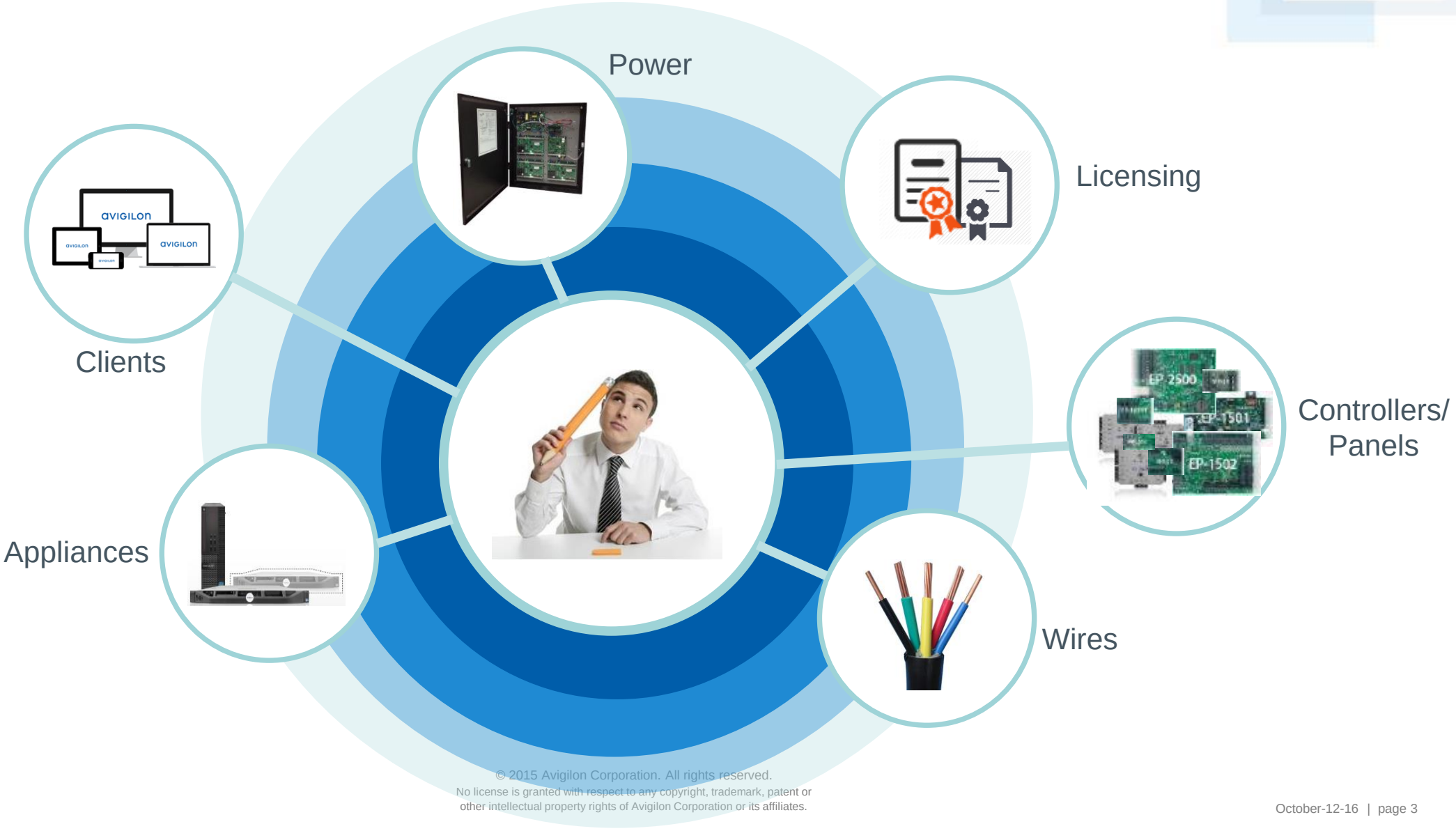
ACM Designing

Requirements



ACM Appliances and Licensing




	Readers	Simultaneous Operators	Identities	Stored Events	Controllers
Enterprise 	(16) (32) (64) (128) (256) (512) up to 2048	(50)	(500,000)	(150,000,000)	(512)
Virtual 	(16) (32) (64) (128) (256) (512) up to 2048	(50)	(500,000)	(150,000,000)	(512)
 Professional	(16) Or (32)	(50)	(500,000)	(75,000,000)	(32)

Mercury Hardware

Mercury – Hardware Overview

Controllers

I/O modules
(sub-panels)

Reader Interface modules
(sub-panels)

Leverage the investment in Non-Proprietary Field Hardware

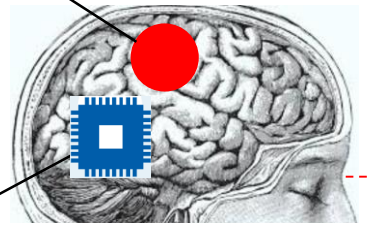
Mercury Controllers

Memory: 16Mb
Card Holder: 145,000
Transaction buffer: 50,000
Built-in support for 1 Door / 2 Readers*

Memory: 16Mb
Card Holder: 145,000
Transaction buffer: 50,000
Built-in support for 2 Doors / 2 Readers

Memory: 32Mb
Card Holder: 370,000
Transaction buffer: 50,000

MEMORY



PROCESSOR

TCP/IP

To other panels

Sub-Panels

Mercury Controller – EP-1501

ACM Appliance

Clients

General purpose (2)
Dedicated (1) - Tamper

Relays (2) Form C, 2 A at 30 VDC

TCP/IP
RS-485
Wiegand

1 Door with 2 Reader Support

1 Door with 1 Reader Support

- Network Ready/POE or Direct Power
- Decentralizes system Intelligence
- Single-door interface with auxiliary I/O
- Scalable to 17 doors

Mercury Controller – EP-1502

ACM Appliance

Clients

General purpose (8)
Dedicated (2) - Tamper, Power Monitor

Relays (4) Form C, 5 A at 30 VDC

1 Door with 2 Readers (IN/OUT)
or
2 Doors with 1 Reader (IN/REX)

TCP/IP
RS-485
Wiegand

- Network Ready (non-PoE)
- Decentralizes system Intelligence
- True Two-door interface with aux
  - 8 Inputs / 4 Outputs
- Scalable to 64 doors

Mercury Controller – EP-2500

ACM Appliance

Clients

Dedicated (2) - Tamper, Power Monitor

Relays (0)

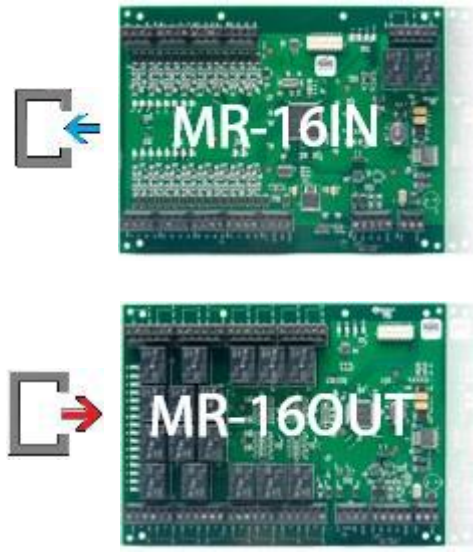
TCP/IP
RS-485
Wiegand

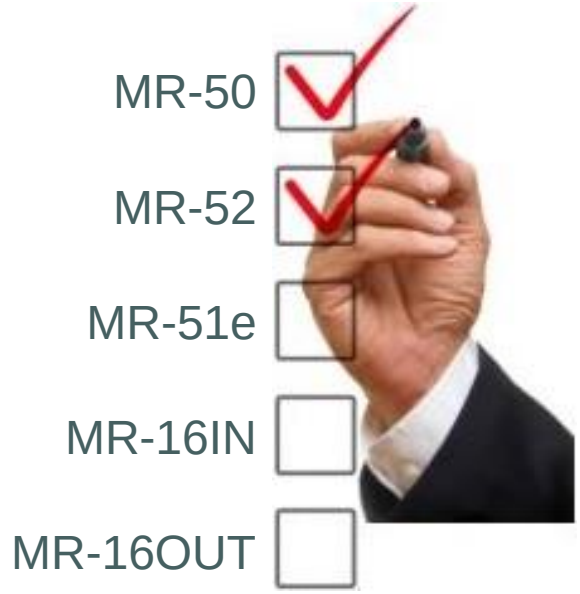
- Network Ready (non-PoE)
- Decentralizes system Intelligence
- Intelligent oversight, auxiliary Monitoring
- Scalable to 64 doors

Mercury Sub-Panels

Reader Interface modules

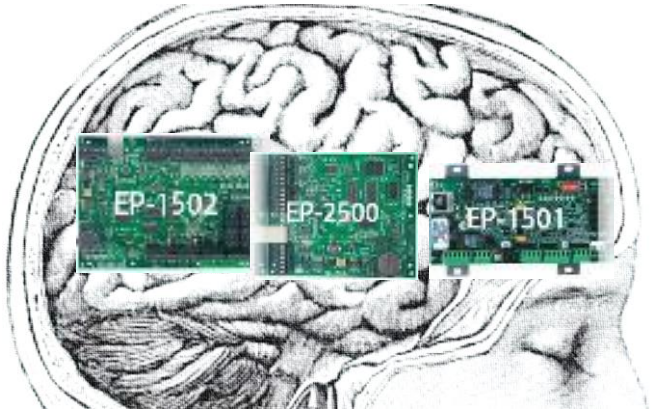
I/O (Input/Output) modules





Mercury Sub-Panels

EP-2500/1501/1502



10101010101010101010101010101010101

Communication problem

What should I do ?

10101010101010101010101010101010101010101

Go Offline Mode (degraded mode)

- Facility Code (Any Card can Grant an access)

Mercury Sub-Panel – MR-50

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

EP-2500/1501/1502

Relays (2)
Form C, 5 A at 30 VDC
Form C, 1 A at 30 VDC

General purpose (2)
Dedicated (1) - Tamper

MR-52

MR-51e

To other panels

MR-16IN

MR-16OUT

1 Door with 1 Reader Support

Mercury Sub-Panel – MR-52

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

EP-2500/1501/1502

Relays (6) Form C, 5 A at 28 VDC

General purpose (8)
Dedicated (2) – Tamper, Power Monitor

2 Doors with 1 Reader (IN/REX)
or
1 Door with 2 Readers (IN/OUT)

To other panels

Mercury Sub-Panel – MR-51e

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

EP-2500/1501/1502

Relays (2) Form C, 5 A at 28 VDC

General purpose (4)
Dedicated (0)

1 Door with 2 Reader Support

To other panels

Mercury Sub-Panel – MR-16IN

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

EP-2500/1501/1502

Relays (2) Form C, 5 A at 28 VDC

General purpose (16)
Dedicated (2) - Tamper, Power Monitor

To other panels

Mercury Sub-Panel – MR-16OUT

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

EP-2500/1501/1502

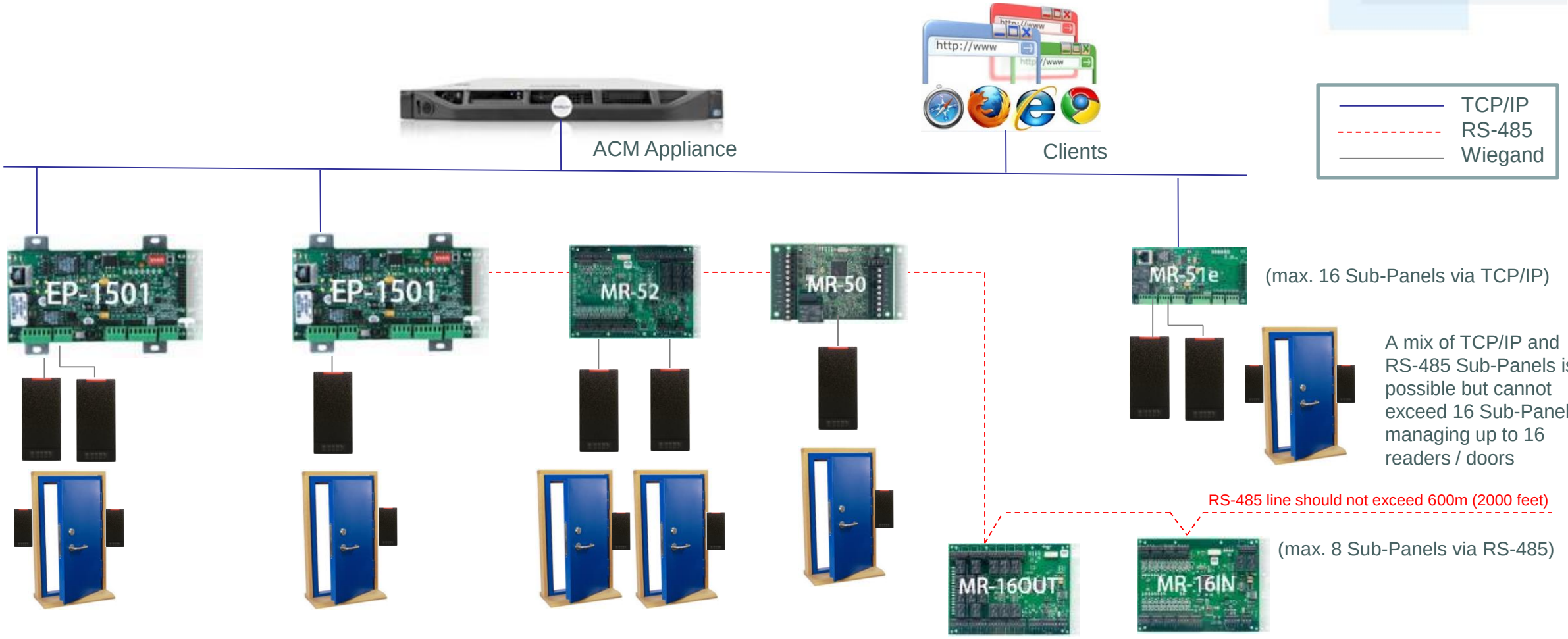
Relays (16) Form C, 5 A at 28 VDC

General purpose (0)
Dedicated (2) - Tamper, Power Monitor

To other panels

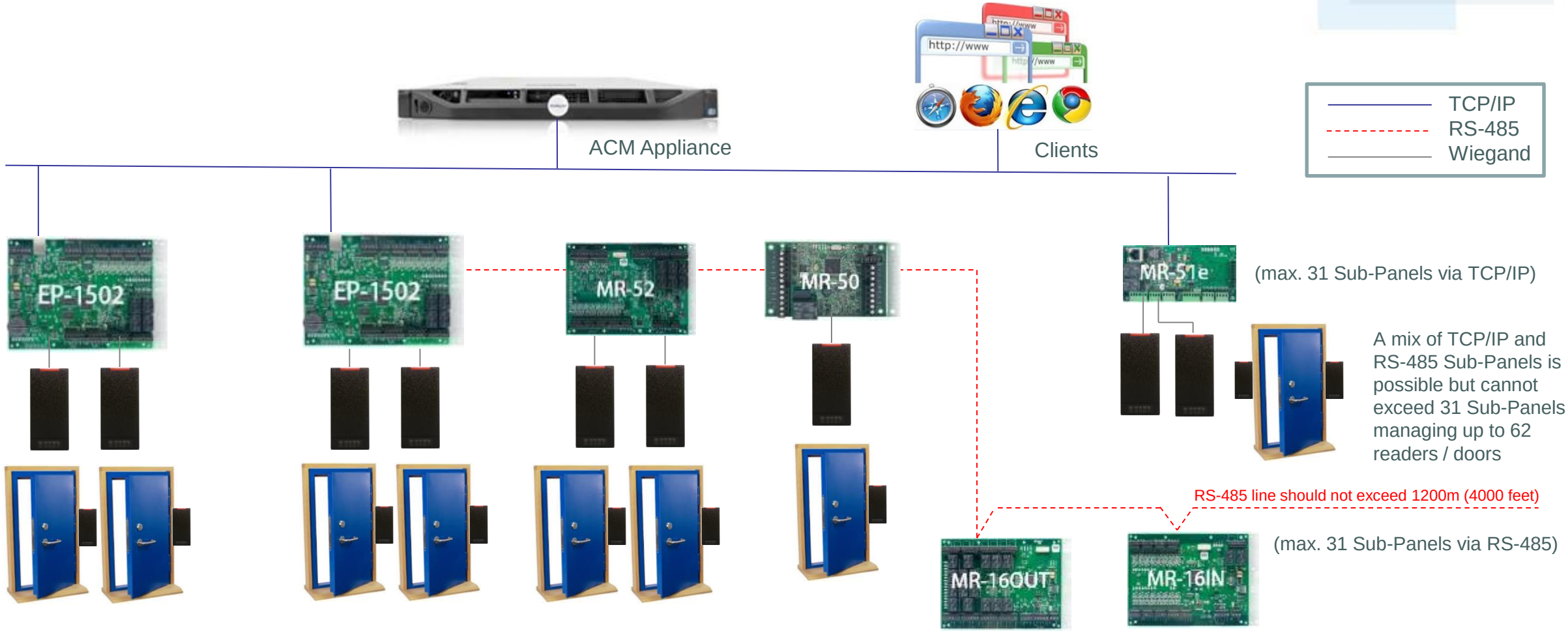
Mercury Controller Communications

EP-1501 communication



Using EP-1501, total number of managed readers/doors is 17

EP-1502 communication



Using EP-1502, total number of managed readers/doors is 64

EP-2500 communication

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

(max. 32 Sub-Panels via TCP/IP)

A mix of TCP/IP and RS-485 Sub-Panels is possible but cannot exceed 32 Sub-Panels managing up to 64 readers / doors

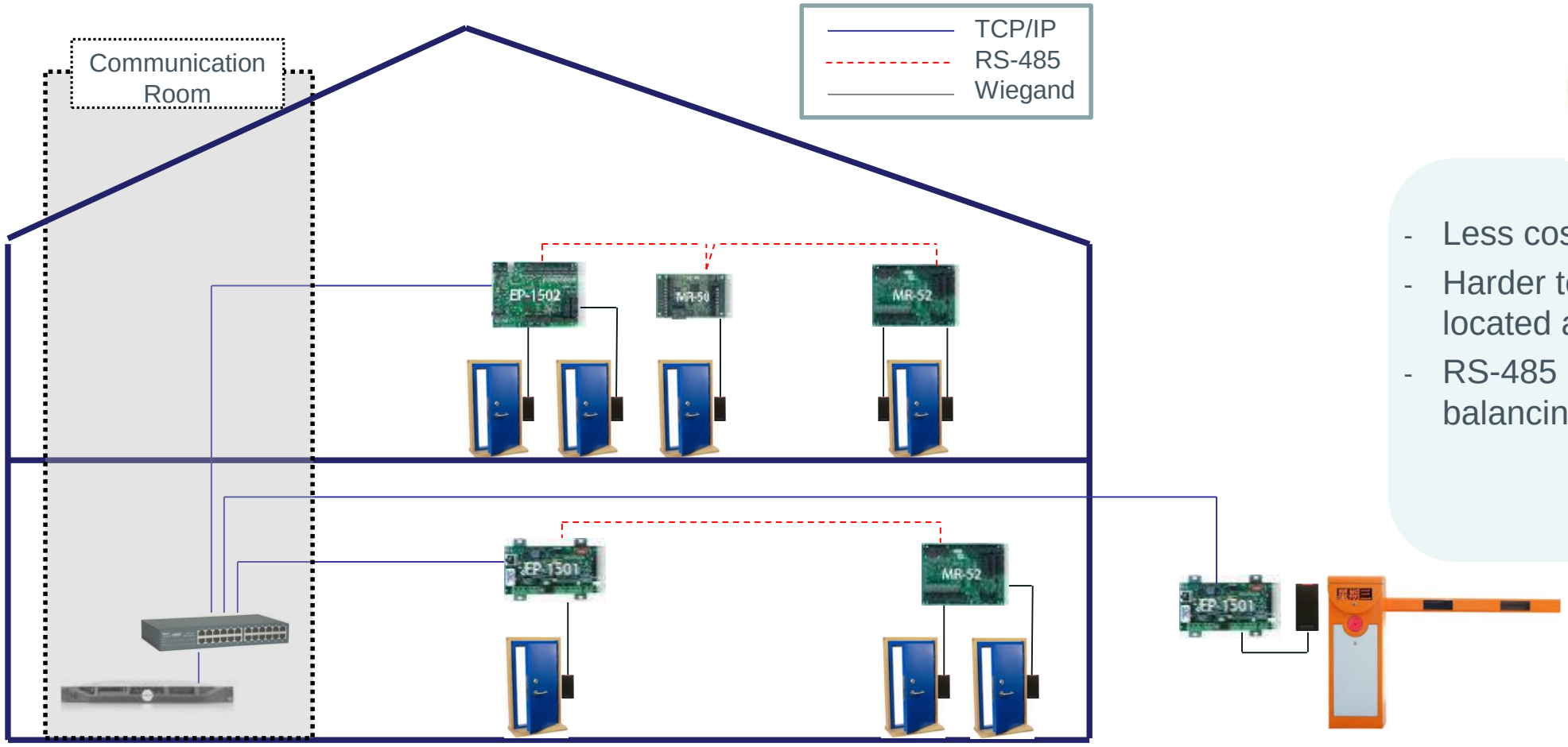
RS-485 line should not exceed 1200m (4000 feet)

(max. 32 Sub-Panels via RS-485)

Using EP-2502, total number of managed readers/doors is 64

Sample Designs
Mercury Hardware

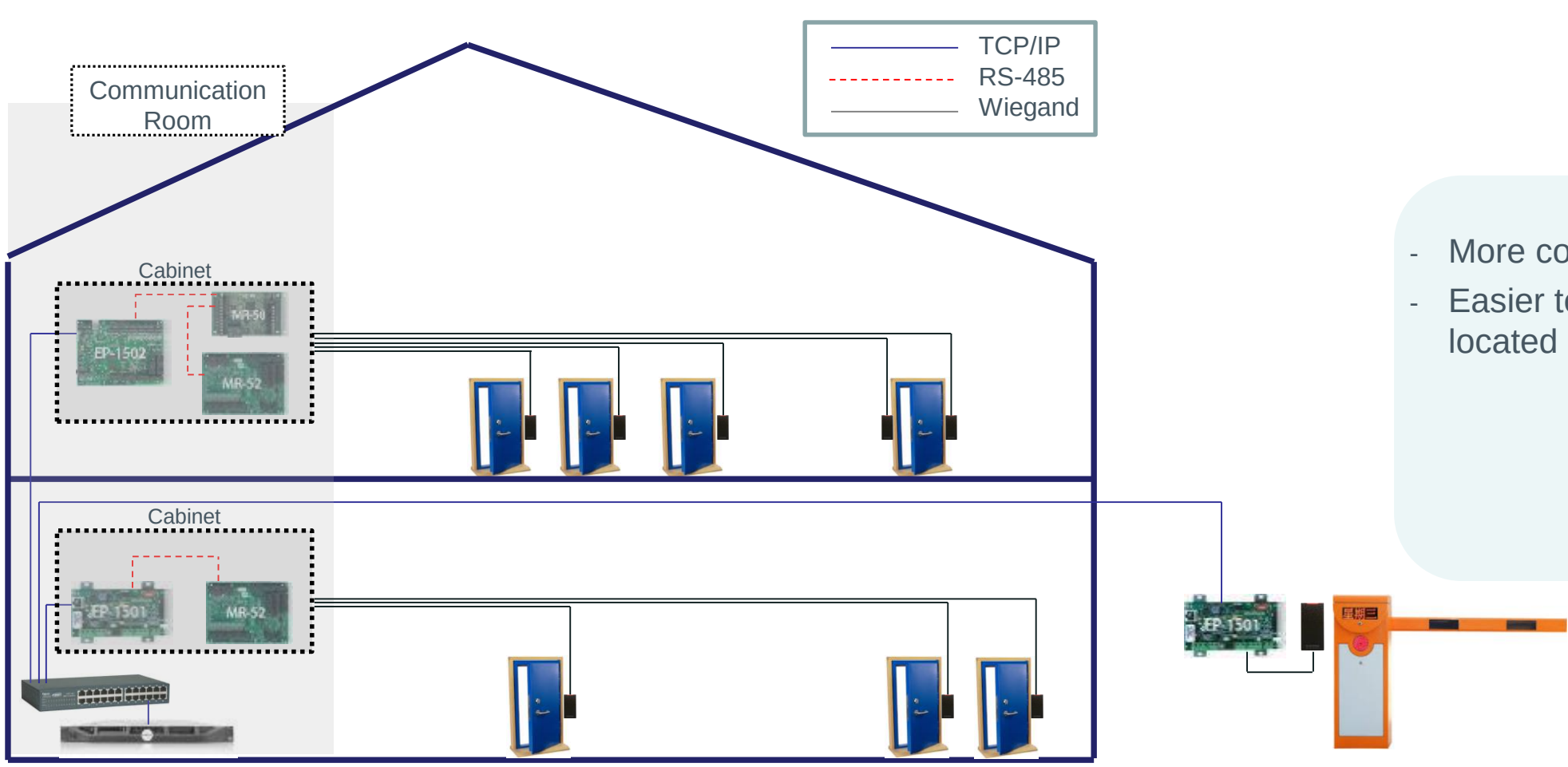
Mercury 8x Door Sample Design - Distributed



Pros & Cons

- Less cost in cables
- Harder to maintain as panels located above the ceiling
- RS-485 network require proper balancing

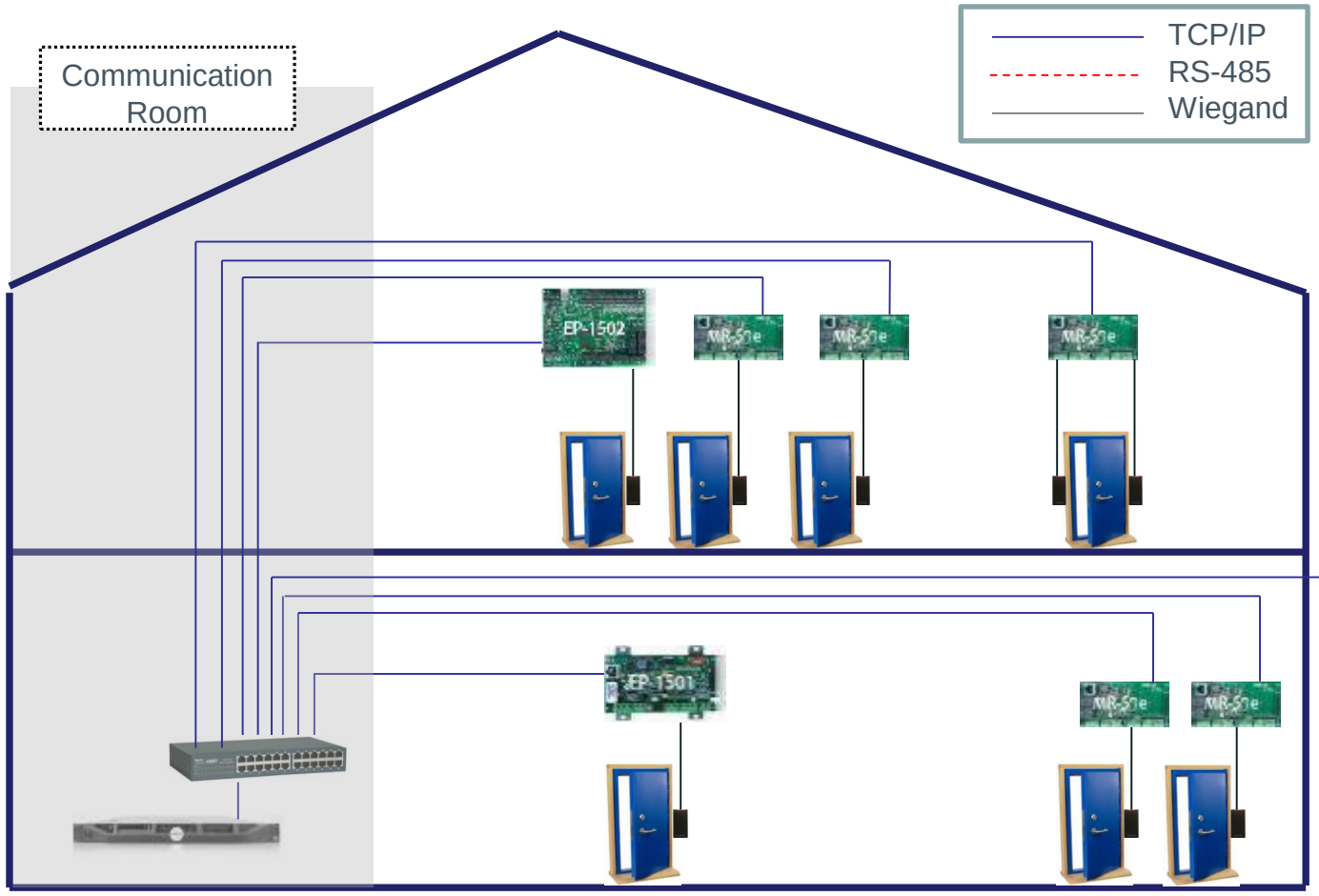
Mercury 8x Door Sample Design - Centralized



Pros & Cons

- More cost in cables
- Easier to maintain as panels located in one cabinet

Mercury 8x Door Sample Design - Full IP



Pros & Cons

- Less cost in cables
- Easier to maintain as panels connected over the network
- Power the entire system using POE

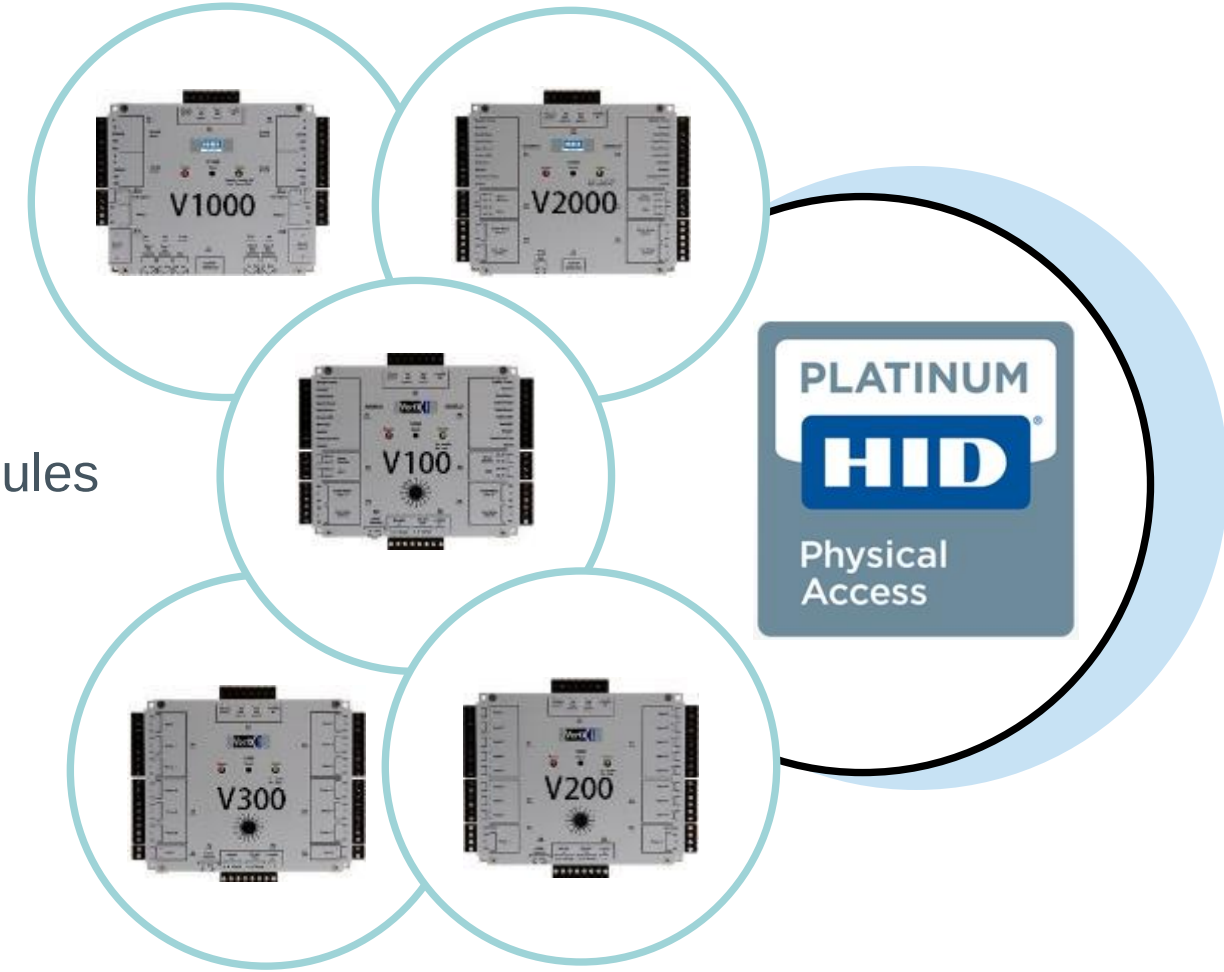
HID Hardware

HID VertX – Hardware Overview

Controllers
(Vertx EVO only!)

Reader Interface modules
(sub-panels)

I/O modules
(sub-panels)



Leverage the investment in Non-Proprietary Field Hardware

HID VertX EVO - Controllers

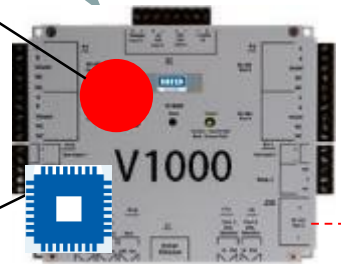
Memory: 256Mb
Card Holder: 250,000

Memory: 256Mb
Card Holder: 250,000
Built-in support of 2 Readers

Only V1000 has RS-485 down-streaming capability up to 32 devices

MEMORY

PROCESSOR



To other panels

Sub-Panels

HID VertX EVO Controller – V2000

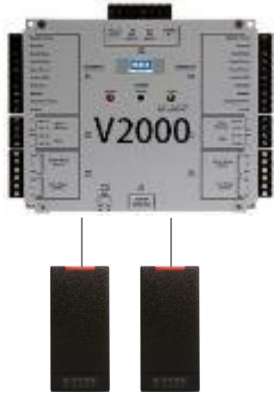
ACM Appliance

Clients

General purpose (4)
Dedicated (3) - Tamper, AC/Battery Fail

Relays (4) Form C, 2 A at 30 VDC

TCP/IP
RS-485
Wiegand



2 Doors with 1 Reader (IN/REX)
or
1 Door with 2 Readers (IN/OUT)

- Network Controller
- Decentralizes system Intelligence
- True Two-door interface with aux
  - 4 Inputs / 4 Outputs
- Max 2 doors

HID VertX EVO Controller – V1000

ACM Appliance

Clients

General purpose (2)
Dedicated (3) - Tamper, AC/Battery Fail

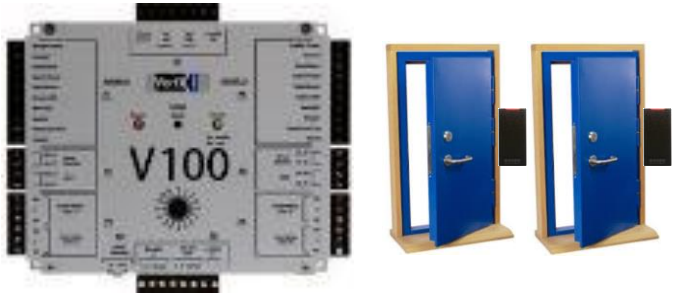
Relays (2) Form C, 5 A at 30 VDC

TCP/IP
RS-485
Wiegand

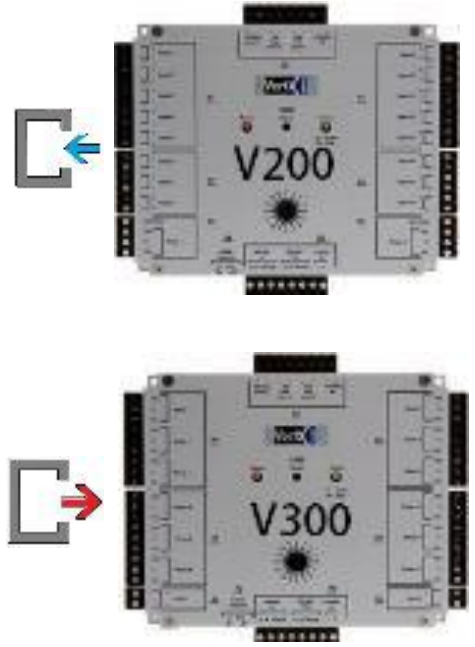
- Network Ready (non-PoE)
- Decentralizes system Intelligence
- Intelligent oversight, auxiliary Monitoring
- Scalable to 64 doors

HID VertX Sub-Panels

Reader Interface modules



I/O (Input/Output) modules

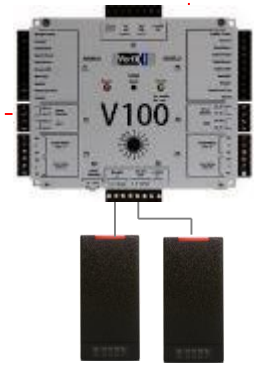


HID VertX Sub-Panel – V100

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand



General purpose (4)
Dedicated (3) - Tamper, AC/Battery Fail

Relays (4) Form C, 2 A at 30 VDC

To other panels

2 Doors with 1 Reader (IN/REX)
or
1 Door with 2 Readers (IN/OUT)

HID VertX Sub-Panel – V200

ACM Appliance

Clients

General purpose (16)
Dedicated (3) - Tamper, AC/Battery Fail

Relays (2) Form C, 2 A at 30 VDC

To other panels

TCP/IP
RS-485
Wiegand

HID VertX Sub-Panel – V300

ACM Appliance

Clients

TCP/IP
RS-485
Wiegand

General purpose (2)
Dedicated (3) - Tamper, AC/Battery Fail

Relays (12) Form C, 2 A at 30 VDC

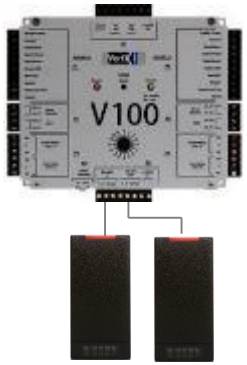
To other panels

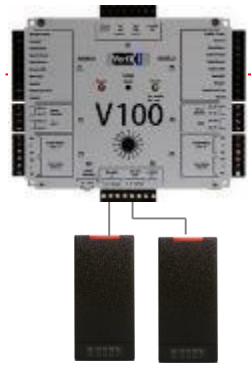
HID Vertx EVO Controller Communications

HID VertX EVO - V1000 communication

ACM Appliance

Clients





RS-485 line should not exceed 1200m (4000 feet)

TCP/IP
RS-485
Wiegand

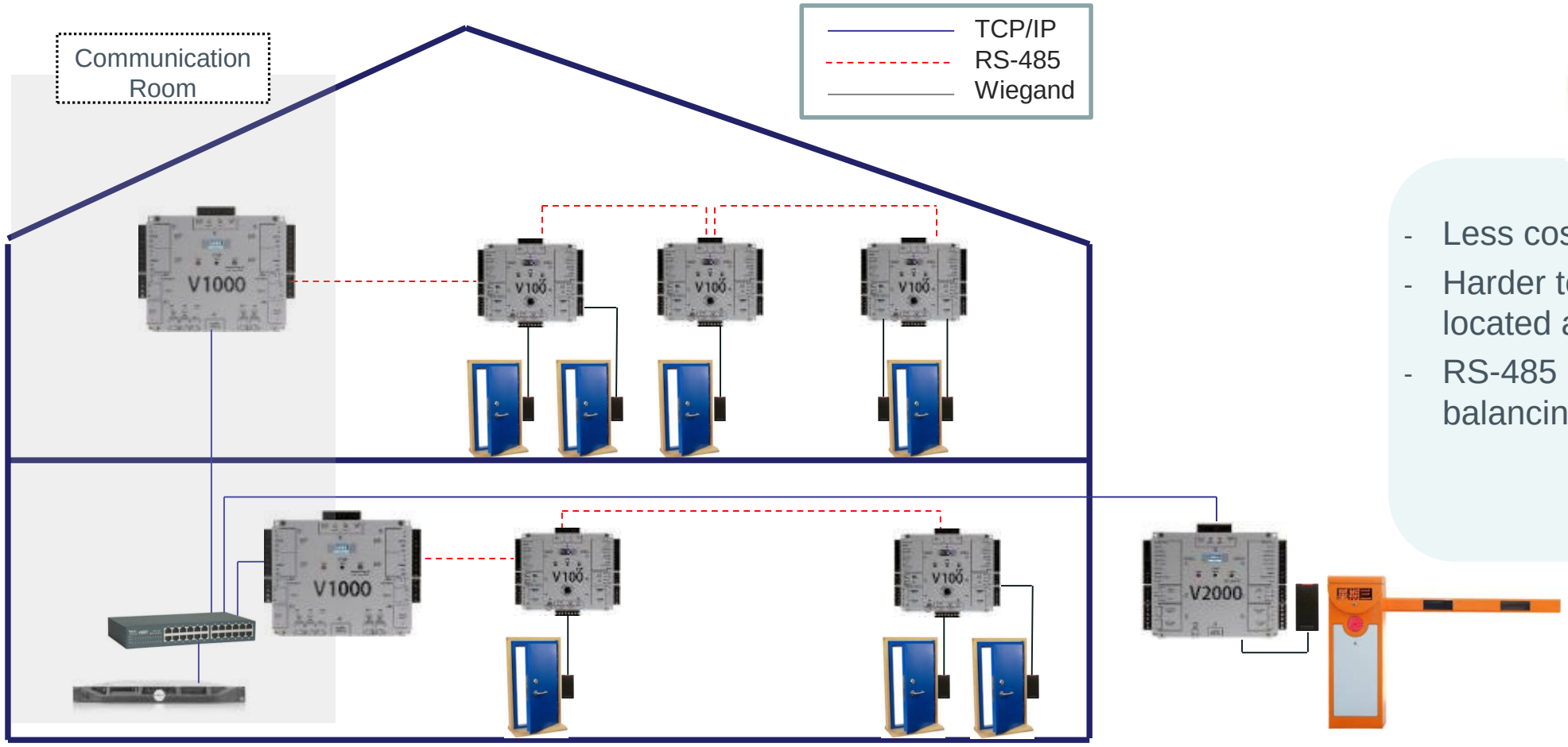
Max. 16 Sub-Panels per RS-485 bus using one or two ports

A mix of RS-485 Sub-Panels is possible but cannot exceed 32 Sub-Panels in total, managing up to 64 readers / doors

Using HID Vertx EVO – V1000, total number of managed readers/doors is 64

Sample Designs
HID Vertx Hardware

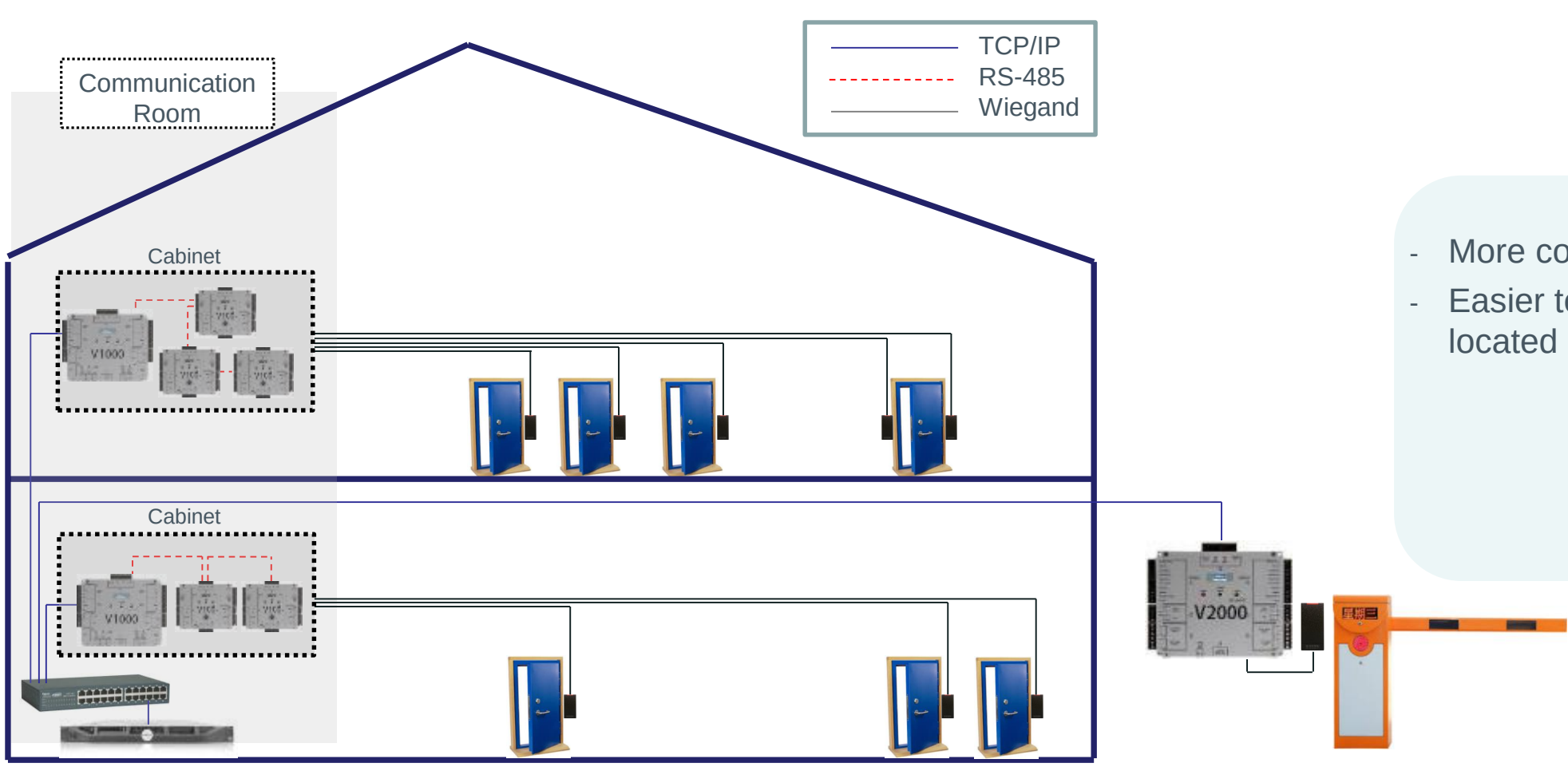
HID 8x Door Sample Design - Distributed



Pros & Cons

- Less cost in cables
- Harder to maintain as panels located above the ceiling
- RS-485 network require proper balancing

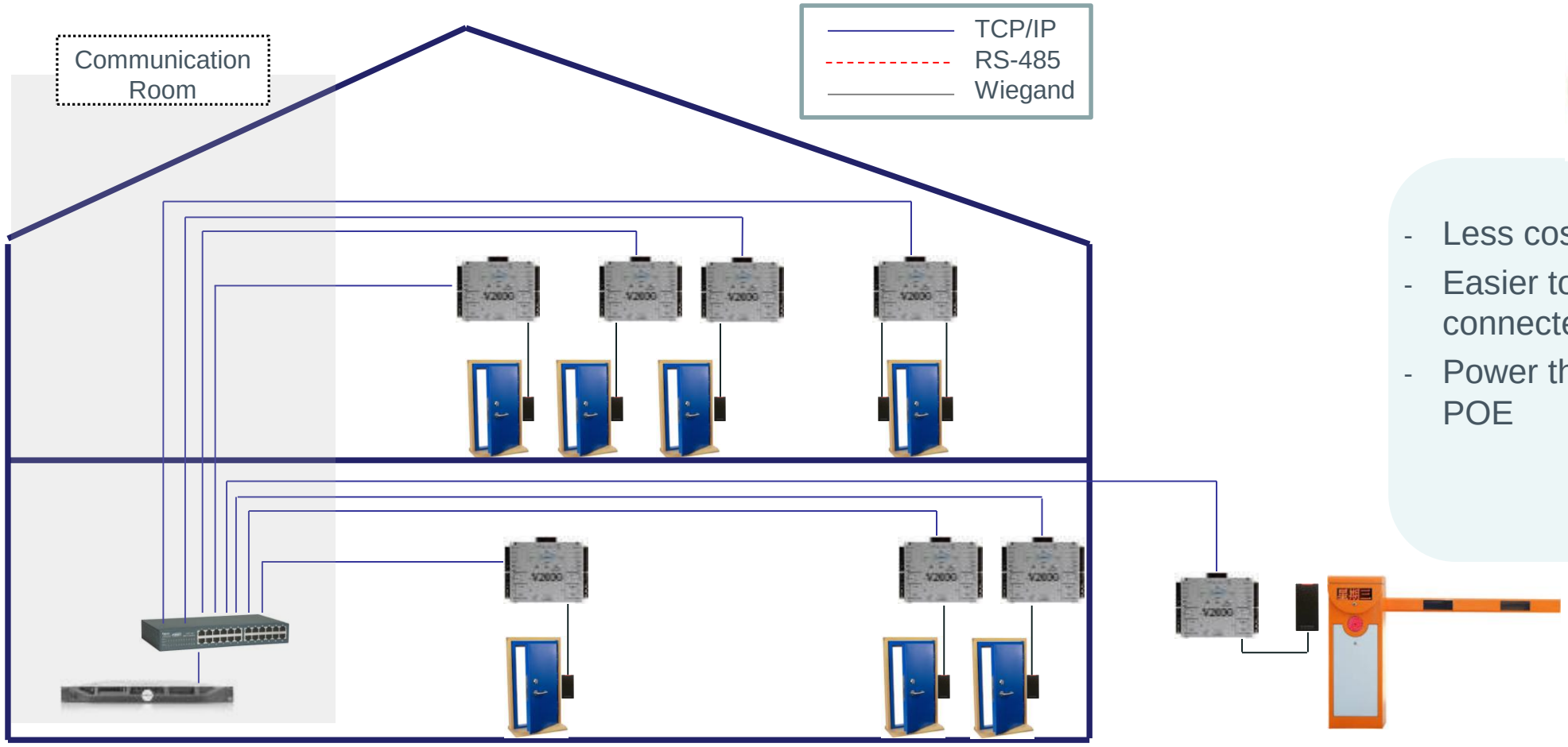
HID 8x Door Sample Design - Centralized



Pros & Cons

- More cost in cables
- Easier to maintain as panels located in one cabinet

HID 8x Door Sample Design - Full IP



Pros & Cons

- Less cost in cables
- Easier to maintain as panels connected over the network
- Power the entire system using POE

Understanding Physical Design

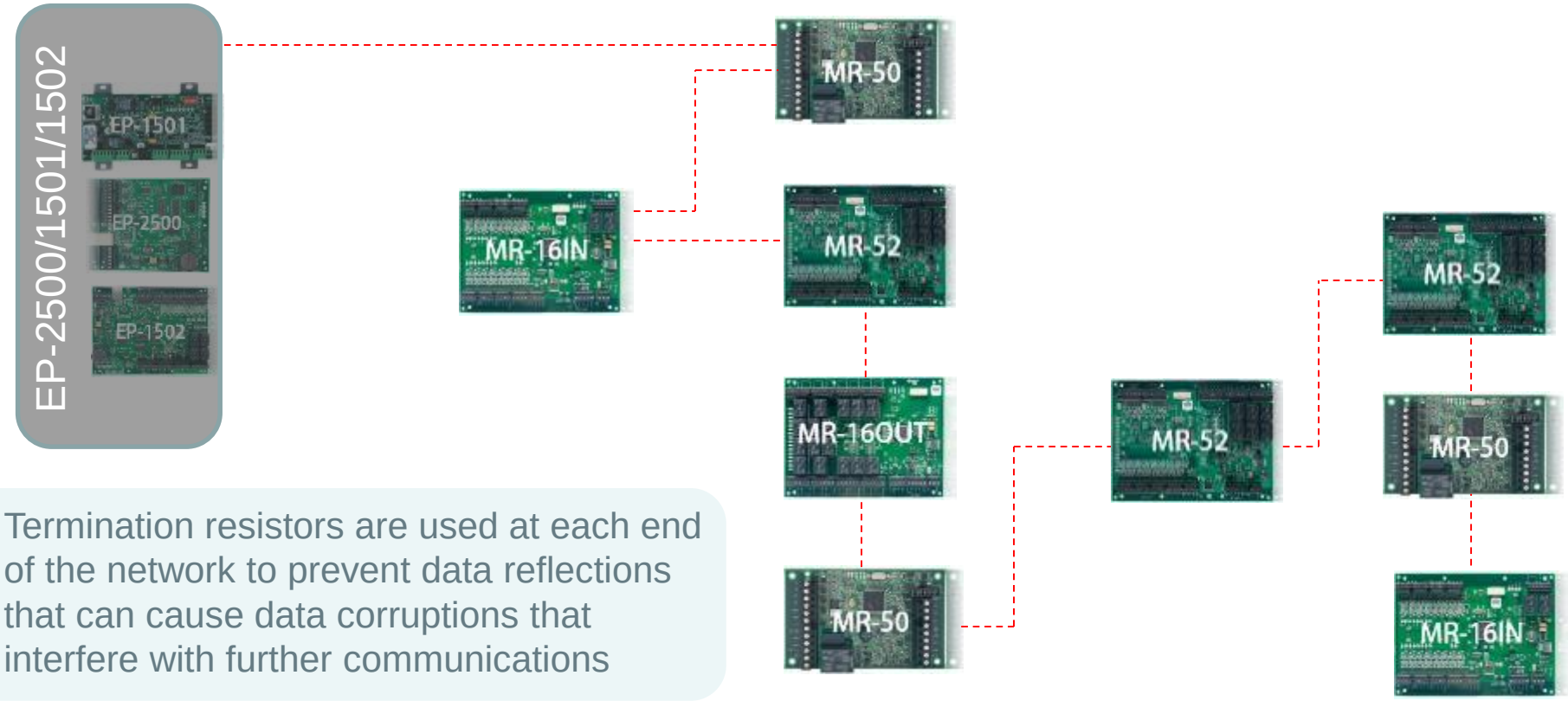
- **RS-485 Network**
  - RS-485 Network topology
  - Distance Limitation
  - Cable Selection

- **Readers/Credentials**
  - Reading technology
  - Communication Protocol
  - Wiegand Readers
  - RS-485 Readers
  - Credentials

- **LifeSafety Power Modules**
  - 2 Doors
  - 4 Doors
  - 8 Doors
  - 16 Doors

RS-485 Network

The RS-485 network must be wired in a daisy chain configuration

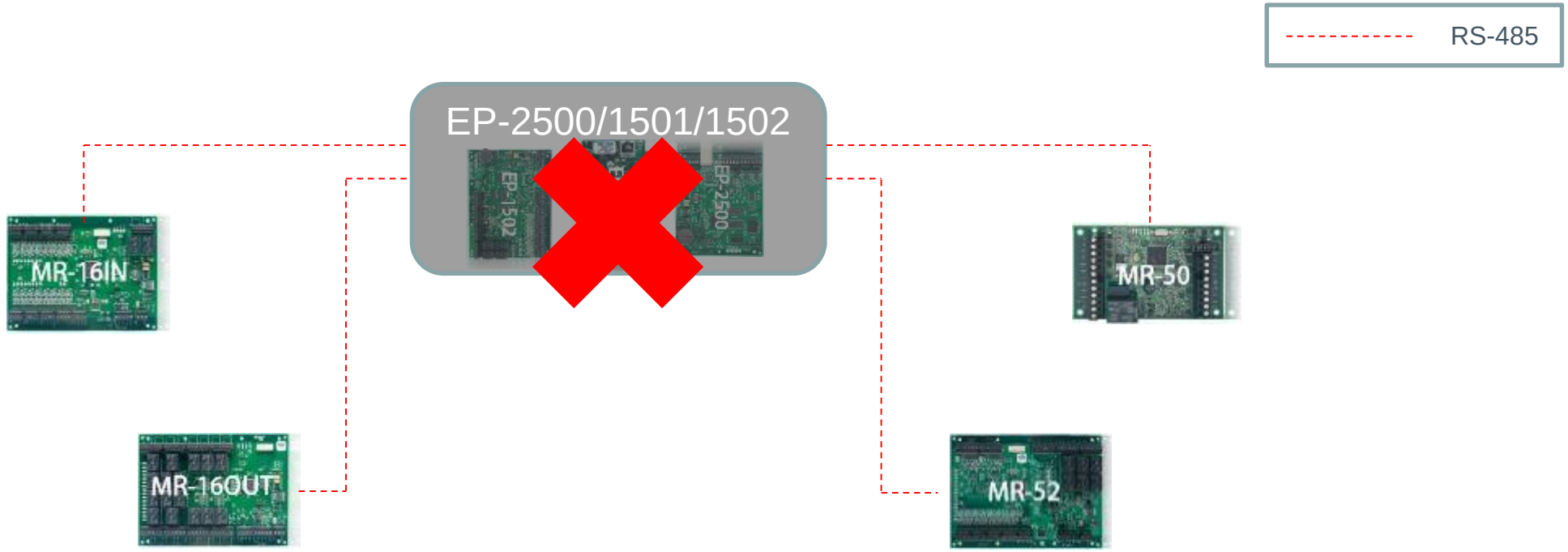


Termination resistors are used at each end of the network to prevent data reflections that can cause data corruptions that interfere with further communications

Daisy chain wiring allows messages to be sent and received by all sub-panels in the network without any bounce back or reflections

RS-485 Network – Star Wiring

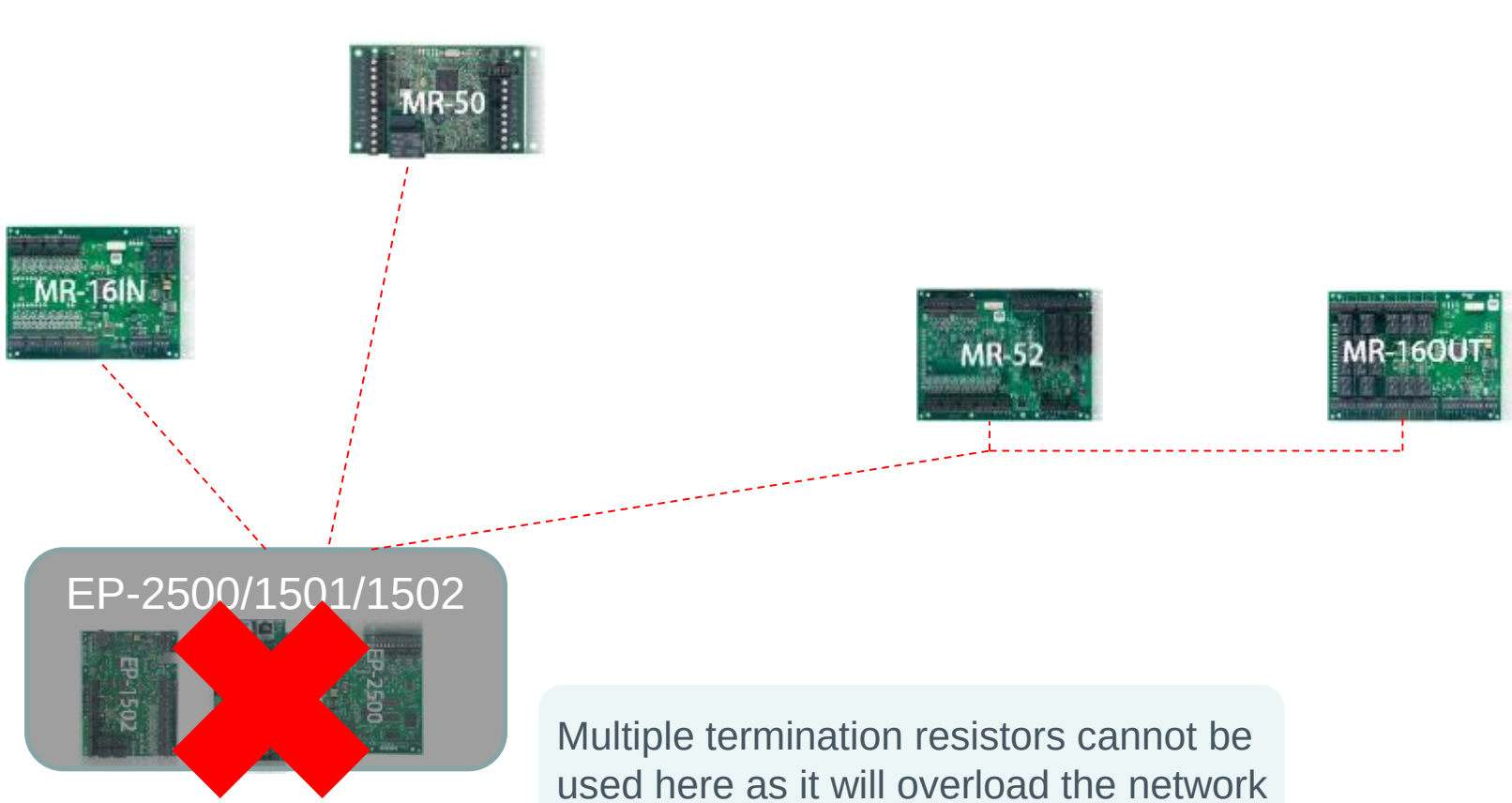
Star or Spur wiring is not an acceptable method for installation



Multiple termination resistors cannot be used here as it will overload the network

RS-485 Network – Spur Wiring

Star or Spur wiring is not an acceptable method for installation



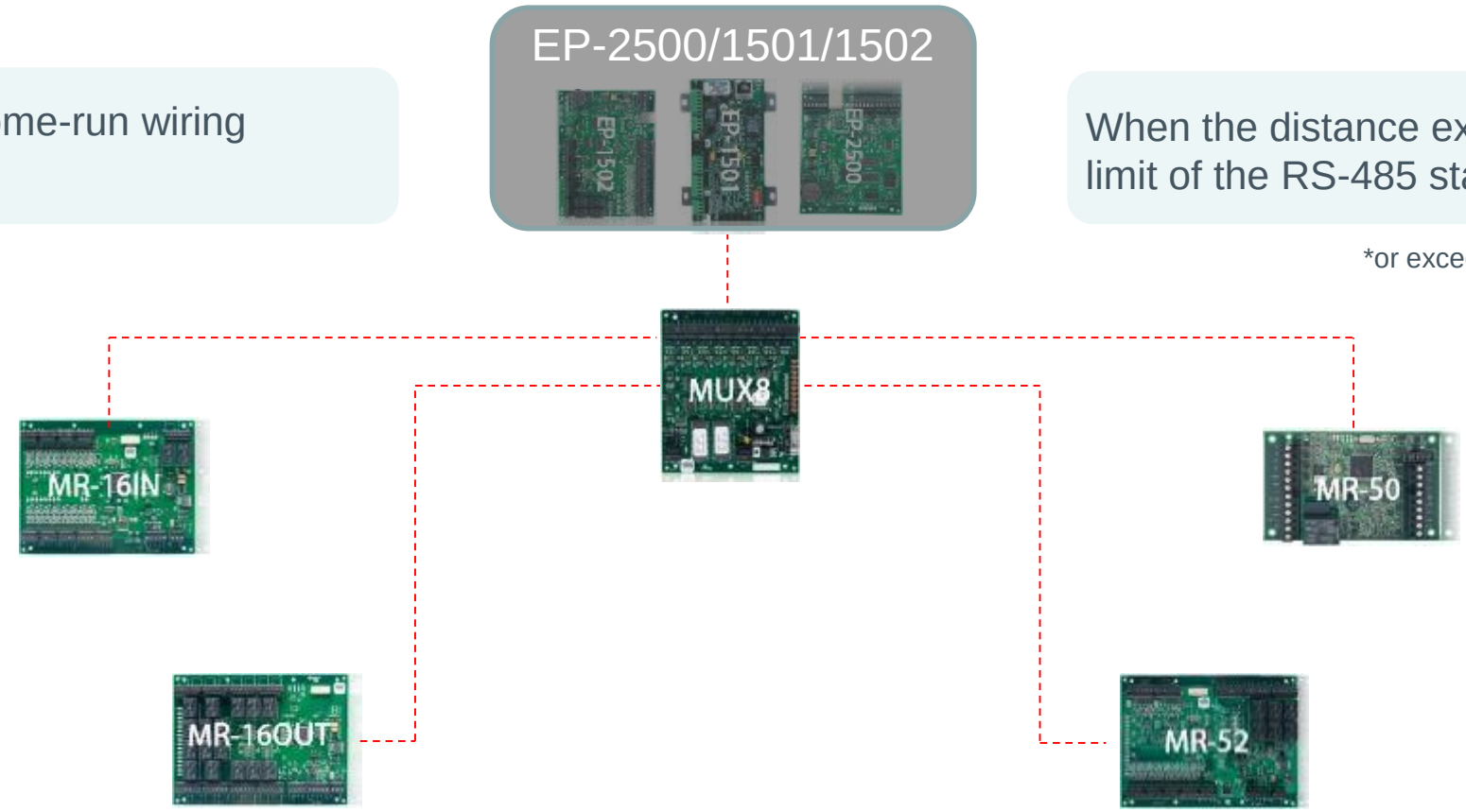
Multiple termination resistors cannot be used here as it will overload the network

RS-485 Network – MUX-8

The **MUX-8** adds flexibility to convert multiple data lines into a single data line to meet difficult system design and installation

RS-485

Star Topology or Home-run wiring schemes



When the distance exceed the 1200m* limit of the RS-485 standard

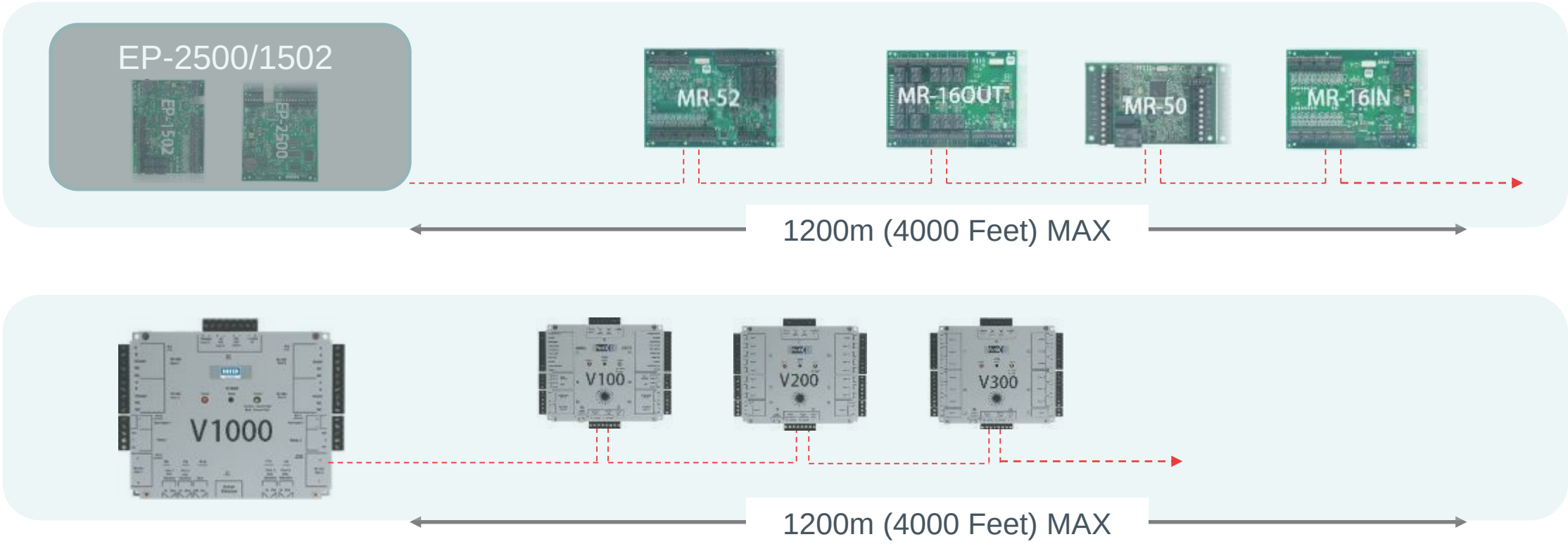
*or exceed 600m when using EP1501

RS-485 Network – Cabling

The total length of the network should not exceed 1200m* (4000 feet)

*600m (2000 feet) when using EP1501

RS-485



RS-485 Network – Cabling

Recommendation:

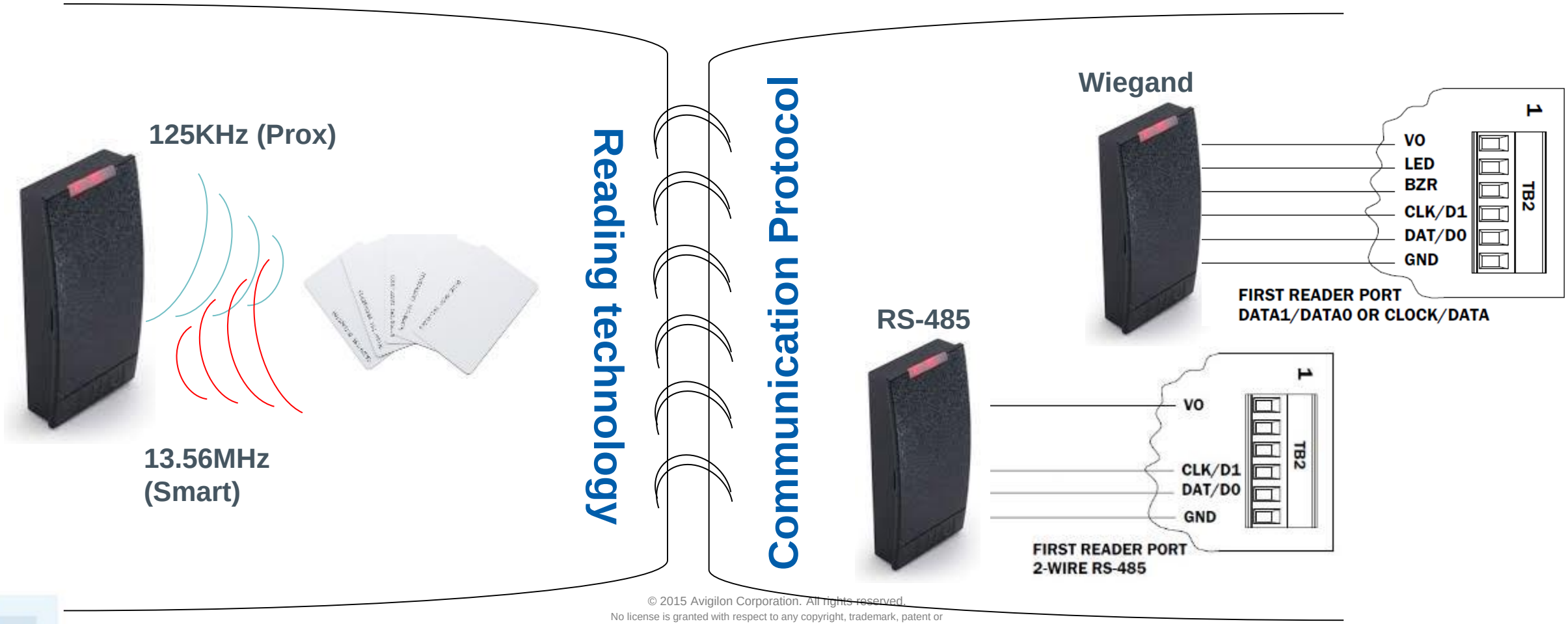
- 24AWG Shielded, screened twisted pair, 120Ω characteristic impedance

Warning:

Unused wires in the cable must not be used to carry power to other devises

Reader Selection

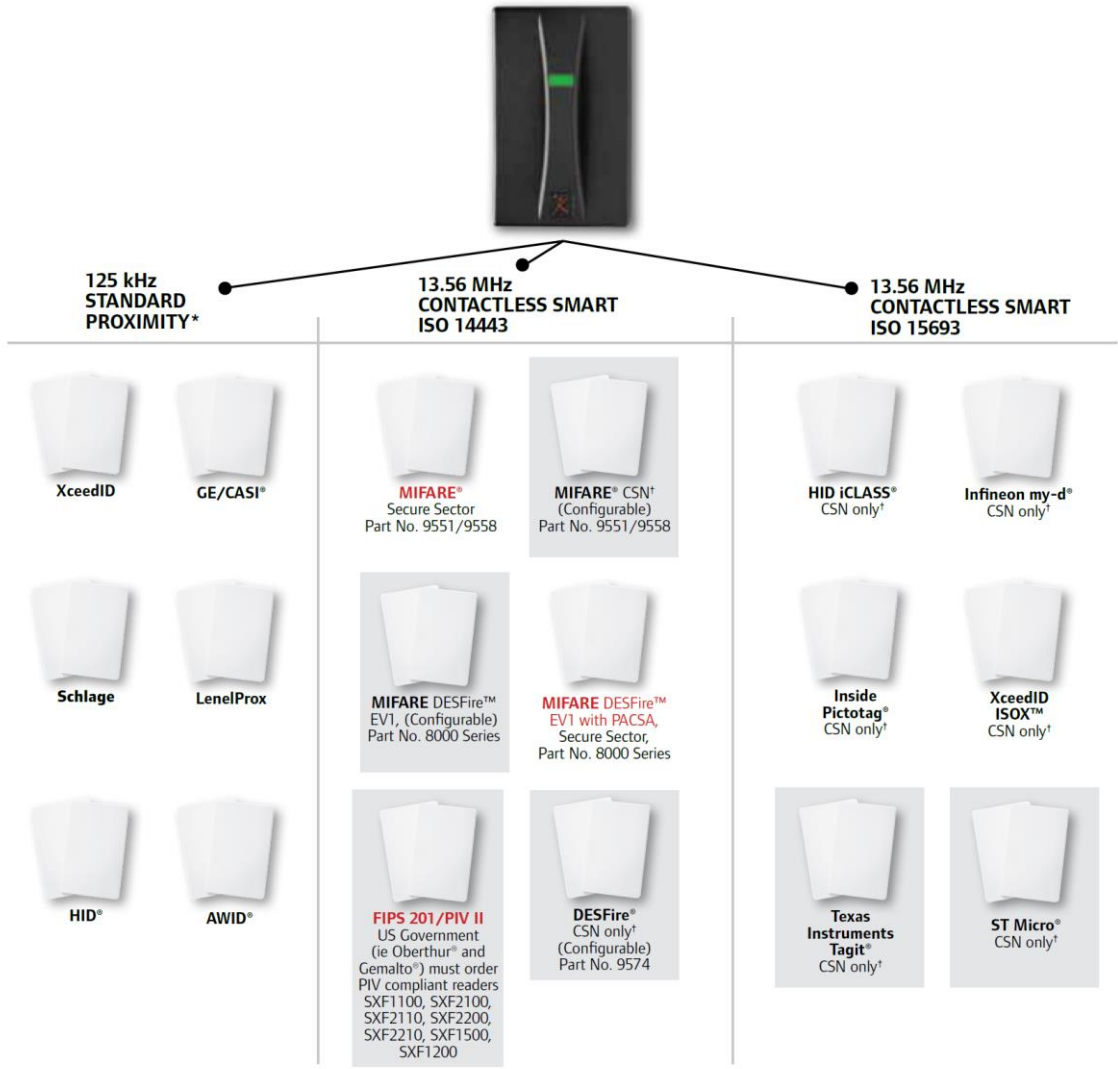
Card readers differ in two important respects: Reading technology and Communication Protocol



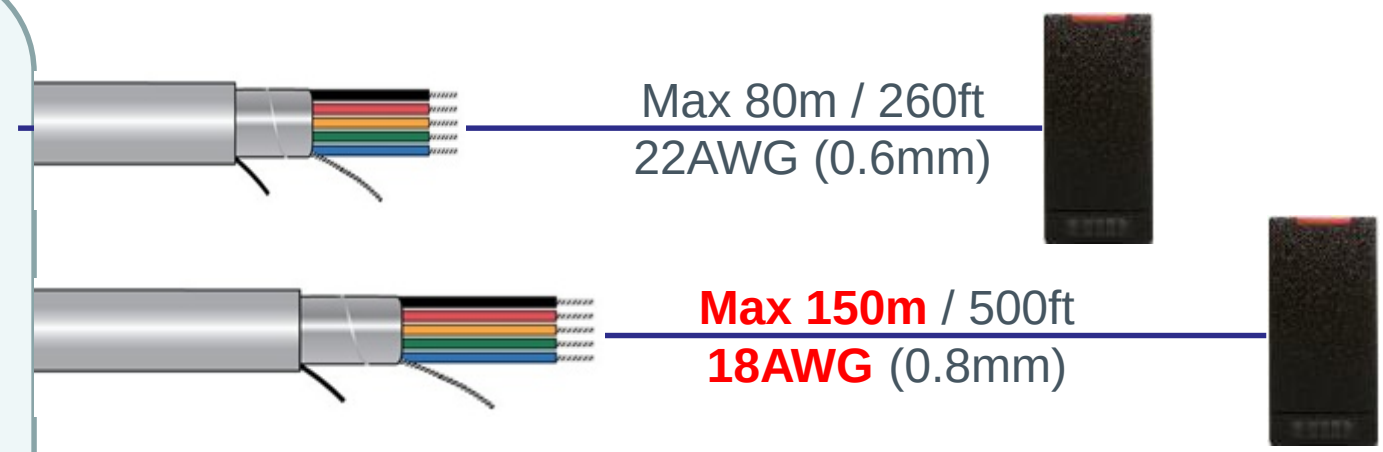
Reading technology

Common readers standards:

- 125 KHz readers
- 13.56 MHz readers
- Dual 125KHz/13.56MHz readers



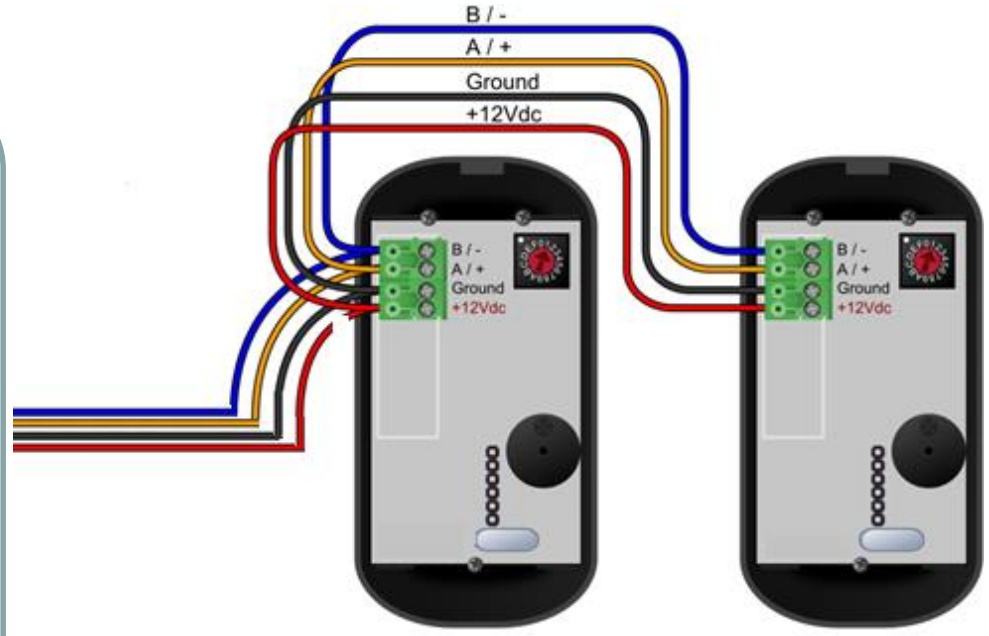
Wiegand Readers



Cat5e and Cat6 data cables were not designed to be used for wiegand readers.

It is recommended that a cable specifically designed for Wiegand readers:
18AWG 6-conductor stranded, overall shielded, cable

RS-485 Readers (supported by Mercury only)



Max 150m / 500ft
1. RS485 up to 1200m **(24AWG)**
+
2. Power Cable up to 150m **(18AWG)**

RS485 reader requires two 2-conductor cables. One cable for power (18AWG) and one for communication (24AWG)
- Reader can be powered directly from the control panel (up to 150m)
- Reader can be powered by separate power supply (make sure to connect communication GND)

Credentials

Commonly used credentials:

- 125 KHz credentials
- 13.56 MHz credentials
- Dual 125KHz/13.56MHz credentials

Thin card

Clamshell card

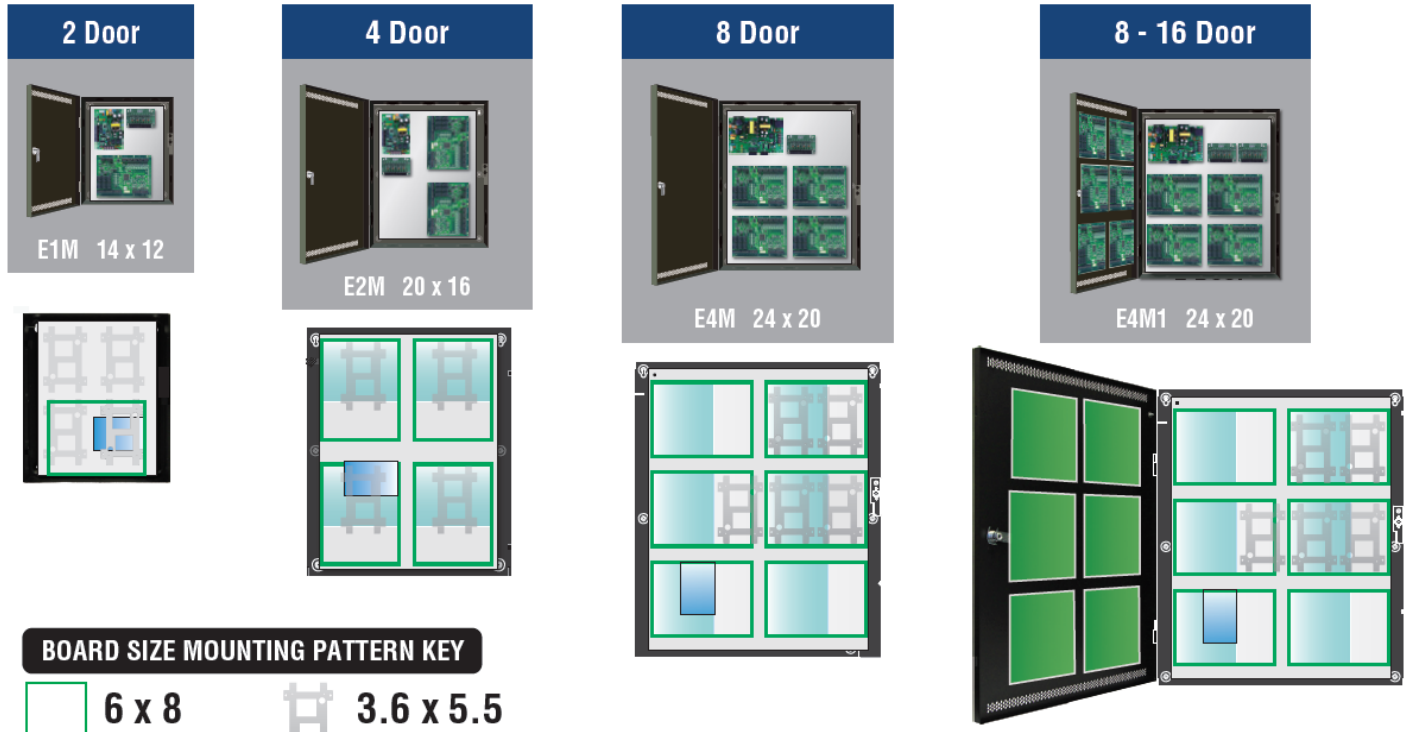
Keyfob

Tag

Avigilon Power enclosures - Mercury

Mercury	Board Size	2 Door	4 Door	8 Door	16 Door
MR50	4.25 x 2.75 x 1	1 slot	1 slot	1 slot	1 slot
EP1501, MR51E	3.6 x 5.5 x 1.11 (bracket)	4 slots	4 slots	5 slots	5 slots
EP2500	6 x 5 x 1	N/A	4 slots	6 slots	6 slots
EP1502, MR52, MR16IN, MR16OUT	6 x 8 x 1	1 slot	2 slots	6 slots	12 slots
The maximum number of Mercury boards that can fit in a single voltage system		1	3	4	10
The maximum number of Mercury boards that can fit in a dual voltage system		1	2	4	8

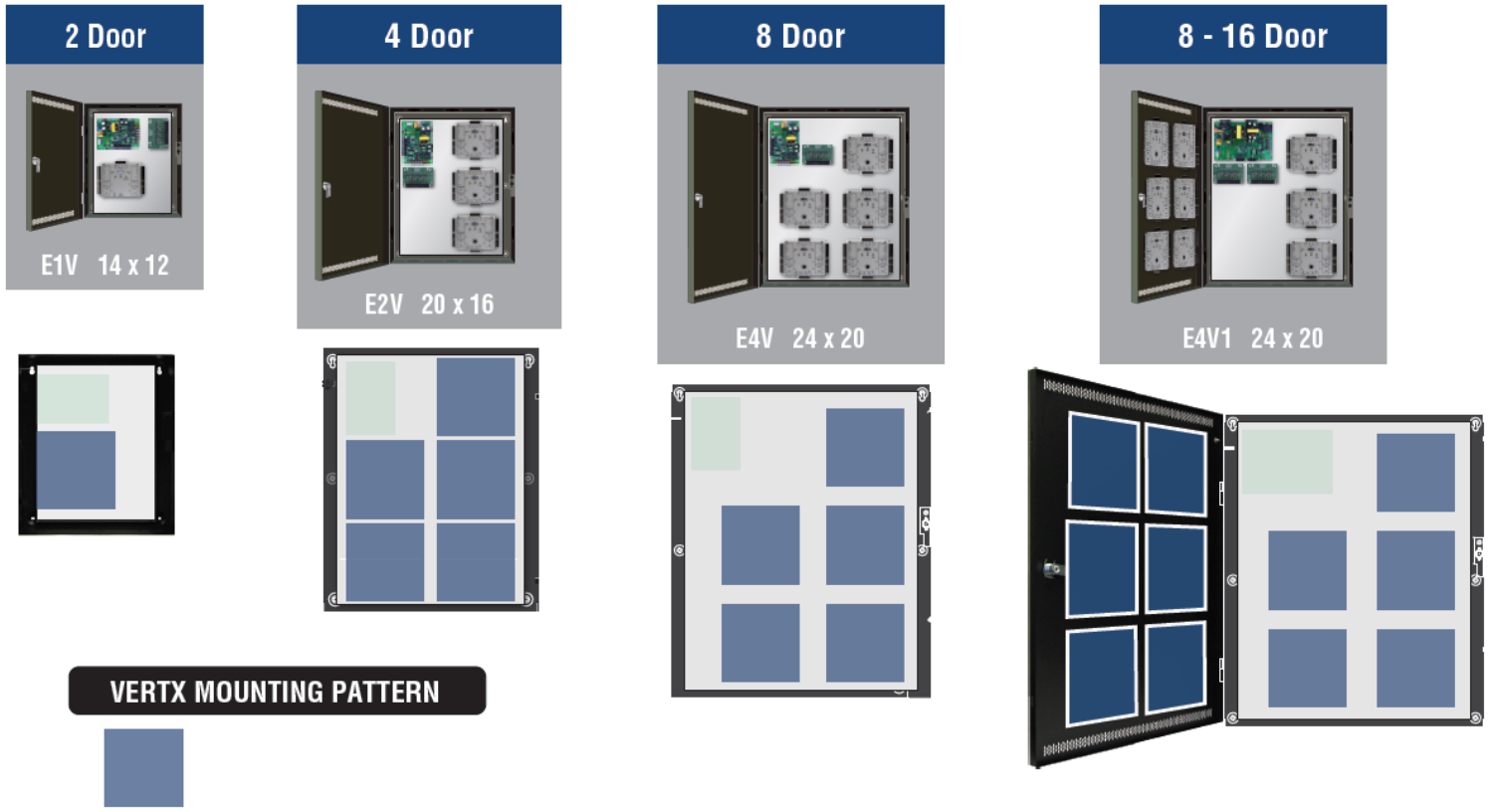
single voltage examples



Avigilon Power enclosures - HID

VertX		2 Door	4 Door	8 Door	16 Door
V2000		1 slot	N/A	N/A	N/A
V1000		N/A	1 slot	1 slot	1 slot
V100, 200		N/A	2 slots	4 slots	8 slots
The maximum number of VertX modules that can fit in a single voltage system		1	4	5	11
The maximum number of VertX modules that can fit in a dual voltage system		1	3	5	9

single voltage examples



LifeSafety Power modules – single voltage

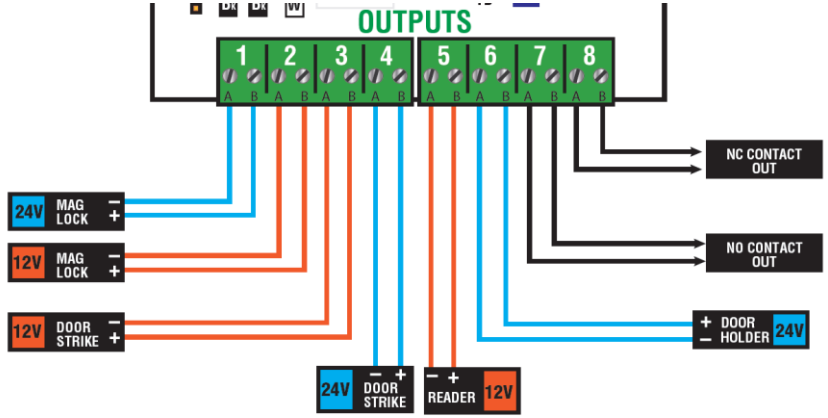
Power supplies and power distribution modules could be preinstalled or purchased separately – depends of design needs

FPO Power Supply / Battery Charger
- 2, 4, 8 Door system (FPO75 – 75W, 12VDC/6A or 24VAC/3A, charges 40Ah, FAI)
- 16 Door system (FPO150 – 150W, 12VDC/12A or 24VAC/6A, charges 80Ah, FAI)

DP8 Power Distribution Module
- 2, 4, 8 Door system (8 auxiliary power outputs rated at 2.5A per output)
- 16 Door system (2 x DP8 - 16 auxiliary power outputs rated at 2.5A per output)

LifeSafety Power modules – dual voltage

Dual voltage power systems are designed with additional power supply ensuring dual voltage 12VDC and 24VDC access power system. The advantage of a dual voltage power supply is the ability to power Mercury boards and door locks.



C8 lock control module

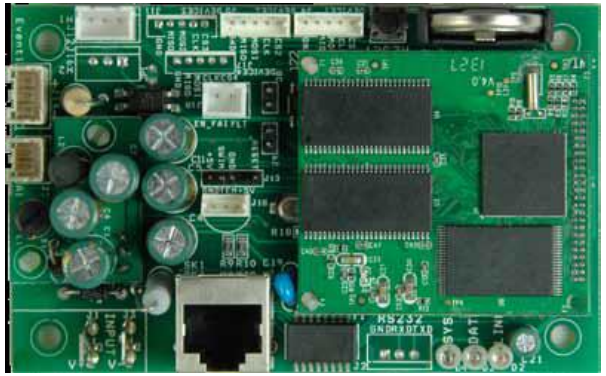
- 2, 4, 8 Door system (8 fused outputs (each 3A) for independent relay lock power control)
- 16 Door system (2 x C8 - 16 fused outputs (each 3A) for independent relay lock power control)

Added FPO Power Supply / Battery Charger

- 2, 4 and Door system (2 x FPO75 – 75W)
- 8 Door system (2 x FPO150 – 150W)
- 16 Door system (one FPO75 – 75W or FPO150 – 150W AND one FPO250 – 250W)

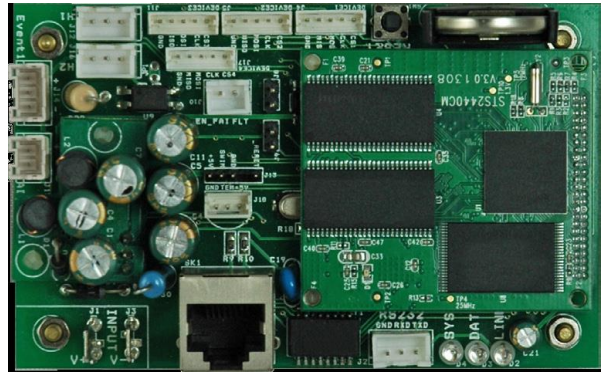
LifeSafety – advanced monitoring and control

- NetLink network modules enable monitoring and control of the power system for System integrity / battery health / output condition, Remote diagnostics and service features, Email notification on. Must be purchased separately.



NL2 Network Communication Module

- Enable monitoring, reporting and control of the power system
- Enables remote testing of one battery set (12 or 24VDC)
- Recommended for use with single voltage systems
- LAN/WAN environment



NL4 Network Communication Module

- Enable monitoring, reporting and control of the power system
- Enables remote testing of one battery set (12 or 24VDC)
- Recommended for use with dual voltage systems requiring independent FPO power supplies
- LAN/WAN environment

Thank you.