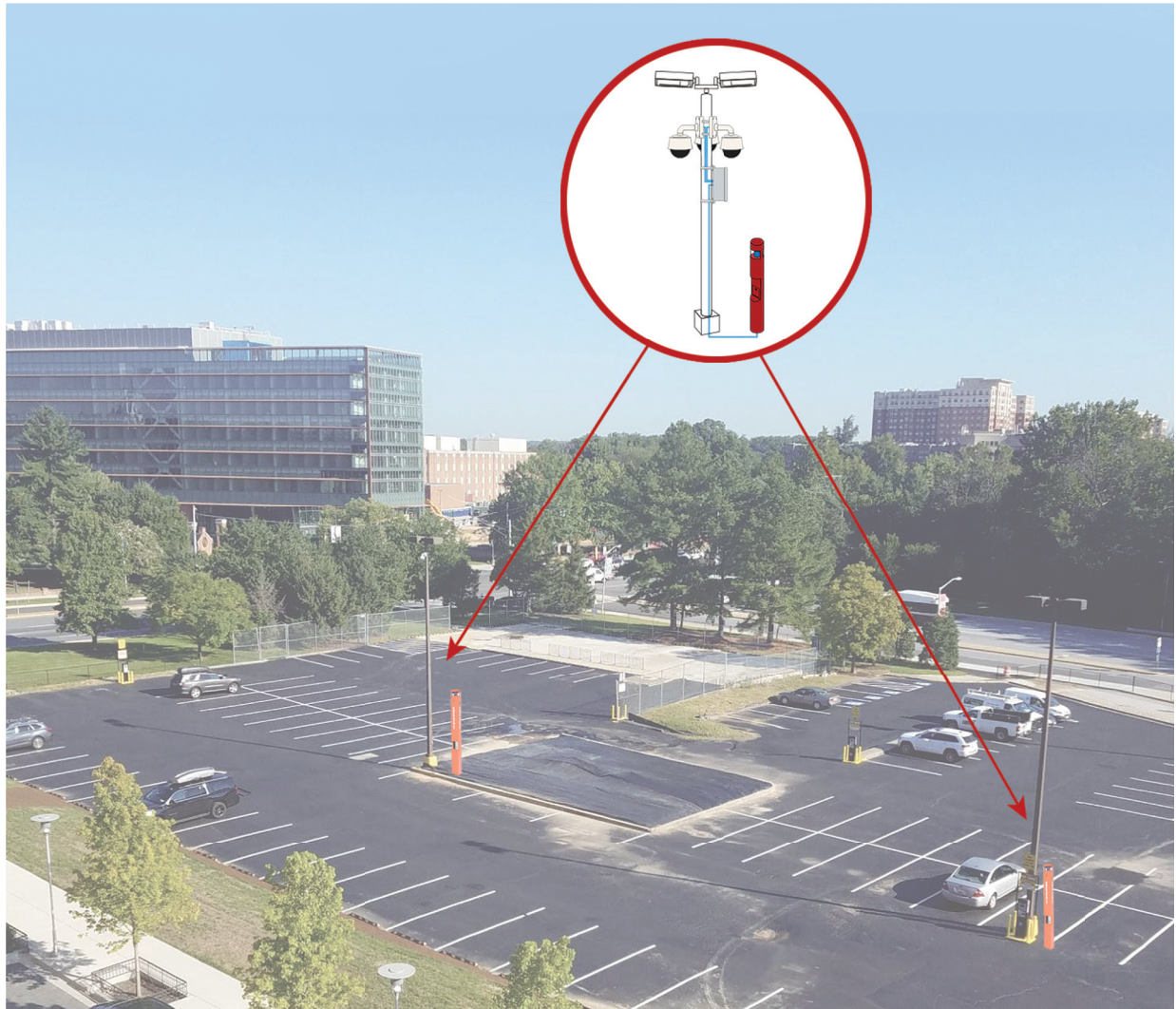


## System Example #1 – Outdoor Wi-Fi Access Point



Smart phone users increasingly expect high performance Wi-Fi to be available everywhere they go. With the latest 802.11ac weatherproof access points, large wireless connectivity can be achieved in public outdoor spaces.

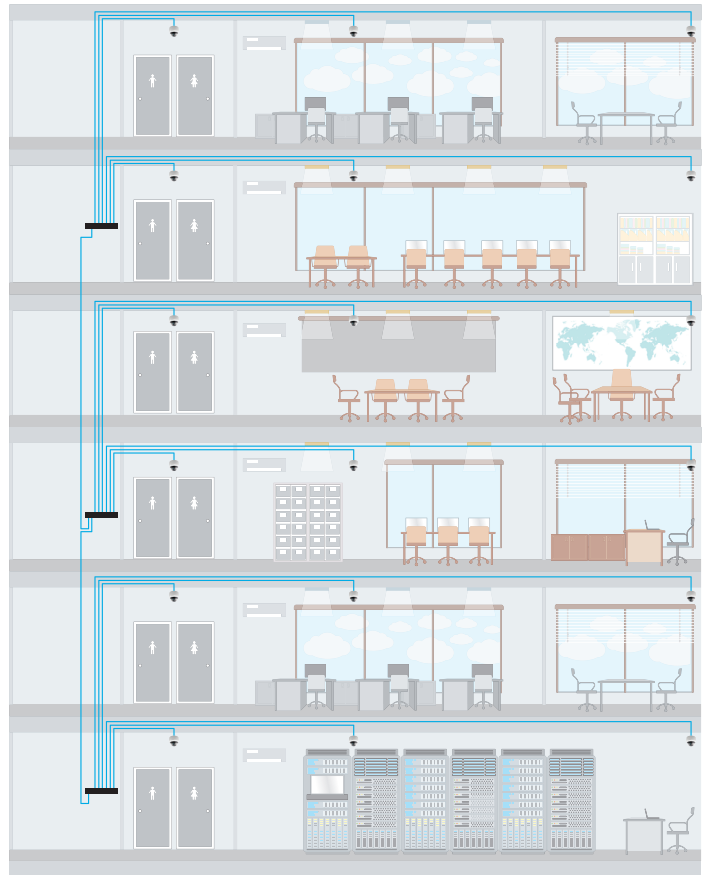
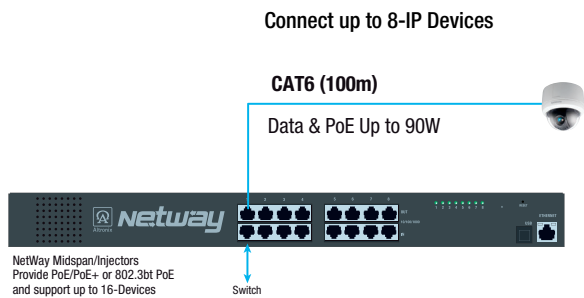
## System Example #2 – Outdoor Cameras



The design of cabling and equipment for the power and connectivity for outdoor IP cameras, emergency phones, and security devices is the same as the Wi-Fi example above, with the added issue of the PoE requirements for the IP cameras that will likely be substantially higher than that needed for Wi-Fi access points.



## System Example #3 – High Rise Security Cameras



Using hybrid cabling in risers, IP and PoE for critical monitoring and security devices can be readily provided throughout a high-rise, large building, or campus of buildings.

## Product Selection and Listings

When planning devices for outdoor/long distance IP and PoE connectivity specifiers should confirm that the devices to be used are properly listed by testing authorities such as Underwriters Laboratories (UL). A critical issue is that the devices selected for outdoor use must be approved for weatherproof installations. Equipment cabinets should be IP66 rated and ruggedized for outdoor use. Equipment cabinet installations should be planned so that they are protected from potential vandalism attacks.

Environmental considerations are also very important for end devices such as Wi-Fi access points, IP cameras, and emergency speakers and telephones.

## The Future for Hybrid Cabling and Hardened Remote Connectivity

The combination of fiber and copper connectivity can greatly reduce installation costs, centralized power, reduced operating costs, simplified and quicker servicing.



Wi-Fi connectivity can be spread across large buildings or outdoor areas, so visitors to parks, museums, stadiums and other locations can experience high quality Wi-Fi services. Electronic monitoring, video surveillance, emergency phones, and PA speakers can be placed both inside and outside of buildings, providing vital information and communications throughout a facility and its surroundings.



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Altronix designs and manufactures innovative solutions that integrate disparate infrastructure and maximize overall performance and efficiency.

Our comprehensive line of power products and peripherals, feature the quality, reliability and unparalleled customer support that have been associated with Altronix for over 40 years – backed by a lifetime warranty.

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