



Future-Proof as a Feature:

Achieving Outdoor IP Resilience with IEEE 802.3bt PoE

White Paper

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Introduction

Modern Ethernet network technologies are growing more complex and robust with each passing year. Every new innovation - more features, better security, expanding sets of powerful applications - opens new possibilities, and delivers solid, bottom-line opportunities for building new value in your technology investments.

Unfortunately, your IP network investments are only as safe and secure as your ability to maintain them. This is particularly true for networks with outdoor application components, such as security cameras, intelligent traffic systems, and wireless access points. From external power surge events to device obsolescence, networks with outdoor exposures face special risks that greatly complicate the task of building cost effective infrastructure resilience.

Future-proofing an outdoor Ethernet network is tough. The good news is that you now have some very powerful new tools for getting the job done right.

Repowering Outdoor Networks with IEEE 802.3bt

Future-proofing as a feature recently took a few steps closer to reality in September 2018, with the approval and ratification of the new IEEE 802.3bt PoE (Power over Ethernet) standards. One of the major intentions behind these new standards was to address the unique needs of outdoor IP network devices.

The first problem that outdoor network devices face is that they often don't get enough power. The prior PoE standard (802.3at) limited Ethernet power delivery to just 30 watts, carried over only two of the cable's four available wire pairs. For electronic devices with low power needs, this was fine. However, more features and greater system complexity means higher power demands, and many modern IP devices now address this 30-watt restriction by limiting the options available to the end user.

Clearly, this wasn't an ideal solution for anyone, prompting the development of a sophisticated and robust PoE standard with greater power delivery capabilities.

This new standard, 802.3bt, represents a major leap forward for PoE technology. Endspans and midspans designed under this new PoE standard can now deliver up to 100 watts of power to devices, using all four wire pairs of a Cat6 Ethernet cable. This, in turn, means that powered devices no longer need to restrict their capabilities for low power scenarios.

Next generation devices now able to utilize PoE include:

Advanced Security Cameras (CCTV). Pan-tilt-zoom (PTZ) security cameras today boast a strong feature list of advanced options, including 1080p HD quality, night vision, highly accurate motion detection, and climate management (heaters/blowers). By incorporating 802.3bt PoE into your network infrastructure, you can now power many of these devices directly from your Ethernet cable, rather than having to rely on conventional power cords and available AC outlets.

Wireless Access Points (AP). Mobile data services in recent years have become a natural part of the background of modern life, its availability taken for granted by many of us. Each new generation of wireless AP boasts wider broadcast ranges, stronger security, better user density management, and support for the latest features and protocols. These innovations will all come with higher power demands, driving the widespread adoption of 802.3bt PoE.

Point of Sale (POS) Terminals. Wherever there is a customer paying with a card for a product or service, there is a point-of-sale (POS) terminal processing the payment. Adoption of 802.3bt PoE offers retailers new flexibility in terminal

placements, allowing them to locate their POS registers conveniently without the need for A/C outlet proximity.

Small Cells. For telecom service carriers, the challenge of providing reliable cell service in high user density areas has been met in recent years by their implementation of “small cell” networks. These small scale cellular broadcast units serve as a more cost effective (and easier to place) alternative to large cell towers. A higher standard of Ethernet-based power delivery means greater flexibility and more efficiency for telecom providers busy developing the next generation 5G service fabric.

And those are just a few. With the adoption of these new PoE standards, we expect to see a general increase in power requirements for outdoor network devices, and a subsequent drop off in the usefulness of older system components. 802.3bt simply raises the bar for every level of outdoor Ethernet infrastructure.

Two Challenges: Interoperability and Surge Protection

Upgrading your outdoor network to 802.3bt, technically, is as simple as either investing in a new PoE switch that utilizes the updated standard, or installing midspan PoE injectors in order to provide the increased power. However, particularly for outdoor network applications, that may not be enough to ensure future-proof reliability.

The first problem is interoperability. Standards, in general, represent an effort to get everyone on the same page, to ensure that compliant devices all function together with a high degree of reliable interoperability. However, saying that your product supports the new standard isn't the same as being able to demonstrate compatibility. Interoperability problems can develop when relying on supporting devices that have not been validated for full power and data throughput and tested for interoperability.

The second obstacle to a future-proof outdoor network infrastructure is the danger of power surges. While any electrical device may be susceptible to transient over voltages, network components with outdoor exposure are uniquely vulnerable. These short duration, high magnitude surges can be the result of lightning, faults or failures in utility infrastructure, insulation failures, or the power cycling of nearby large appliances. A power surge can damage or destroy delicate equipment, as well as interrupt data transmission over connected cabling.

On average, a typical Ethernet switch reaches the end of its effective lifespan after three to five years of operation. When the time comes for a network upgrade, these three factors - 802.3bt compliance, interoperability testing, and strong surge protection - are going to determine the resilience and reliability of your outdoor Ethernet infrastructure.

Most organizations, however, are not planning full switch upgrades in the immediate future, and instead would prefer to extend the lifespan of their current network. Fortunately, cost effective options exist to tackle all of these issues, with a single high quality 802.3bt power delivery solution from Infinite Electronics.

Future-Proof in a Kit: Surge-Protected 802.3bt

Transtector Systems now offers kits that combine 802.3bt power injection, reliable data line surge protection, and quality L-com RF-shielded Cat6a cable assemblies, available in unified solutions that have been matched, tested and validated for interoperability and full data and power throughput.

These solutions include:

Transtector surge-protected PoE+ injector:

- 802.3bt compliant, 100W PoE+ midspan power injection
- Exceeds maximum PoE level
- Surge protection supporting GbE and PoE/PoE+/PoE++ protocols
- Compatible with Cat5/5e/6 cables
- Hybrid SASD/GDT full-mode lightning protection
- UL497B, IEC 60950-1 certified

L-com cable assembly:

- Category 6a rated
- Polyethylene (PE) insulating jacket, providing moisture, water, and UV protection for outdoor installation or direct burial
- Foil shield, protecting against EMI/RFI interference
- Temperature range: -40°C to +70°C

These assemblies have been rigorously tested and validated together to ensure full power and data quality and reliability. In addition, they have certified together by the Ethernet Alliance for standards compliance and component interoperability.

With these kits, you can:

Start using 802.3bt devices today. With this PoE injector solution, you can supply up to 100 watts of power via a midspan PSE to meet the energy needs of 802.3bt-compliant network devices. You don't need to wait for a major switch upgrade, or settle for living with outdated, under-featured and increasingly obsolete devices.

Extend the lifespan of your existing network infrastructure. Not every network needs an immediate upgrade to 802.3bt at the switch level, particularly when you only need the higher power level delivery for specific devices or limited applications. In contrast to the costs involved with full switch replacements, injecting power locally can be an attractive cost-effective alternative.

These kits allow you the best of both worlds: the full benefits of 802.3bt-compliant PoE technologies, along with the ability to choose when and where your upgrade expenses are going to do the most good.

Protect your outdoor power delivery. Don't risk losing expensive new network devices to transient overvoltages. Our Transtector power surge systems protect your outdoor network from power surges carried by the Ethernet cable, and our hybrid SASD/GDT architecture delivers exceptional protection against lightning-related damage. Combined with robust, shielded L-com cabling, these PoE+ injector kits offer not only a strong defense against surge-related equipment damage, but they protect your data transmission integrity as well.

Enjoy certified interoperability compliance. These 802.3bt PoE+ injector solutions have been fully certified for interoperability and standards compliance by the Ethernet Alliance. By providing certification as a combined application/cable kit, we are able to ensure that your network devices receive the resources and protection they need to function properly.

Towards Future-Proof as a Feature

It is easy to claim that a technology is future-proof, but how far into the future? While new innovations can certainly extend the lifespan of your network investments, we are still a long way away from a world in which untested and unreliable upgrade scenarios are a thing of the past.

However, the adoption of new standards such as 802.3bt are important steps in that direction, and we at Transtector Systems are proud to play a part in that progress. At the heart of what we do is a simple idea: it is your network, and you should be free to make your own investment decisions according to your own strategic and business needs, and on your own timetable.

With solutions such as our new 802.3bt PoE+ protection kits, we are working to provide you with the tools you need to build truly future-proof networks. Flexible, up to date, taking advantage of the latest technologies, and still in your control: these are the networks we want to help you build, with solutions that we are confident will sustain lasting bottom-line value.

For more information about Transtector Systems network solutions, contact us at 1-800-882-9110.