

OSI Reference Model

Protocol Stack

Layer No.	Layer Name	Examples
Layer 7	Application	EtherNet/IP - IEC 61158 ProfiNet Diagnose
Layer 6	Presentation	Modbus TCP HTTP
Layer 5	Session	RTP
Layer 4	Transport	IETF TCP/UDP
Layer 3	Network	IETF IP / ProfiNet RT
Layer 2	Data Link	IEEE 802.3/802.1/802.11
Layer 1	Physical	TIA - 1005

Layer 1 – Physical Layer

Design and Implement a Robust Physical Layer

“A significant portion of network downtime, approx. 80%, is attributed to Physical Layer Connections.”

Sage Research

ODVA[™]

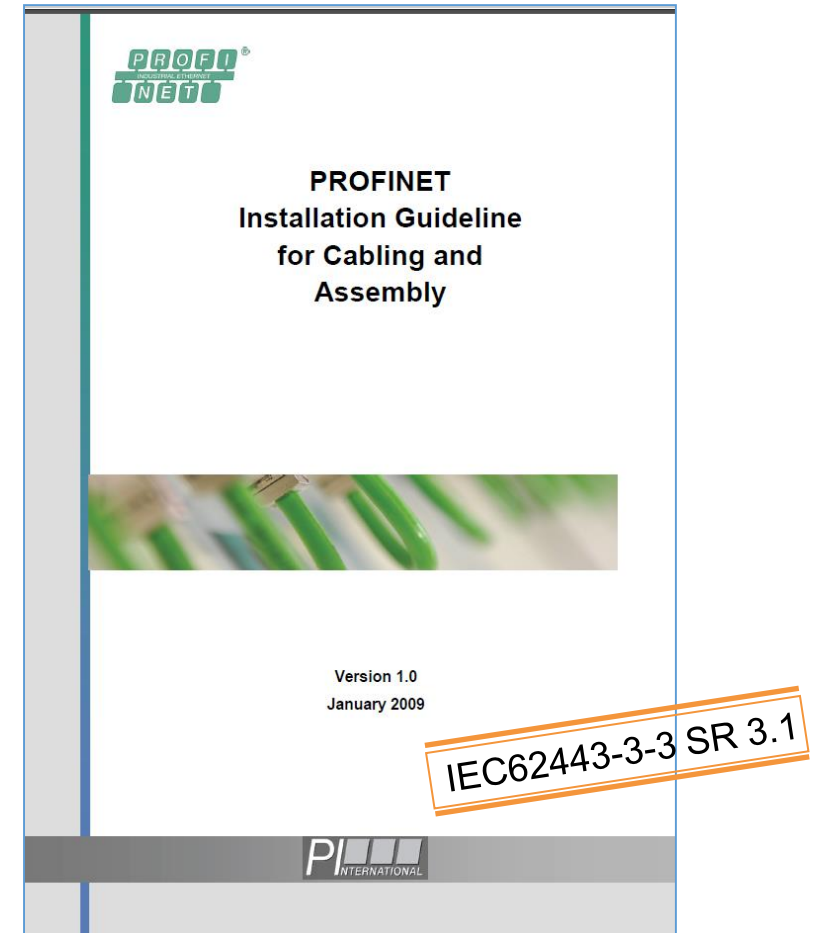


Overvågning og diagnose

Hvad er forudsætningen?

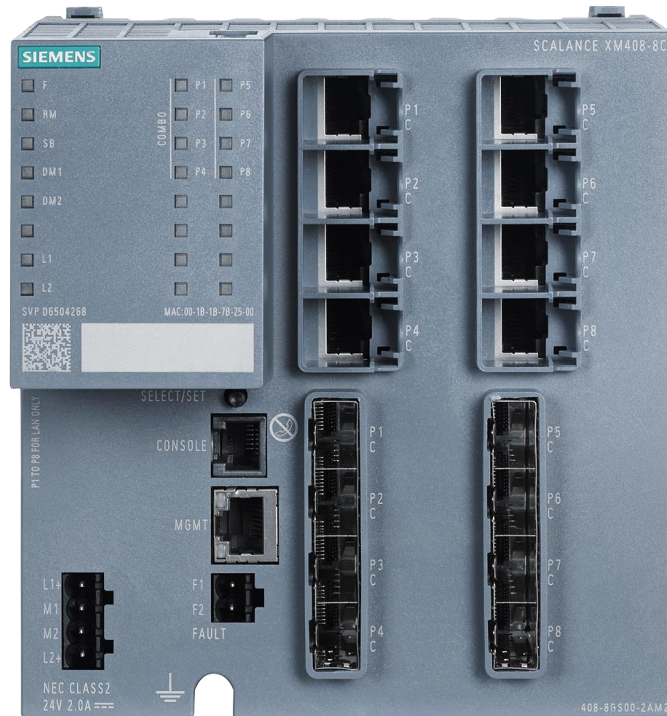
PROFINET Installation Guideline!

<http://www.profibus.com/download/installation-guide/>



Overvågning og diagnose

Hvad er forudsætningen?



**Brug...
Managed Switches!**

**80 % af netværksproblemer
skyldes kabler og stik.....!!!!**

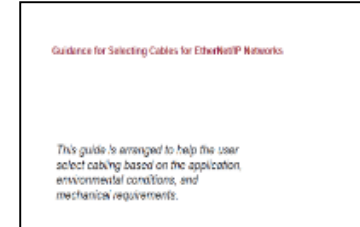


**Brug...
industrielle kabler og stik**

Layer 1 – Physical Layer

Design and Implement a Robust Physical Layer

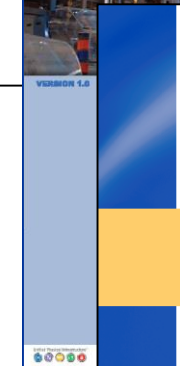
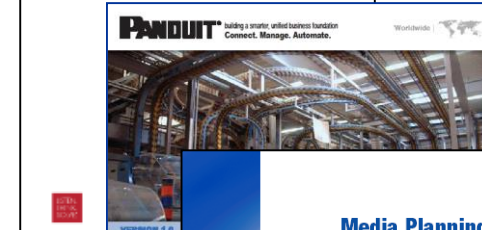
- Environment Classification - MICE
- More than cable
 - Connectors
 - Patch panels
 - Cable management (& labeling)
 - Noise mitigation
 - Bonding, Shielding and Grounding
- Standard Physical Media
 - Wired vs. Wireless
 - Copper vs. Fiber
 - UTP vs. STP
 - Singlemode vs. Multimode
 - SFP – LC vs. SC
- Standard Topology Choices
 - Switch-Level, Device-Level and Hybrid



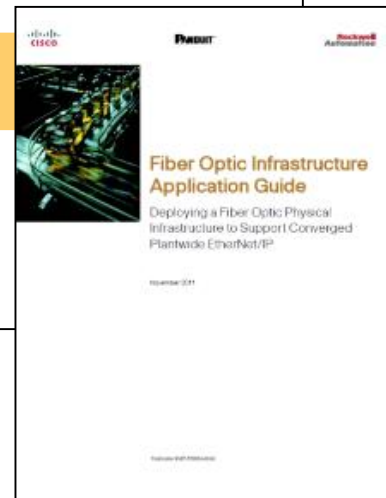
[Cable Selection
ENET-WP007](#)



[Industrial Ethernet Physical
Infrastructure Reference
Architecture Design Guide](#)



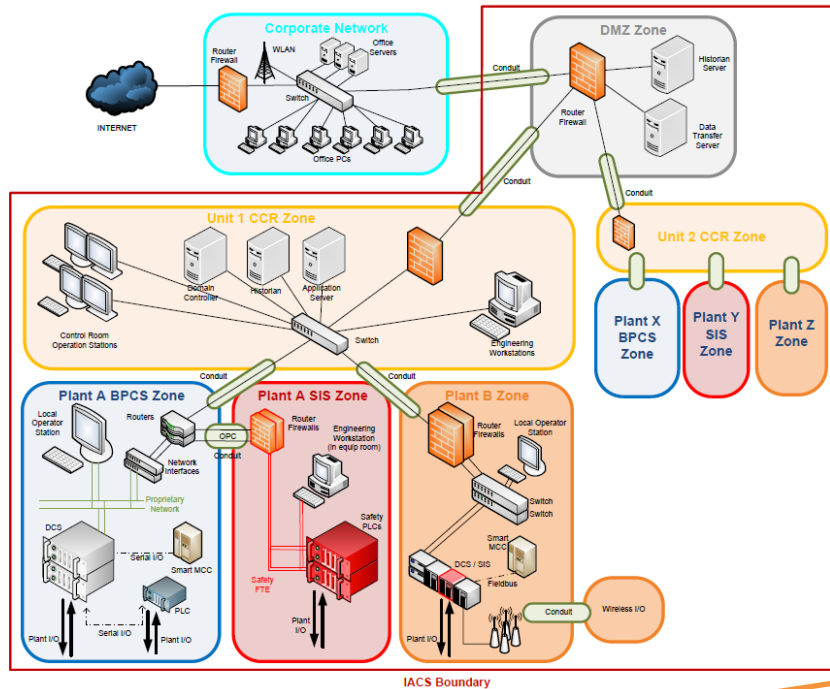
[ODVA Guide](#)



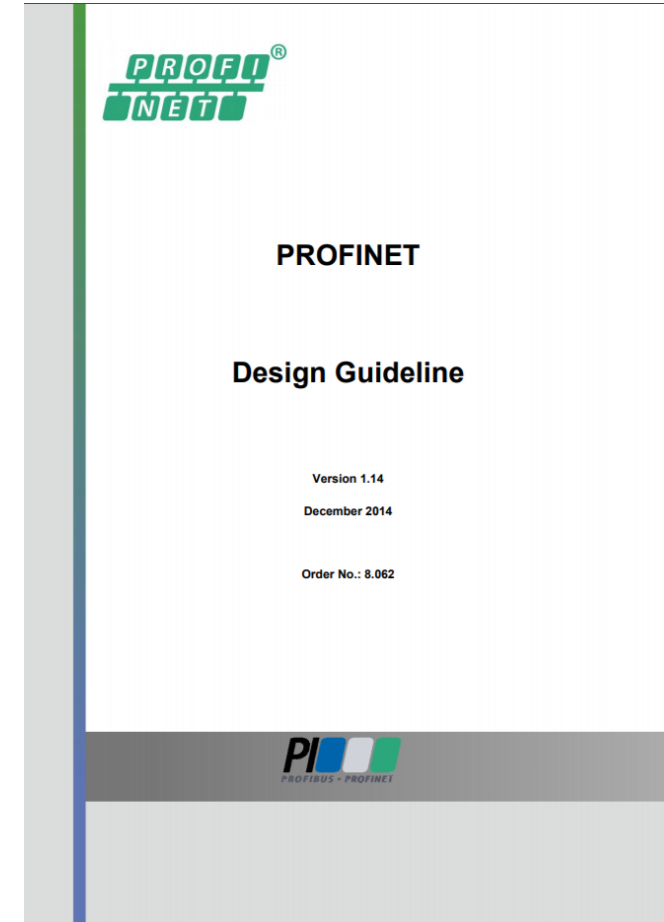
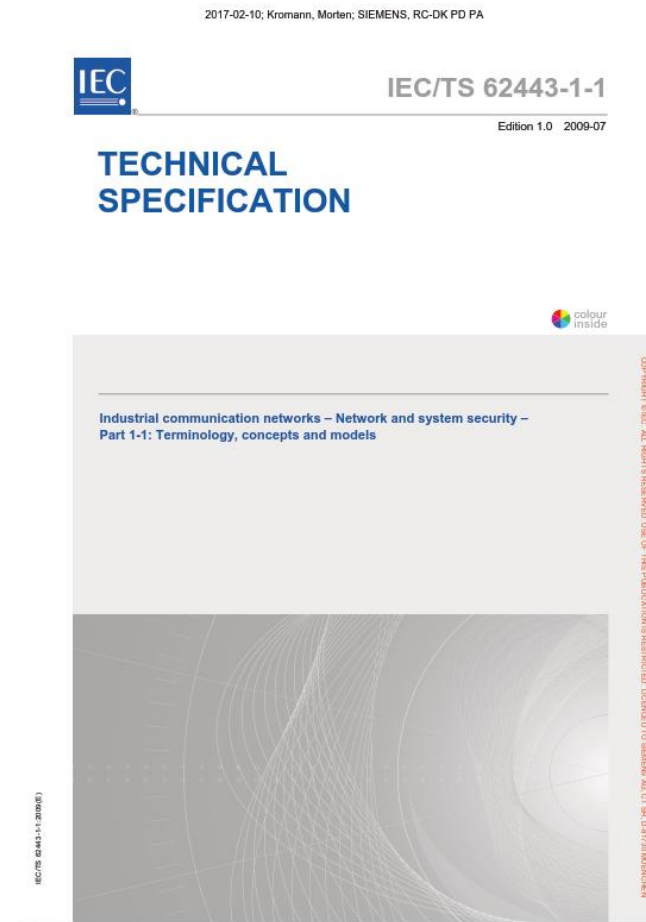
[Fiber Guide
ENET-TD003](#)

Overvågning og diagnose Design efter standarder.

Figure 2-3 Large Site



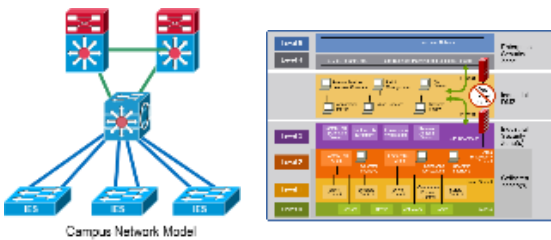
From IEC62443-3-2



Logical Framework Converged Plantwide Ethernet (CPwE)

Rockwell Automation

CISCO



Wide Area Network (WAN)

Data Center - Virtualized Servers

- ERP - Business Systems
- Email, Web Services
- Security Services - Active Directory (AD), Identity Services (AAA)
- Network Services - DNS, DHCP
- Call Manager

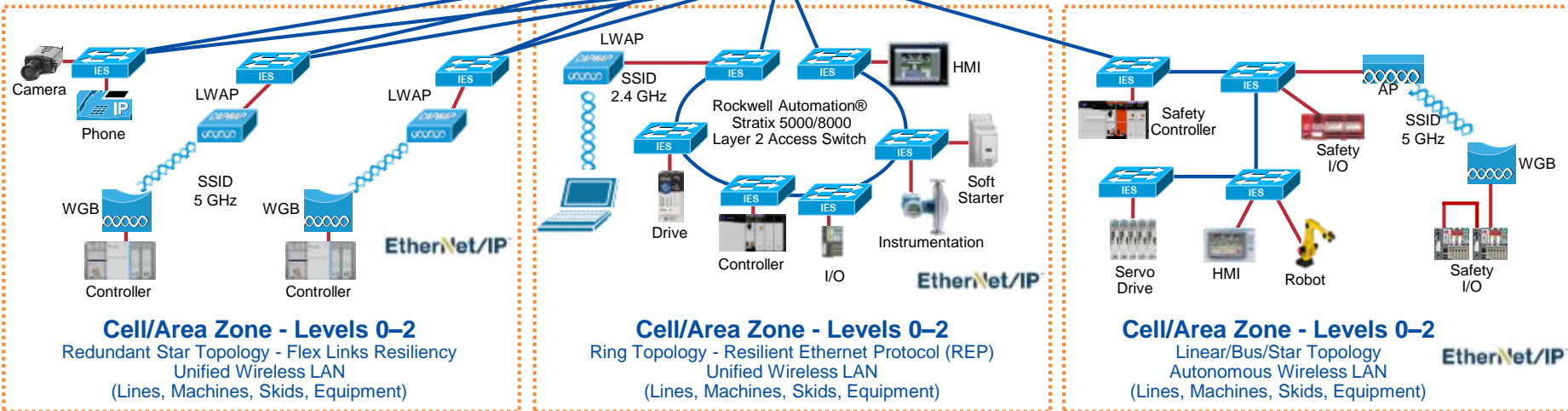
Physical or Virtualized Servers

- Patch Management
- AV Server
- Application Mirror
- Remote Desktop Gateway Server

Physical or Virtualized Servers

- FactoryTalk® Application Servers and Services Platform
- Network & Security Services - DNS, AD, DHCP, Identity Services (AAA)
- Storage Array

Level 3 - Site Operations (Control Room)



Enterprise Zone
Levels 4-5

Industrial
Demilitarized Zone
(IDMZ)

Industrial Zone
Levels 0-3
(Plant-wide Network)

Scalable, Robust,
Secure and
Future-Ready