

TECHNOLOGY BRIEF

WHAT IS HIGH POWER POE?

Industry Standard Paves Way to Power Emerging IoT

THE POWER DEMANDS OF EMERGING IOT

Designing a network that's ready to support the explosion of IoT devices and the latest wireless technologies is a challenge. Future proofing a network requires special consideration that addresses network capacity planning for both speed-based performance and to power network devices. Power over Ethernet (PoE) is an access layer technology which combines both data signals and electrical power into a single Ethernet cable connection to enable remote powered device operation. By eliminating the need for separate data and power cables, PoE provides the advantages of simplicity and cost savings, while adding new intelligent device control capabilities.

Driven by the need to connect emerging power hungry IoT devices, PoE technology has progressed with the introduction of the IEEE 802.3bt standard. This new standard allows switches and powered devices to operate above 30 Watts of PoE per port and support up to 60 and even 90 Watts of PoE per port.

THE CONVENIENCE OF POWER OVER ETHERNET (POE)

For almost two decades, PoE has been used to connect network devices that required low voltage power. IP phones sitting on desks and basic security cameras hanging from ceilings were some of the first devices to take advantage of this technology. PoE runs over twisted pair cabling, which is prevalent worldwide and can also be quickly installed, often without a skilled electrician. Twisted pair cabling can be installed in difficult to reach locations where pulling electrical power is not feasible.

This technology also includes capabilities to lower power consumption during idle periods. And with the data signal capabilities, status can be monitored and information shared between a switch and powered device in order to manage the amount of power delivered to the remote device.

POE TECHNOLOGY ENABLES TRANSFER OF DATA (ELECTRIC SIGNALS) AND ELECTRIC POWER OVER THE SAME CABLE

| | | |
|--|--|-----------------------------|
| Easier and quicker to install Locate anywhere | Lower cost cabling Low maintenance Conserve energy | Monitor and control devices |
|--|--|-----------------------------|

Figure 1: Benefits of PoE technology



IEEE 802.3BT STANDARD (4-PAIR POWER OVER ETHERNET)

Industry standards broaden appeal for new technologies so customers can be assured of multi-vendor products working together which is very critical for network operations. Proprietary solutions can limit customer choice by locking them in to a single vendor and restricts the flexibility to adopt the latest, most advanced, industry standard devices as they become available.

PoE standards developed by the Institute of Electrical and Electronics Engineers (IEEE) have evolved over the past two decades to support large increases in power transmission and faster data speeds with intelligence. These all work together to expand the adoption of the standard and drive demand for new device support.

| Standard | IEEE 802.3af | IEEE 802.3at | IEEE 802.3bt | | | |
|----------|--------------|--------------|-----------------------------|-----|-----|-----|
| Power | 15.4 W | 30 W | 45W | 60W | 75W | 90W |
| | 2003 | 2009 | 2018 High power standard | | | |

Figure 2: The progression of IEEE Standards for PoE

In 2003, IEEE published the 802.3af standard, which outlined the characteristics of Power over Ethernet (PoE) at up to 15.4 W of DC power, running over 10BASE-T and 100BASE-T. Power was delivered over two of the four twisted pairs on Cat 3 cabling or higher.

In 2009, IEEE introduced 802.3at, also known as the “PoE+” standard. This update allowed for the delivery of up to 30 W, and supported 1000BASE-T over CAT 5 or 6. It also limited power delivered over two of the four cable pairs. While PoE+ switches support devices that require higher power, they can also detect devices requiring 13 Watts or less and deliver the appropriate level of power required.

In 2013, IEEE announced the study group for creating 802.3bt, which defined PoE over four pairs and includes support for 10GBASE-T, 5GBASE-T, and 2.5GBASE-T over CAT5e or higher. The IEEE 802.3bt standard was finalized in September of 2018 and defines two types of PoE:

- Type 3 which supports up to 60 Watts
- Type 4 which supports up to 90 Watts

This new technology uses all 4 pairs in an Ethernet cable to deliver power and data over the same medium.

| TYPE 3 - 802.3bt | | | | | TYPE 4 - 802.3BT | | | | | |
|---|-------------------|-------------------|-------------------|--------------------|------------------|-----------------|-------------------|--|--|--|
| TYPE 1 - 802.3af | | | | TYPE 2 - 802.3aT | | | | | | |
| CLASS 1 4 W | CLASS 2 7 W | CLASS 3 15.4 W | CLASS 4 30 W | CLASS 5 45 W | CLASS 6 60 W | CLASS 7 75 W | CLASS 8 90 W | | | |
| 2-PAIR ONLY (TYPE 1 & 2) 2-PAIR OR 4-PAIR (TYPE 3 & 4) | | | | 4-PAIR ONLY | | | | | | |
| CLASS 1 3.84 W | CLASS 2 6.49 W | CLASS 3 13 W | CLASS 4 25.5 W | CLASS 5 40 W | CLASS 6 51 W | CLASS 7 62 W | CLASS 8 71.3 W | | | |

Figure 3: IEEE 802.3bt Classes and Types



DEMAND FOR HIGH POWER POE

Applications for Power over Ethernet continue to grow as the technology and standards advance. Emerging applications that are poised to take advantage of new higher power wattage needs at the access layer include:

- Building infrastructure such as LED lighting
- Retail POS systems and digital signage
- High Performance Wireless Access Points that support IEEE 802.11ax and 802.11ac Wave 2 that may require more than 30 W to function or that can take advantage of the increased watts to provide “pass-thru” power to an endpoint
- High definition pan-tilt-zoom security cameras with heaters for harsh environments

These are just some of the use cases that IEEE 802.3bt will support. As new devices emerge in office spaces, in manufacturing facilities, and within campuses, the use cases will flourish.

SUPPORT FOR HIGH POWER POE STANDARDS

Aruba consistently delivers standards-compliant, rather than proprietary solutions, to the marketplace. This focus on standards enables customers to be confident in the design and deployment of a high power PoE solution from Aruba.

Aruba switches with IEEE 802.3bt provide up to 60 Watts to all standards-compatible powered devices – which means your infrastructure investment will provide value into the future as new devices and applications come to market. As further proof of our commitment to industry standards, Aruba switches are among the first products to be listed on the Ethernet Alliance (EA) Certified PoE Product Registry which helps ensure reliable, network interoperability.

SUMMARY

Considerations for the design, deployment, and management of a smart digital workplace requires network capacity planning for both the demands of a highly mobile workforce and the increasing use of IoT devices. The new IEEE 802.3bt standard for high power PoE provides the capacity and future proofing for networks currently experiencing constraints or planning for growth. IT departments can now rest assured that their network infrastructure can handle the needs of new and emerging power hungry IoT devices.

To learn more about Aruba switches with support for IEEE 802.3bt, visit the [Aruba website](#) for product data sheets, technical overviews, and more.