

MÉXICO

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Revolucionando la tecnología

Fiber or Copper

Which Costs More?

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advancing information transport systems



LAN Infrastructure Choices

- Hierarchical Star (Traditional)
- Centralized Fiber (Fiber to the Desk)
- FTTE (Fiber to the Telecom Enclosure)



Why Compare Costs?

- Demonstrate that fiber-based networks are cost-competitive today with hierarchical star UTP copper networks.
- Design networks using widely available and cost-effective fiber electronic equipment.
- Show practical networks incorporating new standardized architectures that take advantage of fiber's inherent capabilities such as Centralized Cabling and Fiber-to-the-Telecom Enclosure (FTTE).
- Bring network designers and end users up-to-date on advances in enterprise network fiber technology.



Market Changes

- Opto-electronics components cost less before:
 - Still higher than copper components, but electronics component costs declining leading to significant reduction in complete fiber network.
- “Tier One” suppliers now offering fiber workgroup switches.
- Non-blocking fiber architectures facilitate converged networks.
- New categories of UTP copper are more complex, more expensive, and require larger pathways & spaces.
- FTTE now a ratified TIA standard.
 - TIA/EIA-569-B and TIA/EIA-568-B.1, Addendum 5

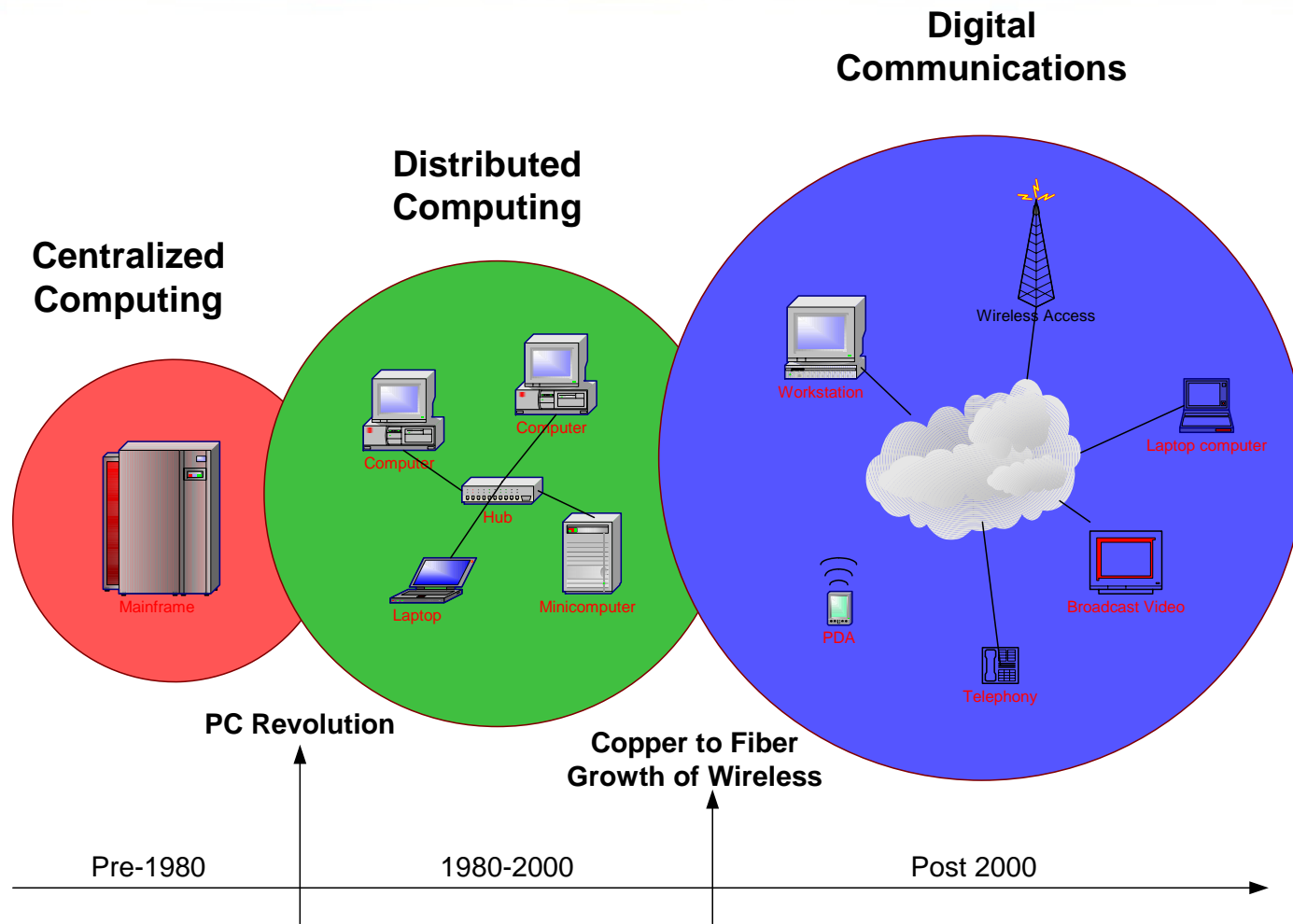


Convergence

- Convergence is paramount in most users' minds today.
 - Voice, Video and Data.
- Advanced fiber LANs make non-blocking architecture easier.
 - Non-blocking = never more user traffic than can be handled by upstream backbones.
 - Even small time delays in the transmission of video and data can impact network performance.



Convergence is Turning the LAN into a Communications Infrastructure



The Networking Market shifts to Communications



What is the Fiber Optics LAN Section (FOLS)?

- Founded in 1993 as a Section of the TIA's Fiber Optics Division.
- Mission: to educate system designers, architects, consultants, engineers, contractors, end users and the media about the technical advantages that optical transmission brings to customer-owned networks.
- FOLS also stimulates the development of new fiber standards and the promotion of optical-based applications in customer-owned networks.





FOLS Members include:

- 3M
- ADC
- Berk-Tek, a Nexans Company
- Corning
- Corning Cable Systems
- Leviton Voice & Data
- OFS
- Ortronics/Legrand
- Panduit
- Sumitomo Electric Lightwave
- TTelectronics / OPTEK
- Tyco



FOLS 3rd Generation Cost Model Compares LAN Architectures

- Launched in June 2005.
- Tool that compares installed first costs of all-fiber and UTP/fiber architectures.
- Allows users to model their own costs.
- Developed by a team of FOLS members, many from companies that sell both fiber & copper.
- FREE to download and use from www.fols.org (registration required)



Comparing Choices

- Hierarchical Star (Traditional)
- Centralized Fiber (Fiber to the Desk)
- FTTE (Fiber to the Telecom Enclosure)

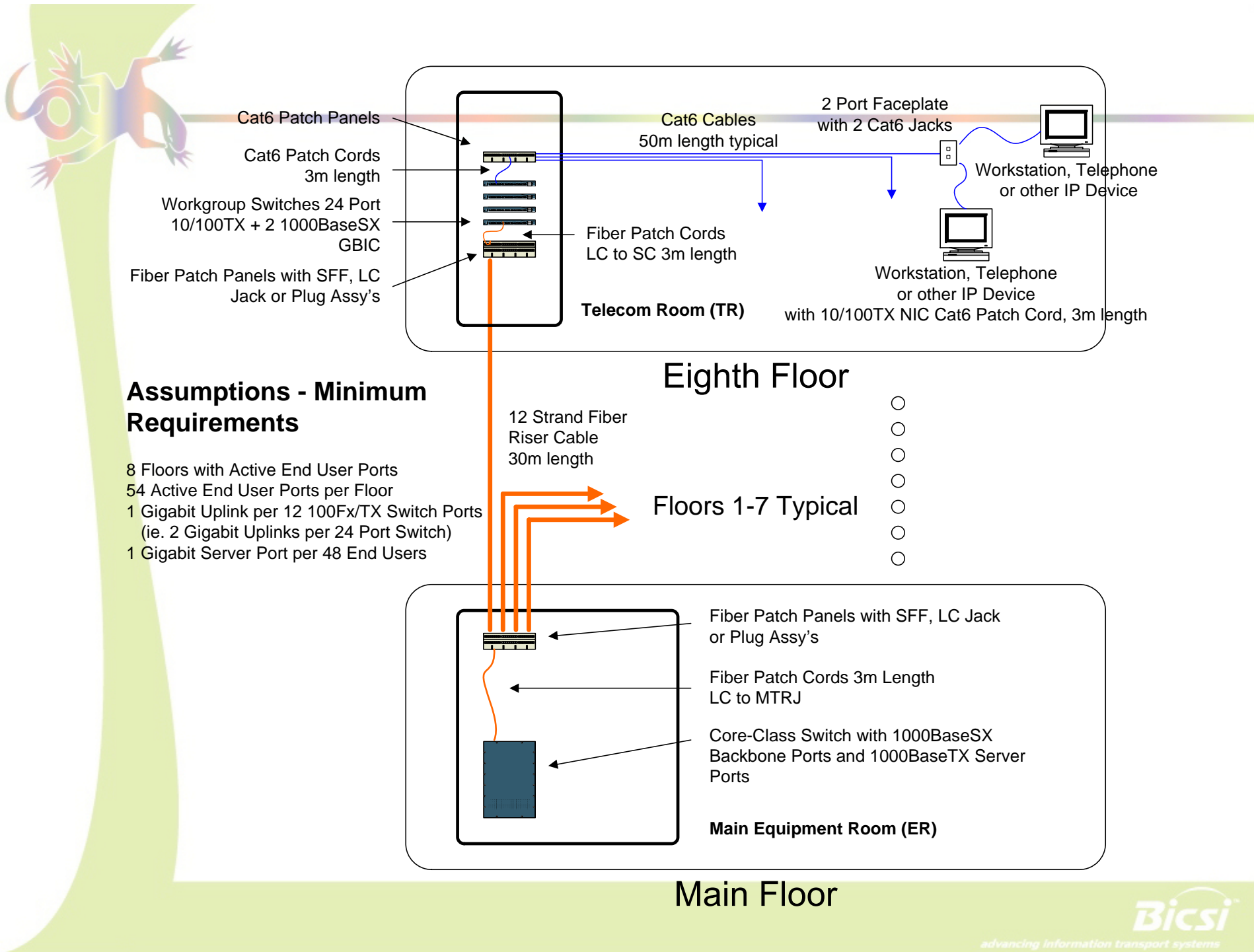


Hierarchical Star

- **“Traditional” architecture.**
- Fiber in the riser, Cat 6 UTP in the horizontal.
- **6'x10' TR on each floor.**
- Cooling required for each TR – Approx. \$10K.
- **Typically have 1 Gbps fiber uplink feeding 24-48 100 Mbps ports.**

** ER = Main Equipment Room

** TR = Telecom Room



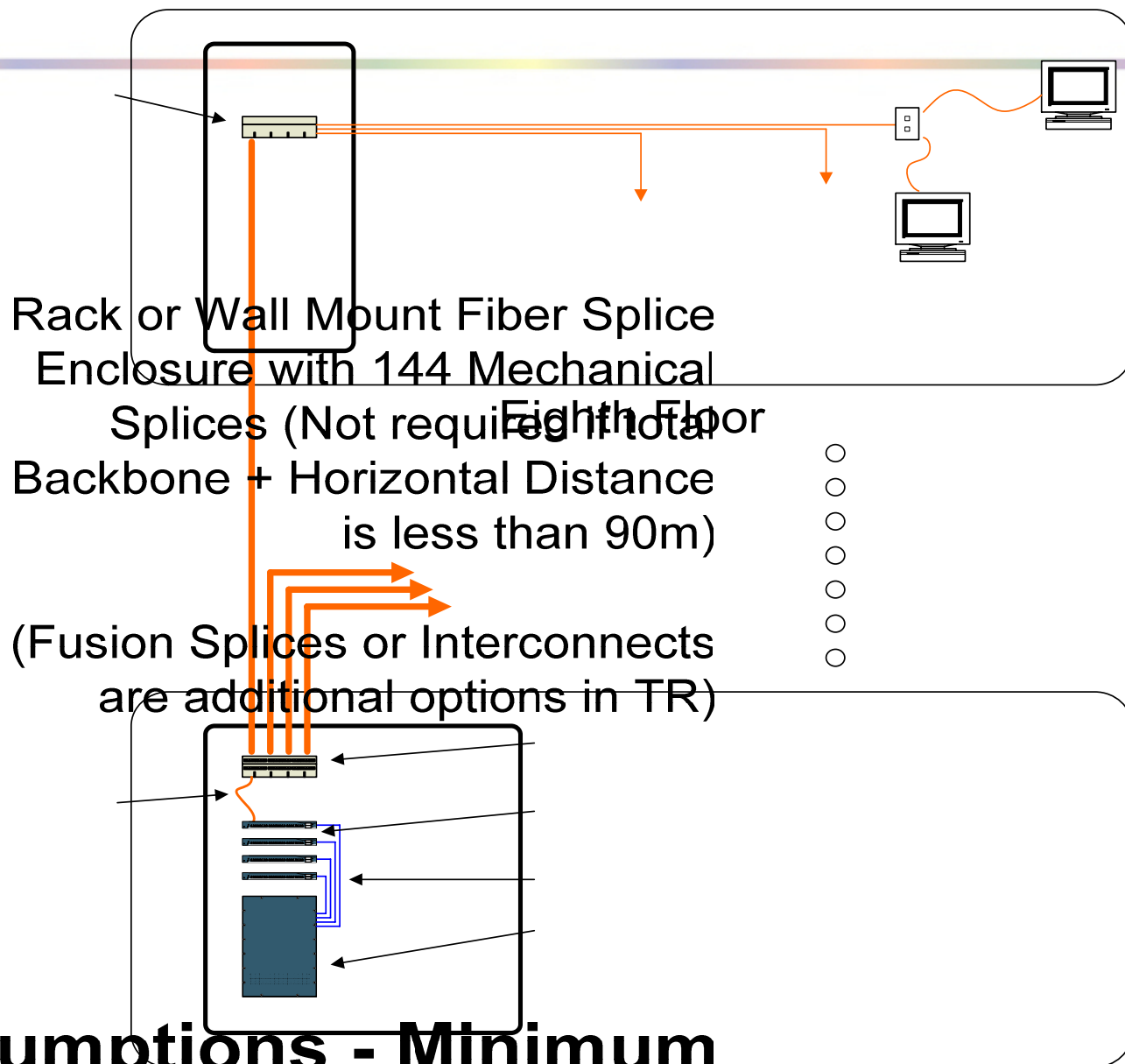


Centralized Fiber

- Fiber to the desktop.
- Electronics centralized in single ER.
- TR is 1/10th the size. No cooling or conditioned power required!
- More secure network.
- Simplified maintenance.
- Electronics more expensive.

** ER = Main Equipment Room

** TR = Telecom Room



Rack or Wall Mount Fiber Splice Enclosure with 144 Mechanical Splices (Not required if Total Backbone + Horizontal Distance is less than 90m)

(Fusion Splices or Interconnects are additional options in TR)

4 S

Tele
Roc
TIA

Assumptions - Minimum Requirements

Main Floor

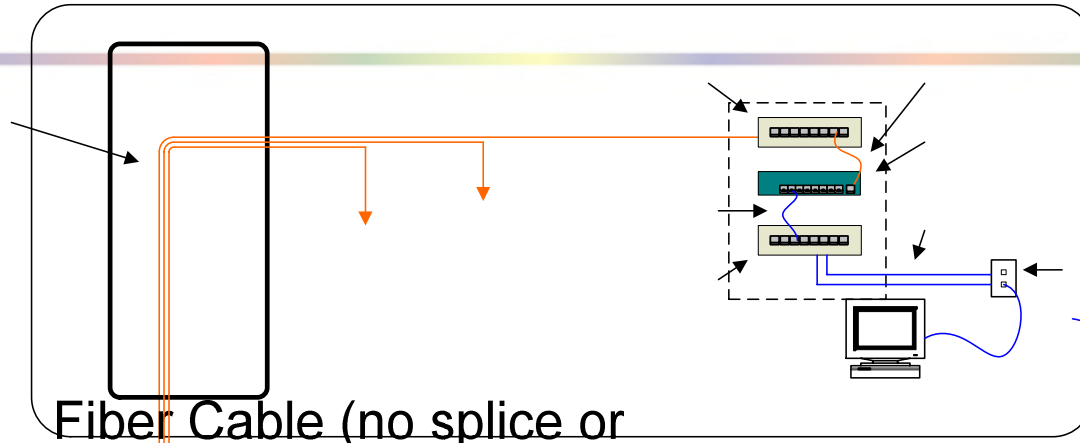
144 Fiber Ri
bundled 12 c
30m length

8 Floors with Active End User Ports



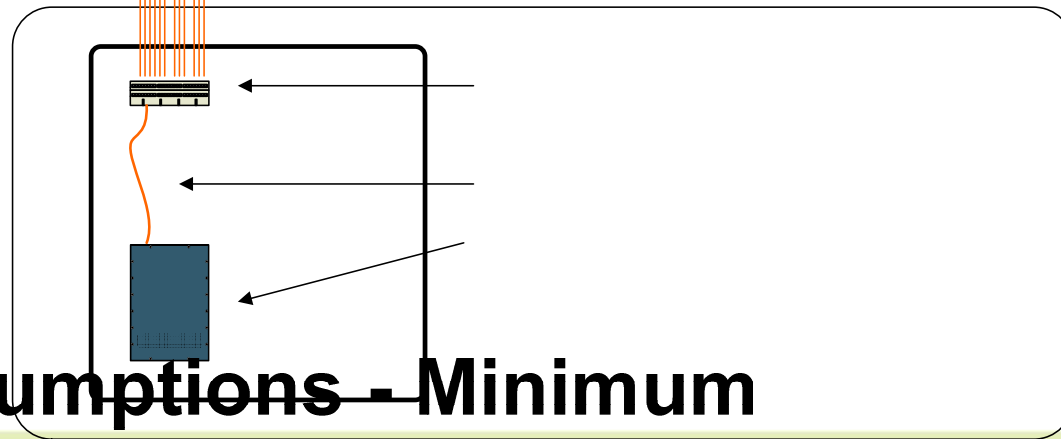
Fiber to the Telecom Enclosure

- Brings fiber to the office environment, closer to end-user.
- Final span can be fiber, UTP or wireless.
- TE has minimal cooling requirement and can use low cost mini-switches.
- Completely non-blocking in low density configuration, only 20% in high-density.
- Highly flexible for moves, adds & changes.



Fiber Cable (no splice or interconnect needed)

Eighth Floor



Assumptions - Minimum Requirements

Main Floor

8 Floors with Active End User Ports

Telecom

Room cou

TIA recom

Multiple 6 Strand
Fiber Plenum Cable
80m length



View of Cost Model Spreadsheet

Microsoft Excel - FOLS_Cost_Model_v5 FINAL.xls

File Edit View Insert Format Tools Data Window Help PDF Create!

Type a question for help

A3 fx

A B C D E F G H I J K

1 **FOLS** Providing Information on the Use of Fiber in Customer-owned Networks Horizontal Cabling Costs: Fiber vs. UTP
 2 FIBER OPTICS LAN SECTION Interactive Cost Model

	Material	Labor	Total	
5 Total Cost Difference: Centralized Fiber vs. Hierarchical Star	\$ 17,882.53	\$ (3,914.00)	\$ 13,968.53	5.0%
6 Total Cost Difference: FTTE (Low Density) vs. Hierarchical Star	\$ (85,836.01)	\$ 1.00	\$ (85,835.01)	(30.5%)
7 Total Cost Difference: FTTE (High Density) vs. Hierarchical Star	\$ (114,133.18)	\$ (3,569.00)	\$ (117,702.18)	(41.8%)
8 Hierarchical Star Network Totals	\$ 258,838.46	\$ 22,689.00	\$ 281,527.46	
9 Centralized Fiber Network Totals	\$ 276,720.99	\$ 18,775.00	\$ 295,495.99	
10 Fiber-To-The-Enclosure (Low Density) Totals	\$ 173,002.45	\$ 22,690.00	\$ 195,692.45	
11 Fiber-To-The-Enclosure (High Density) Totals	\$ 144,705.28	\$ 19,120.00	\$ 163,825.28	
12 Port Cost Difference: Centralized Fiber vs. Hierarchical Star	\$ 41.39	\$ (9.06)	\$ 32.33	
13 Port Cost Difference: FTTE (Low Density) vs. Hierarchical Star	\$ (198.69)	\$ 0.00	\$ (198.69)	
14 Port Cost Difference: FTTE (High Density) vs. Hierarchical Star	\$ (264.20)	\$ (8.26)	\$ (272.46)	
15 Hierarchical Star Network Totals	\$ 599.16	\$ 52.52	\$ 651.68	
16 Centralized Fiber Network Totals	\$ 640.56	\$ 43.46	\$ 684.02	
17 Fiber-To-The-Enclosure (Low Density) Totals	\$ 400.47	\$ 52.52	\$ 452.99	
18 Fiber-To-The-Enclosure (High Density) Totals	\$ 334.97	\$ 44.26	\$ 379.23	

Print

View Cost Sheet

Go To Hierarchical Star Inputs View Layout

Go To Centralized Fiber Inputs View Layout

Go To FTTE (Low Density) Inputs View Layout

Go To FTTE (High Density) Inputs View Layout

The FOLS cost model requires the use of macros to run properly. If the buttons above do not work then change your Excel macro security to medium then close and reopen this workbook and select Enable Macros.

Common Inputs:

Check to Use Custom Pricing **Market Pricing Used**

Number Floors [Telecom Rooms] 8

Number Ports per Floor [Telecom Rooms] 54 (2 ports req'd per wallplate)

Total Number Ports 432

UTP TR Closet Size 60 sq.ft.

Fiber TR Closet Size 6 sq.ft.

Closet Construction Rate \$ 150.00 \$/sq.ft.

Closet Power/Lighting Rate \$ 1.50 \$/sq.ft./yr

UTP TR Closet Construction Cost \$9,000.00

UTP TR Closet Power Cost (\$/5 years) \$ 450.00

Fiber TR Closet Construction Cost \$ 900.00

Total Loaded Labor Rate \$ 60.00 \$/hour

Centralized and Hierarchical Star

Horizontal Plenum Cable Average Length 50 meters

Vertical Riser Cable Average Length 30 meters

Fiber-To-The-Enclosure

Horizontal Plenum Cable Average Length 15 meters

Vertical Plenum Cable Average Length (MC to Telecom Enclosure) 80 meters

UTP Switch Port Utilization 70%

Fiber Switch Port Utilization 90%

Server Ports Required (1 per 48 user ports) 9

Notice of Disclaimer and Limitation of Liability

- * The Cost Model is designed to be used with your own data, and you must determine your own pricing to make the model work for you.
- * The Cost Model does not calculate all costs of items common to the Hierarchical Star, Centralized Fiber, and FTTE Networks.
- * The Cost Model is not to be used in place of your independent judgment.
- * The information provided is taken from publicly available documents and web sites.
- * The numbers provided are historical and are in no way an attempt to ascertain current prices.
- * The cost model is not intended to preclude other approaches for financial modeling.
- * The various scenarios contained in this model and the assumptions therein are examples only.
- * The default fiber telecom room size used in this model are standards compliant and may be most appropriate for new construction and/or existing buildings where existing telecom real estate may be redeployed for other uses.
- * TIA does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the cost model.

For more information, call the Fiber Optics LAN Section (FOLS) of the Telecommunications Industry Association (TIA) at (781) 259-8584 or (703) 907-7723. Visit FOLS on the internet at <http://www.fols.org>

Hierarchical Star Network

Model Costs Hierarchical Star Layout Centralized Fiber Layout FTTE Layout

Ready NUM



Customizing the Model

- FOLS encourages all users to input their own data into the model.
- **Representative pricing used for examples is average pricing taken from PEPPM and other industry. databases**
- FOLS looked at a minimum of three options for each component.

Common Inputs:		
Check to Use Custom Pricing →	<input type="checkbox"/>	Market Pricing Used
Number Floors [Telecom Rooms]	8	
Number Ports per Floor [Telecom Rooms]	54	(2 ports req'd per wallplate)
Total Number Ports	432	
UTP TR Closet Size	60	sq.ft.
Fiber TR Closet Size	6	sq.ft.
Closet Construction Rate	\$ 150.00	\$/sq.ft.
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Fiber TR Closet Construction Cost	\$ 900.00	
Total Loaded Labor Rate	\$ 60.00	\$/hour
Centralized and Hierarchical Star		
Horizontal Plenum Cable Average Length	50	meters
Vertical Riser Cable Average Length	30	meters
Fiber-To-The-Enclosure		
Horizontal Plenum Cable Average Length	15	meters
Vertical Plenum Cable Average Length (MC to Telecom Enclosure)	80	meters
UTP Switch Port Utilization	70%	
Fiber Switch Port Utilization	90%	
Server Ports Required (1 per 48 user ports)	9	



First Results Centralized Fiber

Centralized fiber architecture is within 5% of legacy hierarchical star copper architecture

- Essentially at cost parity – will depend on your building and component prices.
- Fiber components are still more expensive (but not as much as people think), but system cost extremely close to copper.
- In new builds (and some existing installs), TR can be made much smaller, allowing space to be reallocated.
- More secure network that is easier to maintain.
- Total system installed first cost only \$13,968 more for all-fiber network.



First Results FTTE

FTTE Low Density is 30-42% less expensive than hierarchical star

- Extends fiber closer to the end user.
- Takes advantage of fiber's long-distance capabilities.
- Facilitates moves, adds & changes.
- 100% non-blocking architecture, allows highest workstation performance.
- Total system cost \$85,835-\$117,702 lower than hierarchical star architecture.



Conclusion

- Users no longer need to rely on hearsay and dated information to make infrastructure decisions.
- The cost model provides the opportunity to compare network infrastructure choices for your network.
- New standards-compliant LAN architectures offer performance and price advantages
- Now is a good time to consider fiber!

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This presentation includes material generated by members of FOLS and in particular Gary Cawley, former FOLS chair

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