

Power over Ethernet – Design Considerations for Electronic Access Control

Power Over Ethernet, run network cabling and power comes along for the ride who doesn't like a two for one deal! With an ever growing array of devices using this technology to avoid the need to supply separate power it's no surprise that a growing range of access control devices are capitalizing on this technology. Millennium Group recently announced the availability of our POE compatible NetDCD door controller just for this purpose!

But dig a little deeper and the decision to use POE versus more conventional power solutions include numerous and complex factors. This white paper is intended to provide some basic information and guidance related to the deployment of Power over Ethernet in Access control systems.

When deciding to deploy an access control solution using POE, three key factors need to be considered.

1. How much power do I need at each door
2. What is the distance between network switches or nodes and door controllers
3. What is the relative installed cost POE vs Conventional RS-485

How much power do I need at each door

While POE can power many things, there are some substantial limitations in the total available power. Two common variants of Power Over Ethernet exist, POE according to the 802.3AF spec is limited to a total of 15.4 Watts, or 350 mA and POE+ per the 802.3at standard which provides 25.5 Watts and a maximum current of 600 mA. This can represent a real limitation as it represents the total allowed power demand at all devices powered over the POE circuit. For example, when you think of a door with a strike drawing 450 mA, a reader drawing 150 mA, a controller drawing 50 mA and a REX drawing 50 MA you can see how easily it is to exceed the power availability of even the higher spec POE+ standard. Careful planning of the total power requirements of the door including all ancillary devices is critical to ensuring that supplemental power supplies are not required.

Distance between Nodes

Wiring distances can be very meaningful when deciding POE versus conventional because of two key differences in network topology. The major difference is that POE wiring must conform with the relevant IEEE 802.3 standard for wired ethernet whereas most communication wiring for conventional access control needs to comply with the TIA-485 standard.

While there are many details related to full compliance with the ethernet wiring standard, two major factors effectively drive the efficiency of the design. The first is the requirement that there is a maximum of four connections between a hub or switch and the end point device, and that the connection between these devices be continuous. Put another way, POE wiring generally requires that every device be connected to a switch or router in a "homerun" configuration. Further, the maximum allowed length of each of these connections is 100 meters

or 328 ft. In a large facility, meeting this requirement can prove challenging particularly in parts of the facility that would not normally have a dense network of wired ethernet.

Conventionally wired access control utilizing RS-485 wiring has a much more flexible wiring standard, allowing many different wiring topologies including daisy chain, loop, T-Tap and other along with maximum permissible wiring lengths of up to 1200 meter or 4000 feet. It's rare when a building topology can't be easily and efficiently served with the flexibility provided by RS-485!

Relative Cost

There are secondary costs to consider for each option that can make a meaningful difference in the ultimate installed cost. For example with POE the termination of the Cat 5 or 6 cable with an RJ-45 jack requires significantly more care and precision than the simple screw terminals typical of RS-485. Things like POE+ switches or power injectors need to be carefully specified, approved by IT and provided adequate power and cooling.

At the end of the day it always comes down to a question of cost. For a relatively small building that already has an extensive wired ethernet and relatively low power demand exits, POE can leverage this existing infrastructure to reduce time to installation and installation costs. For large facilities, with many doors separated by long distances, and a less dense existing ethernet infrastructure, conventional wiring is likely to be a much more cost-effective approach.

In many cases, a mixed infrastructure can represent the most efficient option. Having a detailed understanding of the relative advantages and disadvantages of each approach is critical to optimizing the access control network infrastructure and delivering the most effective and efficient solution.

Millennium Group Inc. is a growing provider of reliable, highly scalable state of the art building access control solutions. With a legacy stretching back more than 50 years as a premier supplier of high quality access control to organizations of all sizes, we focus on partnerships with factory trained and certified system integrators to ensure that every system is carefully tailored to meet the unique needs of building owners. Whether you have one door or thousands of doors across multiple campuses, Millennium has a solution for you.