

Planning, Deploying, and Troubleshooting Ethernet

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Session Content

- ▶ Planning New Ethernet Deployments
- ▶ Troubleshooting Existing Ethernet Deployments
- ▶ Power Over Ethernet (PoE)
- ▶ Terminology
- ▶ Q & A



Session Perspective

- ▶ Industry Standards
- ▶ Practical Methods
- ▶ Sharing of My Best Practices

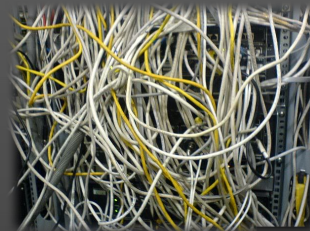


“No, I Won’t Do That!”

- ▶ **Work Inside Walls and Ceilings**
leave that to data cabling specialists – you own what you touch
- ▶ **Violate Building and Fire Codes**
fire marshals don’t like non-plenum cabling – not safe either
- ▶ **Work with Existing Bad Cabling**
decision maker will pay down the road – but YOU don’t have to

“Plenum” {noun}

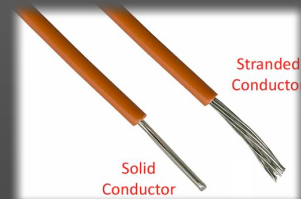
an air-filled space in a structure; especially : one that receives air from a blower for distribution



"No, I Won't Do That!"

- ▶ **Crimp My Own Patch Cables**
leave that to the manufacturers - is your q/c as good as theirs?
- ▶ **Swap "Solid-Core" and "Stranded" Cabling**
cheaper solid core is for 'non-flex' use only - stranded is for patch cables
- ▶ **Blame Systems or Software for a Cabling Problem**
bad cabling appears like computer issues - know the difference

"solid core cable"
one solid wire per conductor



Physics vs. Money

- ▶ **Cabling Works on an Analog Scale**
works > works poorly > works intermittently > does not work
- ▶ **Poor Cabling = Less Cabling Costs**
pay less for cabling - pay more for troubleshooting
- ▶ **Cat # Components Alone \neq Cat # Performance**
installation best practices are just as important as the components
- ▶ **Physical Factors have Significant Impact**
gravity, temperature, humidity, ozone, rodents, changes, time

"analog" {adjective}
a mechanism in which data is represented by continuously variable physical quantities



Planning for Office Buildings

“MDF”

main distribution frame

- ▶ **Future Proof**
build growth now – adding later is very expensive
- ▶ **Cabling Closet** (MDF and IDF)
climate controlled space with clean electrical and restricted access
- ▶ **Installation Sequence**
run cable and inspect before walls/ceilings are closed, terminate after



Planning For Old Buildings

“best practice”

is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark.

- ▶ **Future Proof**
build growth now – adding later is very expensive
- ▶ **Cabling Closet**
climate controlled space with clean electrical and restricted access
- ▶ **Prepare for Rework and Troubleshooting**
may not work even with best practices – many unknowns
- ▶ **Use an Experienced Installer**
some installers i know seem to sniff out what’s behind a wall!

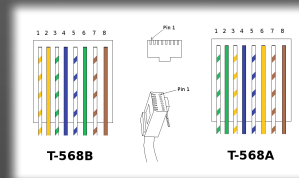


Ethernet Copper Cabling

“ethernet” {noun}

a computer network architecture consisting of various specified local-area network protocols, devices, and connection methods

- ▶ **Ethernet Cabling uses T568A or T568B Scheme**
4 Pairs using specific colors and pin configuration
T568A and T568B can be mixed but not on the same cable run
- ▶ **Connectors are Modular RJ-45**
TERA shield quadrant plug for Cat 7
- ▶ **90 Meters + 10 Meters = 100 Meters**
Up to 90 meters solid-core horizontal +
10 meters stranded patch cables



Ethernet Copper Cabling

“AWG”

american wire gauge

	Type	Max. Performance	Max. Length	Cable Gauge (AWG)	Max. Frequency	Pairs Used
Cat 3	UTP	10baseT	100 m	24 - 26	16 MHz	2
Cat 5	UTP	100baseT	100 m	24	100 MHz	2
Cat 5e	UTP	1000baseT	100 m	22 - 24	350 MHz	4
Cat 6	UTP	1000baseT	100 m	22	250 MHz	4
Cat 6a or 6e*	UTP	10GbaseT	55 m	22	500 MHz	4
Cat 7*	S/FTP	10GbaseT	100 m	n/a	600 MHz	4
Cat 7a*	S/FTP	40GbaseT	50 m	n/a	1000 MHz	4

* Emerging Standards



Power Over Ethernet

“IEEE” {noun}

institute of electrical and electronics engineers

- ▶ **Pass Power Safely with Data on Same Cabling**
Power Sourcing Equipment (PSE) to Powered Device (PD)
- ▶ **Low Power or High Power**
12.95 Watts with 802.3af (Type 1) or 25.5 Watts with 802.3at (Type 2)
- ▶ **Common PSE's are Ethernet Switches or PoE Injectors**
Smart PD Detection and Power On Sequence



Power Over Ethernet

“quality” {noun}

degree of excellence

- ▶ **10BaseT and 100BaseT Can Use Data Pairs or Spare Pairs**
PoE with Data Pairs is Mode A, PoE with Spare Pairs is Mode B
- ▶ **1000baseT Uses all 4 Pairs**
Phantom Power – Carries Power and Data on Same Cable Pairs
- ▶ **Watch for Power Loss**
Quality of Cabling Critically Important
- ▶ **Saves Energy**
Removes use of Power Bricks

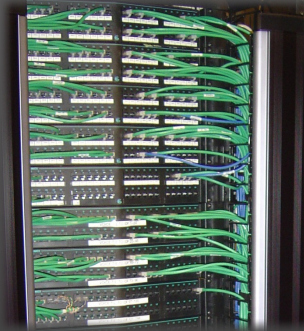


Troubleshooting Ethernet

- ▶ **Check Link Status & Traffic Lights**
Check Both Ends of Connection
- ▶ **Check Equipment**
Ethernet Switch & Device for Bad Ports or Damaged Ports
- ▶ **Check Cabling**
Cable, Components, Termination, Workmanship
- ▶ **Check Network Closet, Inside Ceilings**
Damage, Climate Control, Improper Installation

“damage” {noun}

loss or harm resulting from injury to person, property, or reputation



Troubleshooting PoE

- ▶ **Check Link Status, Power Status & Traffic Lights**
Check Both Ends of Connection
- ▶ **Check Equipment & Standards**
Ethernet Switch & Device for Bad Ports or Damaged Ports & Ratings
- ▶ **Check Cabling**
Cable, Components, Termination, Workmanship
- ▶ **Check Network Closet, Inside Ceilings**
Damage, Climate Control, Improper Installation

“installation” {noun}

the act or process of making a machine, a service, etc., ready to be used in a certain place



Resources

“resource” {noun}
a source of supply or support

- ▶ **Training & Certification**
<https://www.bicsi.org/Default.aspx>
- ▶ **Panduit Wall & Patch Panel Jacks**
<http://www.panduit.com/groups/MPM-OP/documents/SpecificationSheet/103589.pdf>
- ▶ **Seimon Punch-Down Patch Panel**
<http://www.siemon.com/network-patchpanels.asp>



Q & A

“Q & A” {noun informal}
an exchange of questions and answers.

- ▶ **“No, I Won’t Do That!”**
Work with Existing Bad Cabling
Crimp My Own Patch Cables
- ▶ **Planning for Installation in New and Old Buildings**
Future Proof
Hire and Experienced Installer
- ▶ **Ethernet**
Stick to Standards (and the Entire Standards)



Tips from Q & A

- ▶ Don't point a "hot" fiber cable to your eyes
- ▶ Maintain minimum bend radius and don't bunch up excess cable
- ▶ Un-Plug/Re-Plug to clean and fix poor connection. Pushing connector is not enough
- ▶ Leave Pull-Strings when installing cable and adding cables to ease future additions
- ▶ Look for poor quality termination, cut ends off and re-terminate properly
- ▶ Don't re-use connectors and jacks
- ▶ Don't use patch cables with broken clips
- ▶ Cut and throw away bad or suspect cable so, it won't haunt you or anyone else again
- ▶ Sheathing pulled back, more than 1/2" of un-twisting and loose conductors are bad

"Q & A" {noun informal}
an exchange of questions and answers.

