Technical Information Paper

Edge Devices for Access Control

Introduction

Edge Devices or Edge Readers are often promoted as being the ideal solution for access control due to ease of installation and communication. When considering the option to use an edge device, this paper outlines some of the points to consider.

Security Management System to Edge Device Connectivity

Two primary requirements for connectivity are access control data and power supply. Many devices make use of POE (Power Over Ethernet) to combine the power supply and data in a single cable, a CATx (CAT5, CAT6, etc) cable.

The CATx cable uses some of the wires within the cable for supplying DC power to the device.

Internationally recognised standards for providing a POE are available. These are:

- IEEE 802.3af-2003 providing up to 15.4 Watts of DC power at approximately 48 volts to each edge device. Note that the 15.4Watts is the supplied power. When power dissipation in the CATx cable is taken into account, approximately 13 Watts only is available at the device.
- IEEE 802.3at-2009 is also known as POE+ This standard allows for up to 25.5 W of supplied power. Again, after power dissipation, approximately 20 Watts is available at the edge device.

Assuming a nominal 12 volt system, this means that POE can support a 1 Amp load and POE+ can support a 1.6 Amp load.

- An edge device is likely to draw 200 mA with the door control relay operated.
- An electric strike or mortise lock will draw approximately 250 mA.

- A magnetic lock will draw approximately 500mA[1]

Therefore the total load at a single door will be between 450mA and 700mA. Allowing for start-up current peaks, a rough guide will be for:

- POE One access controlled door complete with electric lock.
- POE+ Two access doors complete with lock.

The power source for the edge device needs to be provided from a network switch (end-span switch) or a special purpose injector (mid-span device).

Caution is needed when specifying POE systems where the expectation is to draw maximum current from all network ports on the switch. Most switches available cannot provide (for example) 15 Watts per port for 24 ports. They will offer this over 12 ports or, alternatively, 7.5 Watts over all 24 ports on the switch. On this basis, 7.5 watts will only support the reader electronics with a very small amount of power available to control a lock.

Another consideration is that to ensure 100% availability of an access control system running over a network, all network devices required for access control must have adequate back up power supplies provided. This is particularly true for POE based equipment, where without power via POE, the edge device cannot function at all.

From an installation perspective, providing edge device connectivity allows a single network cabling contractor to provide all network cabling as a single contract. The alternative is for the security contractor to provide the security network.

To summarise:

- The power available via a POE connection is limited.
- It is unlikely that all ports on a POE switch will be able to supply the maximum 15/25 Watts per port.
- The start-up current required or all controllers having to start up from cold after a power outage needs to be considered.
- If 100% service level is expected, then all network devices in circuit will require a backup power supply.
- The customer requirements for the installation contract may determine if a single source contractor is preferred or not.

[1] The holding force of a magnetic lock will determine the current required. The greater the holding force, the greater the current. Beware of “low power” when referring to a magnetic lock (not applicable to magnetic shear locks). Locks having a holding force of less than 300lb are only suitable for cabinets etc. Doors should be fitted with 1200 lb minimum, locks.

Edge Device Security Monitoring

A typical access control edge device is a self-contained electronic assembly consisting of access card reader, door monitoring sensor inputs and the electronic controller. A self-contained edge reader has a door control relay. This means that the control of the door is on the public or unsecure side of a door. This in turn means that if the edge device is removed from the wall, the control contacts are exposed, allowing a person to gain access through the door by activating the door control relay.

It is important to keep the door control relay and associated circuit on the secure side of the door.

To overcome this situation, the door control functions must be installed on the secure side of the door. This is achieved by installing the reader only on the public side and the remainder of the controller on the secure side.

For both edge device and traditional system installations, the door status monitoring and door release buttons still require wiring in the vicinity of the door. An edge device does not eliminate the need for door control wiring.

To summarise:

- The door control relay must be provided on the secure side of the door only.
- For both traditional and edge device installations, door monitoring with associated wiring is required.

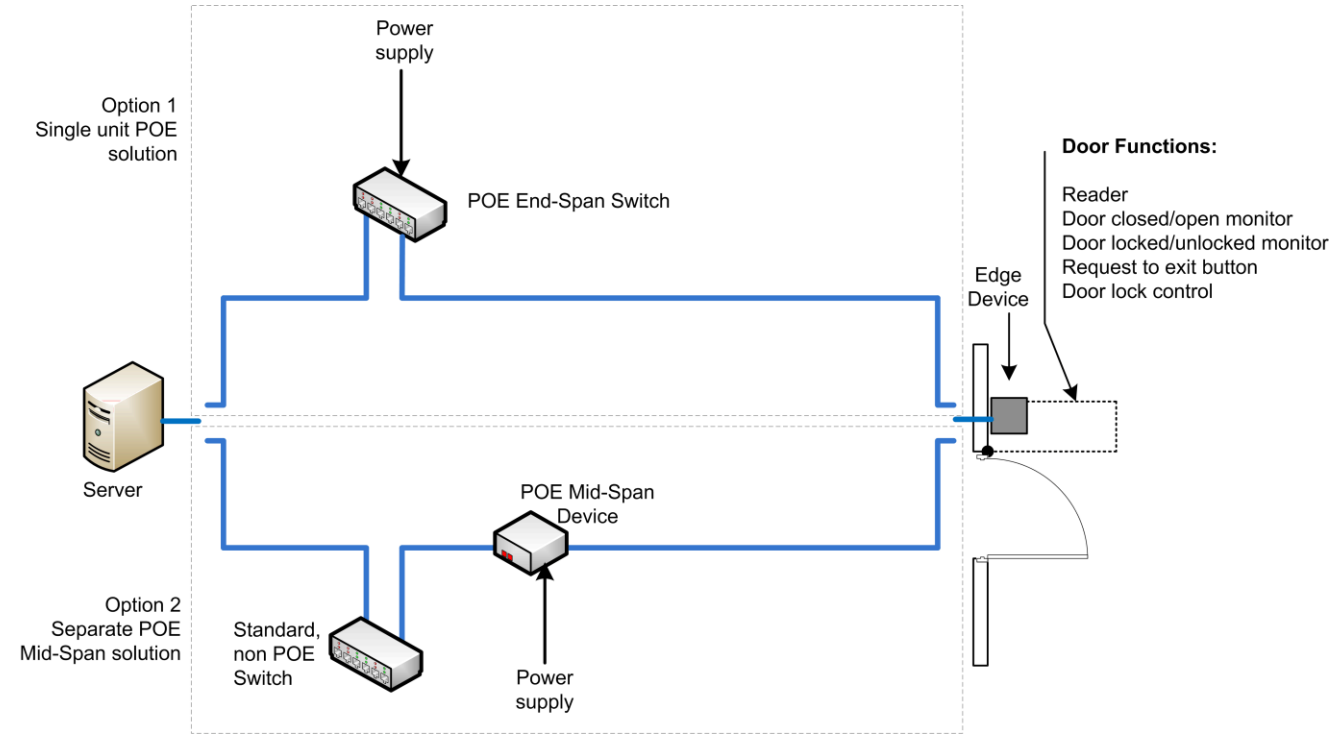


Diagram 1 – Network POE Options

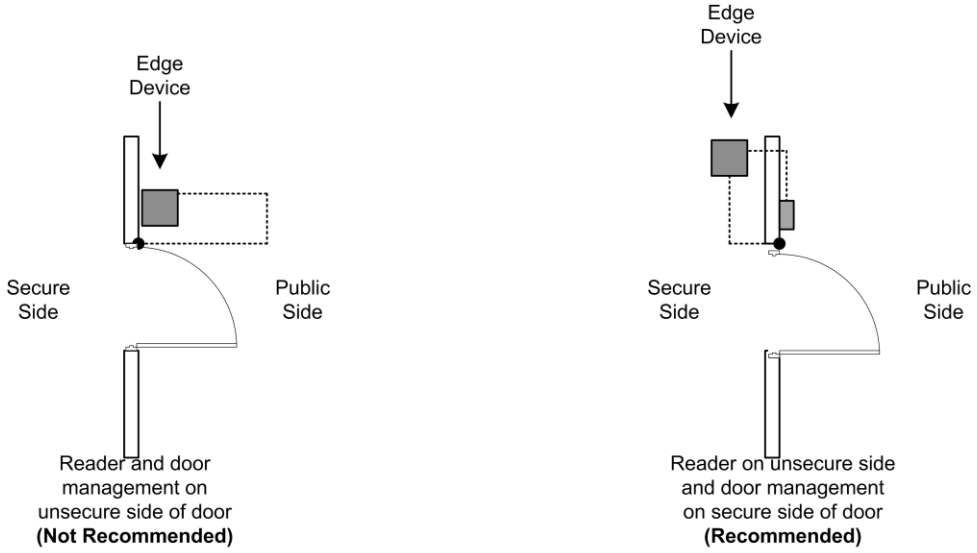


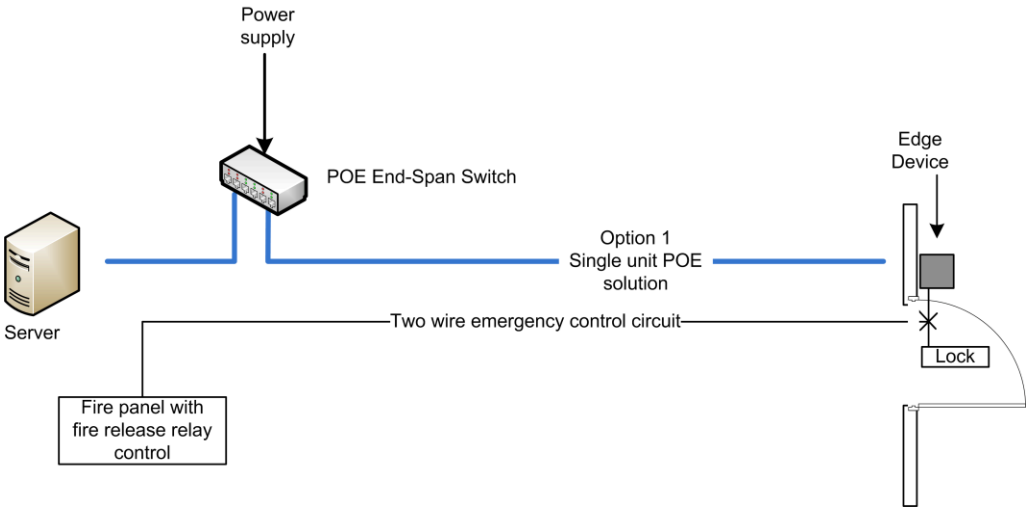
Diagram 2 – Door Function Wiring

Fire Release for Doors

Another consideration is the method for unlocking doors for emergency exit, often referred to as “fire release”. Emergency door release should not rely solely on software to unlock a door. The preferred method (often this is a regulatory requirement) is to provide a failsafe mechanism. This is achieved by providing a relay control from the building fire system that when operated, will remove power from the lock, allowing the door to be freely opened. Should a fire destroy the fire control circuit, this has the same effect as the fire panel control by removing the power supply to the lock.

To achieve this via a POA configuration requires the POE voltage source to be interrupted. The negative side of this action is that the edge device also loses power. When the edge device restarts after the emergency has concluded, the in-rush current into several edge devices connected to a single End-Span switch may be such that the edge devices may not start or make take an excessive time to restart.

To overcome this situation, it is necessary to provide a fire release circuit to each door lock requiring emergency release.



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