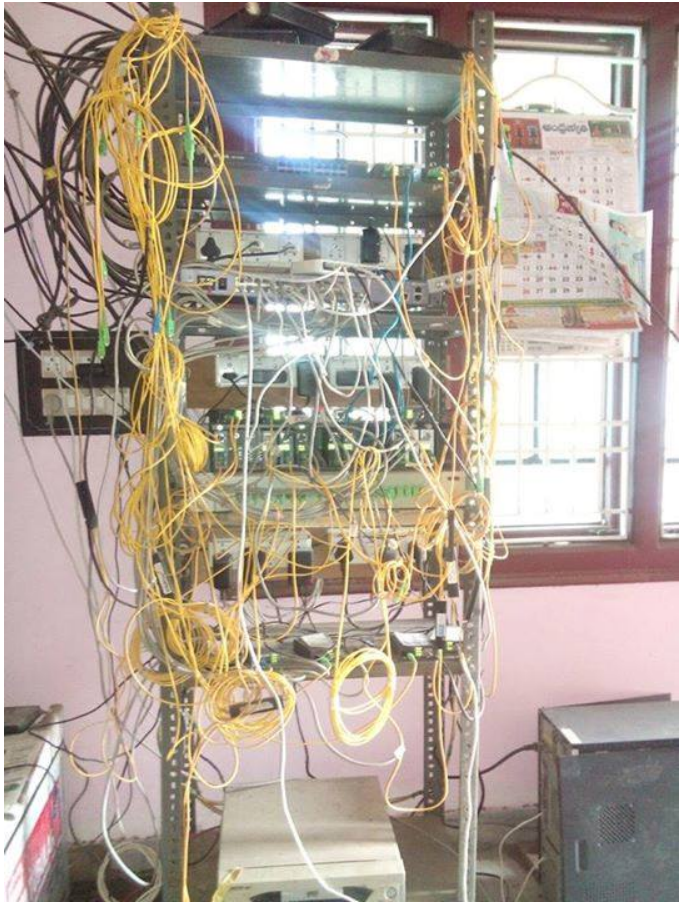
Structured Cabling

Campus Network Design & Operations Workshop

Why Structured Cabling?

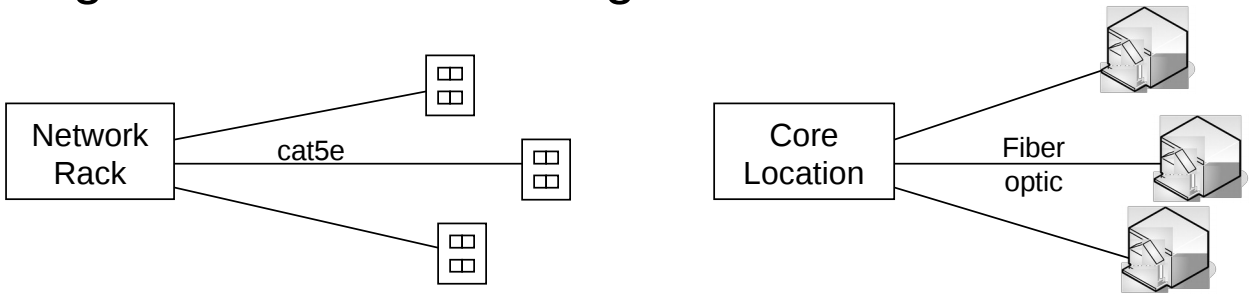


Structured Cabling

A structured cabling system is a complete system of cabling and associated hardware, which provides a comprehensive telecommunication infrastructure. This infrastructure serves a wide range of users, such as to provide telephone service and also transmit data through a computer network. It should not be device dependent.

Structured Cabling Systems

- Only two types of cabling:
  - Unshielded twisted pair copper – provides service to individual computers and between network racks
  - Fiber optic cabling – provides service to buildings and between network racks
- Everything is run in a star configuration



Unshielded Twisted Pair Cable

- Run in star configuration from network rack location to individual outlets in offices or labs.
- Run at least 2 cables to every outlet – I recommend 4 if you can afford it.
- Run 4 to 6 cables between network racks if the distance is less than 90 meters
- Question: what type of cable to run? Cat5, Cat5e, Cat6, Cat6A

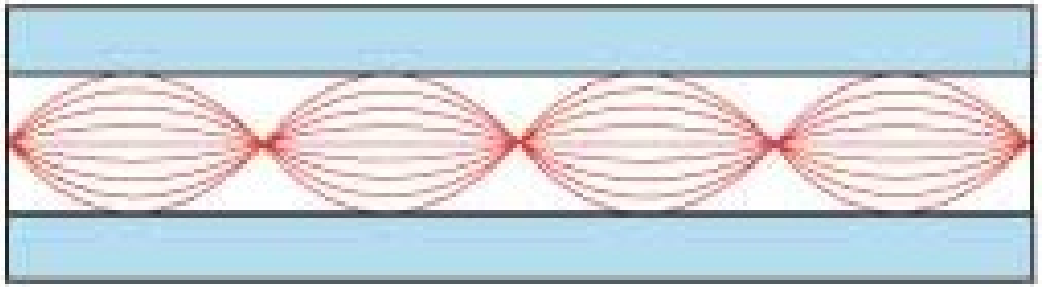
What type of UTP

- What speed does each type support?

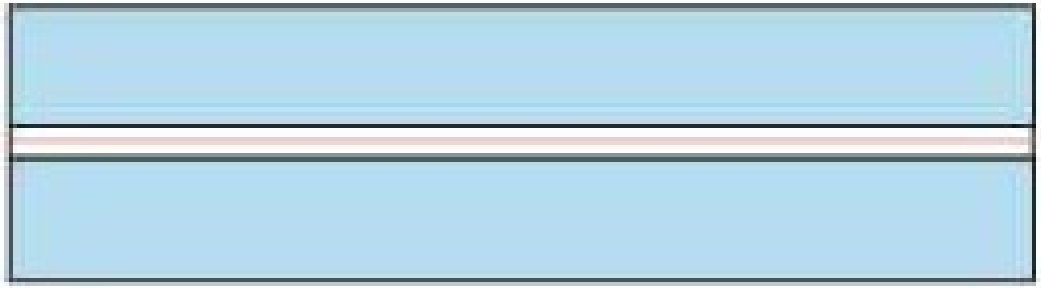
Cable Type	Max Speed	Max Distance	Cost Factor*
Category 5	100Mbs	100m	1x
Category 5e	1000Mbs	100m	1x
Category 6	1000Mbs	100m	1.5x
Category 6	10,000Mbs	57m	1.5x
Category 6A	10,000Mbs	100m	4x

Fibre Optic Cabling

- Two basic types of fiber
  - Multi Mode



  - Single Mode



Multi Mode Fiber

- Two basic types:
  - 62.5 micron core. Legacy, older style
  - 50 micron core. Newer
- A number of standards to be aware
  - G.651 – 50 micron
  - OSI/IEC 11801 OM1 – 62.5
  - OSI/IEC 11801 OM2 – 50 micron
  - OSI/IEC 11801 OM3 – 50 micron laser optimized
  - OSI/IEC 11801 OM4 – 50 micron higher bw

Single Mode Fiber

- All have core between 8 and 10 micron
- Standard types:
  - OS1 and OS2 (OSI/IEC 11801 types)
  - ITU G.652 (A, B, C, D)
  - ITU G.653 – 1310/1550 with EDFA amps
  - ITU G.654 – 1550 only
  - ITU G.655 – 1550/1625 for long haul DWDM
  - ITU G.656 – 1460/1625 for long haul DWDM
- You want G.652.D or OS2 single mode

Optical Interface Standards

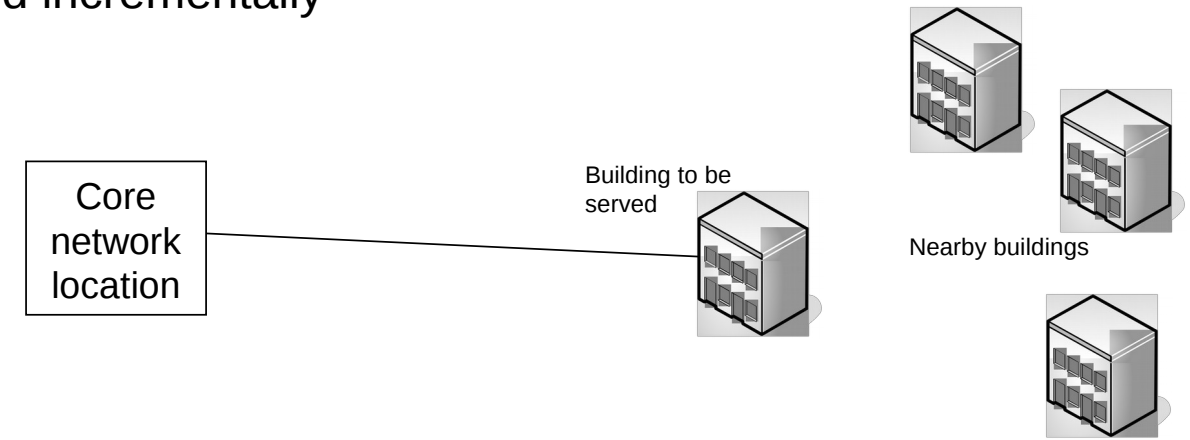
Standard	Speed	Fiber Type
100baseFX	100Mbs	MM
1000baseSX	1Gbs	MM
1000baseLX/LH	1Gbs	MM or SM
10GbaseSR	10Gbs	MM
10GbaseLRM	10Gbs	MM
10GbaseLR	10Gbs	SM
10GbaseER	10Gbs	SM

Fiber Optic Recommendations

- Don’t install any Multi mode
- Only install Single mode
- Run in star configuration from core network location to individual buildings
- Run in star configuration inside of buildings from main network rack to other network racks
- To reduce costs, can run large fiber cable from core to some remote location, then smaller cables from there to surrounding buildings

Star Configuration

- Plan for future -- Install enough fiber
  - Between Buildings: 6 single mode from core to each building (consider 12 fibers if you can afford it)
  - Inside of buildings: 6 single mode between network racks
  - Can build incrementally



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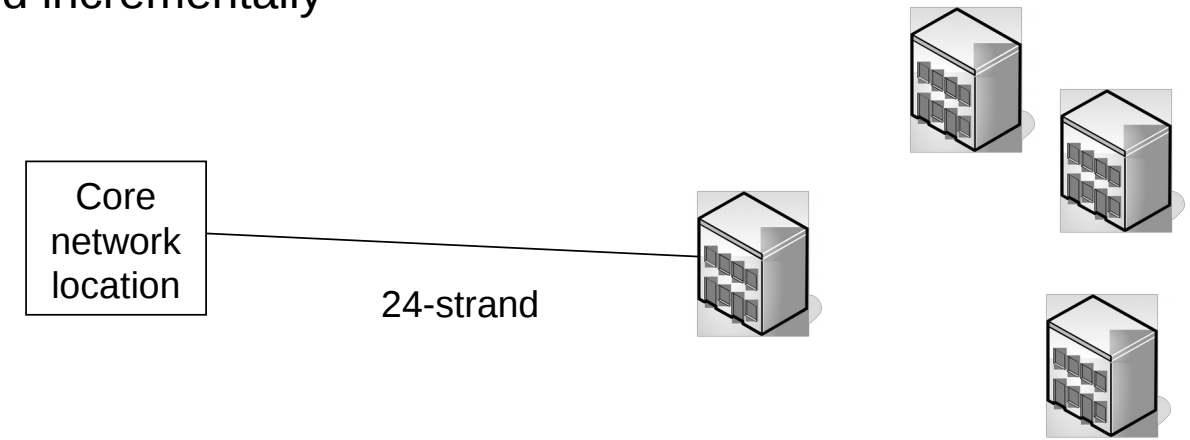

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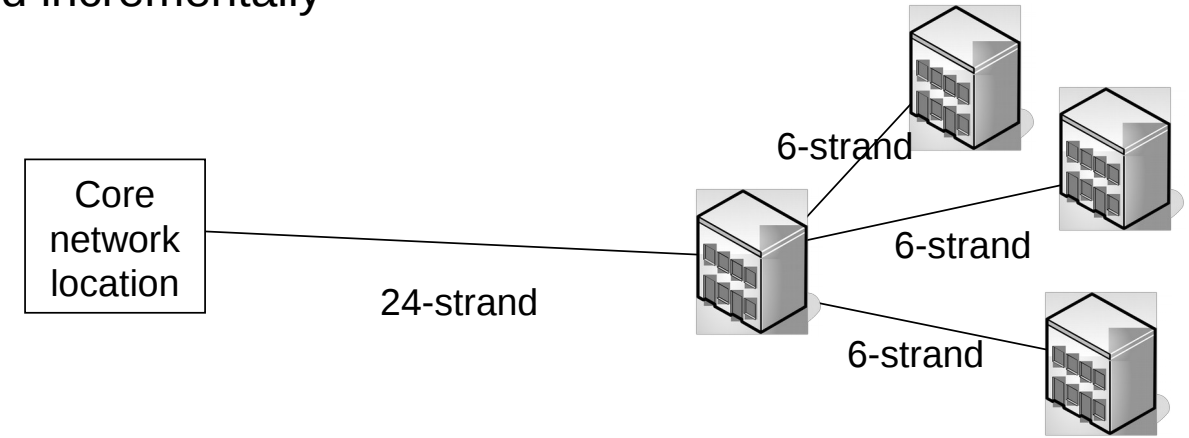
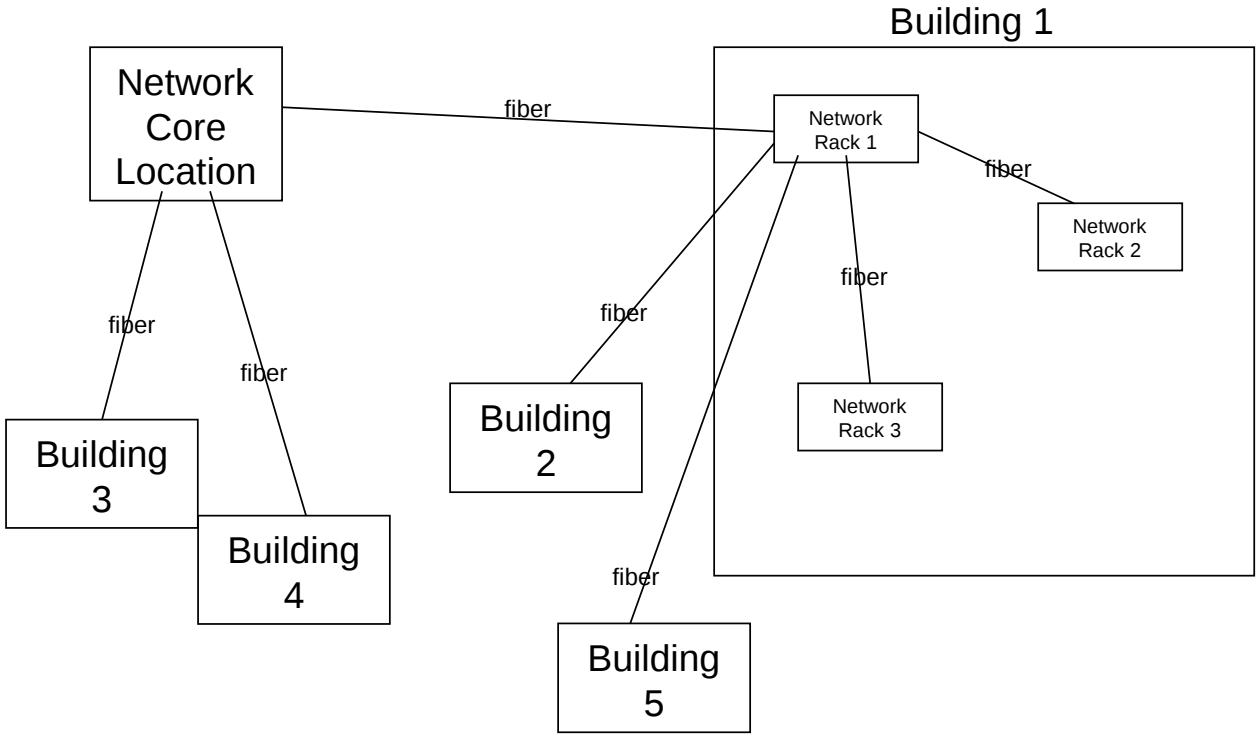
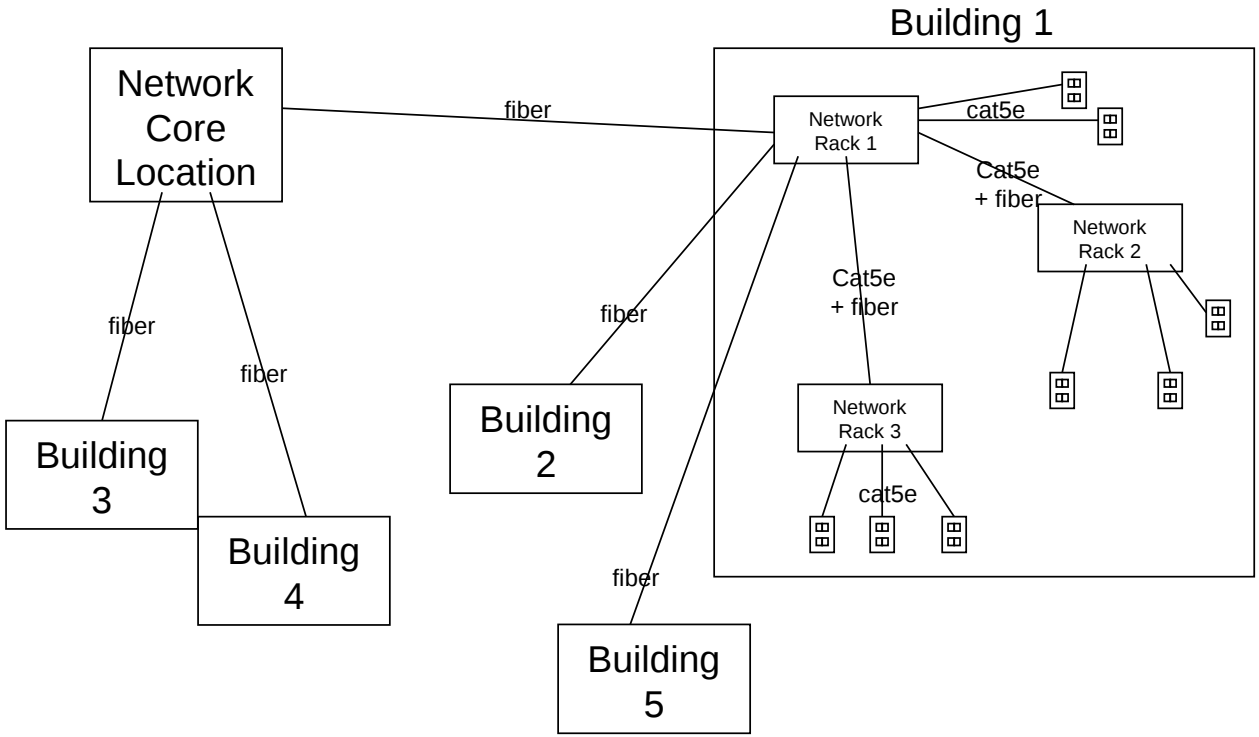


Fiber Optic Topology



Putting it all Together



Acknowledgement

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