Planning, Deploying, and Troubleshooting Ethernet

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LOCKEY SOLUTIONS
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What we'll cover

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

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Session Perspective

- Industry Standards
- Practical Methods
- Sharing of Best Practices

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Cabling a Location

- Planning a new office wiring layout
- Planning for the deployment of new cabling into an old building

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networks
QUALIFICATION TESTER
Wiremap Only Results
SIGNAL
PERFORMANCE
105 FT
TO SELECT

Fluke DTX 1800 with Fiber & Copper
Online Price $31, 760

- http://www.tequipment.net/FlukeNetworksDTXKit-DTX-1800-MSO-120.html
- **Amazon is $28,522!**

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Testing Products

- Fluke DTX 1800 is the top of the line
- $40 testers from Fry's are only for continuity and not other factors
- $1000 Fluke Testers for Copper only
- Testing vs Certification

“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

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“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

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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 ! Cat # Performance
  - installation best practices are just as important as the components
- Physical Factors have Significant Impact
  - gravity, temperature, humidity, ozone, rodents, changes, time

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Building out Physical Infrastructure

- Different wiring grades
- Types of patch panels

Planning for Office Buildings

- 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

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Planning for Old Buildings

- 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!

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Ethernet Copper Cabling

- 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

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Ethernet Copper Cabling

	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

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Power over Ethernet

- What devices use PoE?
- Classes
  - 802.3af
  - 802.3at

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Power Over Ethernet

- 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

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Power Over Ethernet

- 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

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Troubleshooting Cabling Problems

- Finding the problem
- Types of physical layer testing tools
- Remediating bad cable runs correctly

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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

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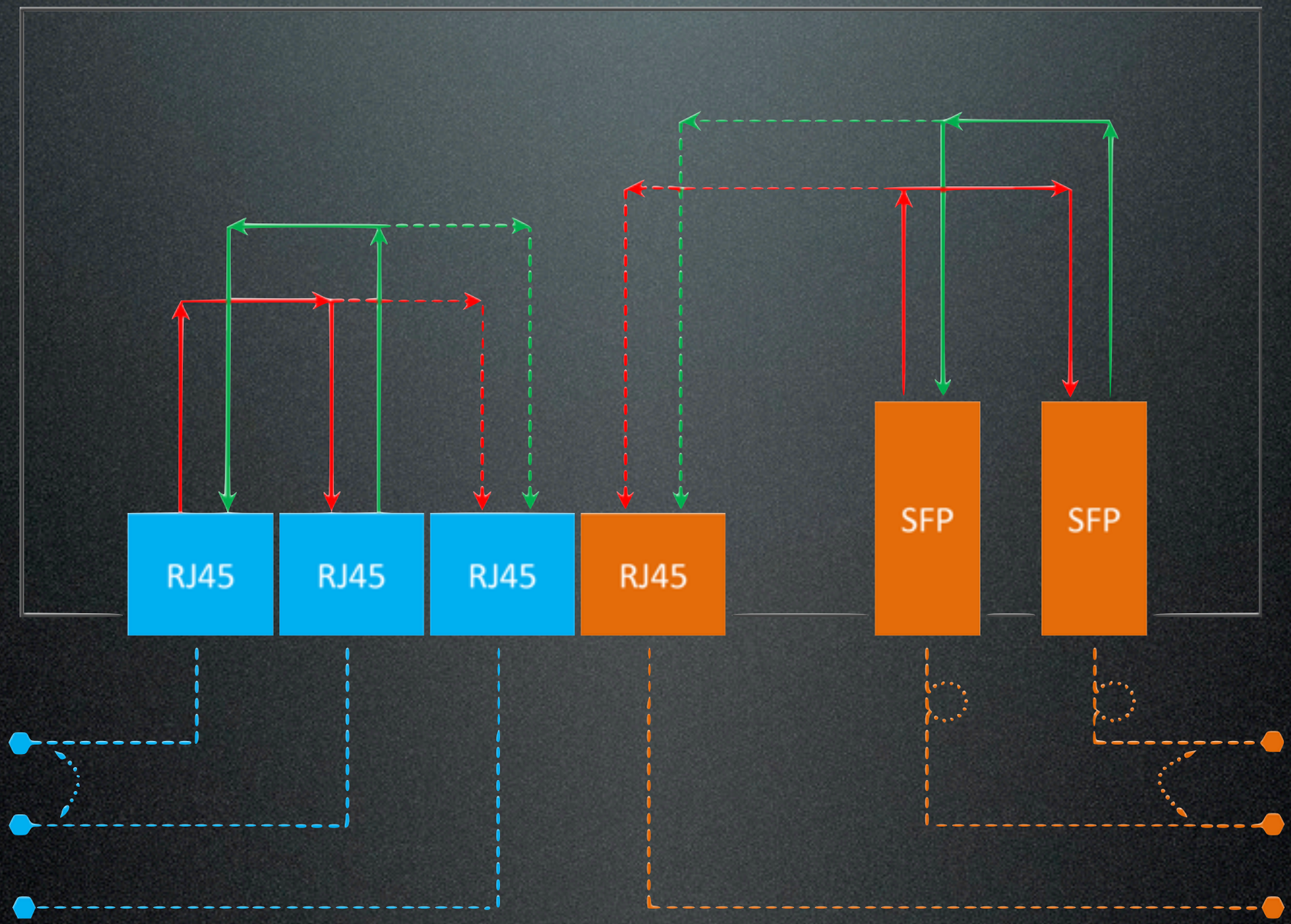
http://www.dual-comm.com/dual-gigabit-copper-and-fiber-easytap.htm

DualComm Copper/Fiber Model 2206



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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

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Resources

- 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

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Q&A

- “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)

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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 od and re-terminate properly

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Tips from Q&A

- 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

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