SIEMON™

Supporting Application Operation Beyond 100m

TECH BRIEF

Reading Time: 4 min.

The Need for Extended Reach

Do your customers occasionally struggle with installation design when there's a need to support low speed (10 Mb/s and 100 Mb/s) devices beyond 100m? Flexible and future-proof infrastructure solutions include installing another telecommunications room (TR) close to the devices or using optical fiber cabling in conjunction with media converters. However, if there's only a couple of devices and no future upgrades are anticipated, a third option is to specify an extended reach cabling solution that supports the specific communication and powering protocols required by the device.

Application-specific extended reach support distances for Siemon's most popular cabling systems (TERA® 1000 MHz, Z-MAX® 6A Shielded, Z-MAX® 6A UTP*, and System 6®) are derived using a mathematical approach. Using this method, the worst-case transmission performance of a cabling system is compared against the minimum data and remote powering application requirements to determine an Engineered Channel capable of operation beyond 100m. Engineered Channels are assessed for performance across the entire frequency range. Conditions, such as environmental temperature, are factored into the calculations. Unlike Equipment Reliant approaches, which utilize field testers, bit error rate (BER) testing, or switch link status to make go/no-go determinations in a specific environment, Engineered Channel application support reaches do not vary from channel to channel or installation site to installation site. Engineered Channels guarantee reliable and repeatable performance because typical or average channel data and unallocated margin aren't used in the calculations.

The **transmission parameters** that constrain data and power application reach operation are:

INSERTION LOSS: Signal strength lost over a transmission line, measured in decibels (dB)	Insertion loss constrains reach in elevated temperature environments. Engineered Channels with superior thermal performance, such as TERA and Z-MAX 6A Shielded, support longer reaches.
PROPAGATION DELAY: The amount of time it takes for a signal to travel across a transmission line, measured in nanoseconds (ns)	TERA 1000 MHz and System 6 have propagation delay headroom compared to Z MAX 6A Shielded and Z-MAX 6A UTP* so can support longer reaches for applications constrained by propagation delay.
DC LOOP RESISTANCE: The total resistance of the circuit formed when the two conductors of a pair are shorted together on one end, measured in ohms (Ω)	DC loop resistance constrains Type 2 and higher PoE applications, but not data applications. The 22AWG conductors in TERA 1000 MHz Engineered Channels have less resistance and support longer reaches when PoE is deployed.

Key Takeaways:

- An Engineered Channel modeling approach conservatively determines application-specific (10BASE-T and 100BASE-T data rates and Type 1, 2, 3, and 4 PoE) support beyond 100m.
- TERA 1000 MHz cabling has the most headroom for all constraining parameters and supports the longest reach for all applications and temperatures.
- Z-MAX 6A Shielded supports longer reach than Z-MAX 6A UTP* at elevated temperatures when insertion loss is the limiting parameter.
- Only TERA 1000 MHz Engineered Channels provide meaningful extended reach support of 1000BASE-T (up to 111m), 2.5/5GBASE-T (up to 111m), and 10GBASE-T (up to 110m), both with and without PoE.

Siemon Engineered Channel Reach

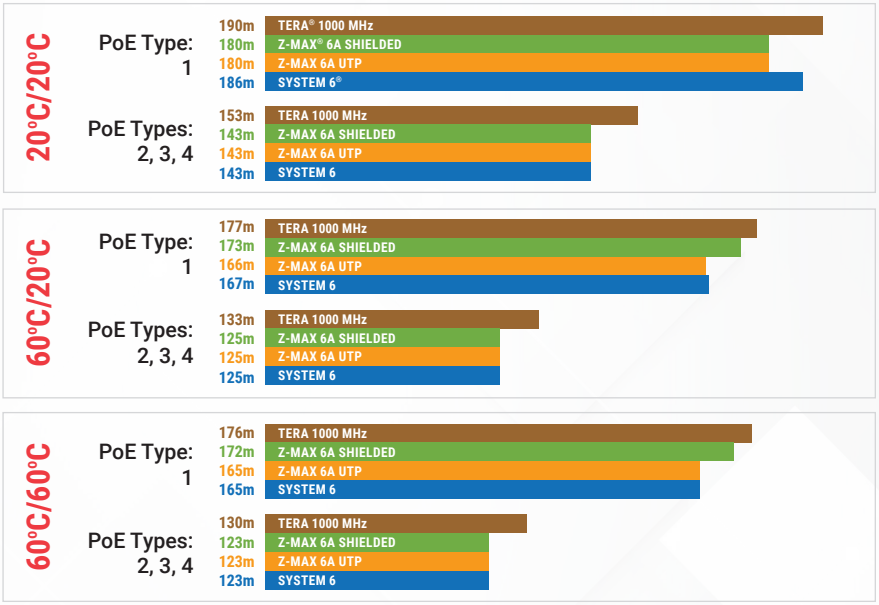
Siemon Engineered Channel models assume 4 connectors and 10m of stranded patch cord. Worst case reach is application (power and data) specific and calculated for the following three operating conditions:

20°C/20°C
Horizontal cable and cordage at 20°C

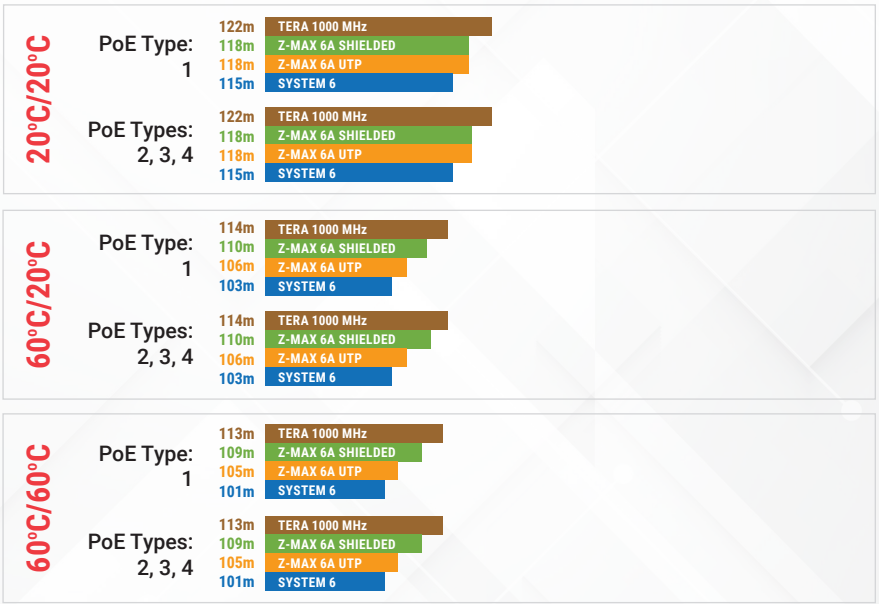
60°C/20°C
Horizontal cable at 60°C and cordage at 20°C

60°C/60°C
Horizontal cable and cordage at 60°C

10BASE-T Reach with Siemon Engineered Links



100BASE-TX Reach with Siemon Engineered Links



Reducing the number of connectors in the Engineered Channel does not change maximum reach length and extended reach support of 100BASE-TX is independent of PoE deployment.

Best Practices

Engineered Channels should be used judiciously and by exception to resolve the specific problem of supporting a limited number of low-speed devices, like cameras or building automation systems such as access control, beyond 100m. Since these implementations are application-specific, support of higher speed applications and equipment upgrades cannot be guaranteed. Engineered Channels are not intended for use as a design strategy to reduce the total number of TRs in an installation.

Specifying TERA 1000 MHz Engineered Channels, deploying an additional TR, or using optical fiber cabling in conjunction with media converters, is recommended for supporting wireless access points (WAPs) and other devices operating at 1 Gb/s and higher speeds.

Siemon recommends specification of Standards-compliant 100m channels guaranteed to support future application and equipment upgrades whenever possible.

*Z-MAX 6A UTP references also apply to UltraMAX™ 6A UTP systems.

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