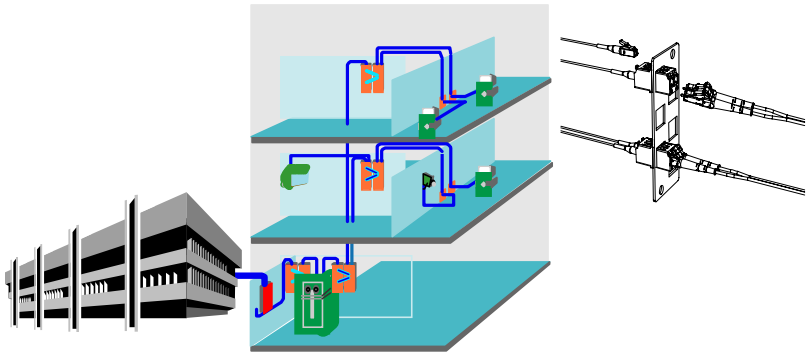
LC Connector

The High Density Standard for Premises Networks



Terry R. Cobb
Lucent Technologies
Nov. 1998
IEEE 802.5

LC Connector
Outline

- Improvement over SC
- Low Complexity
- Size
- Duplex with Polarity
- Multimode and Single Mode
- Performance compliant with ISO 11801 & EIA-568-A
- Suitable as an equipment connector
- Dust protection
- Ergonomics
- Availability of Detailed Specifications
- TIA patent and licensing requirements
- Outdoor use

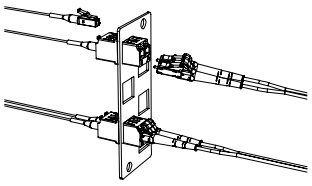
LC Connector
Improvement over SC

	SC	LC	Improvement
Size - Fiber Spacing *(in)*	0.500	0.246	51%
MM Insertion Loss *(dB Avg)*	0.3	0.1	66%
MM Return Loss *(dB Avg)*	28	33	69%
SM Insertion Loss *(dB Avg)*	0.2	0.1	50%
Field Install Time *(min)*	5	3	40%

LC Connector
Low Complexity

Lower SYSTEM complexity is KEY

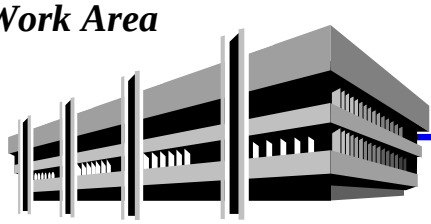
- **No cost shifting**
- **No special fiber required**
- **No special cable required**

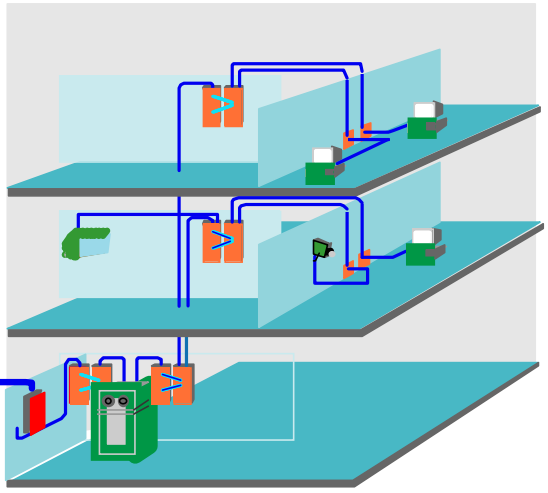


LC Connector
Low Complexity

ONE connector for ALL segments:

Campus Backbone
Riser Backbone
Equipment Room
Telecom Closet
Horizontal
Work Area



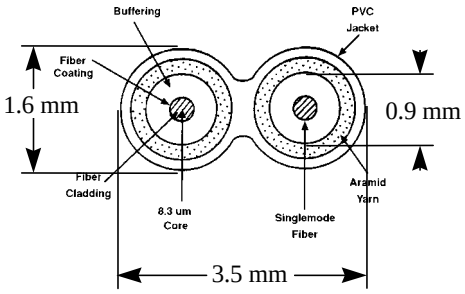


LC Connector
Low Complexity

Simplified Components

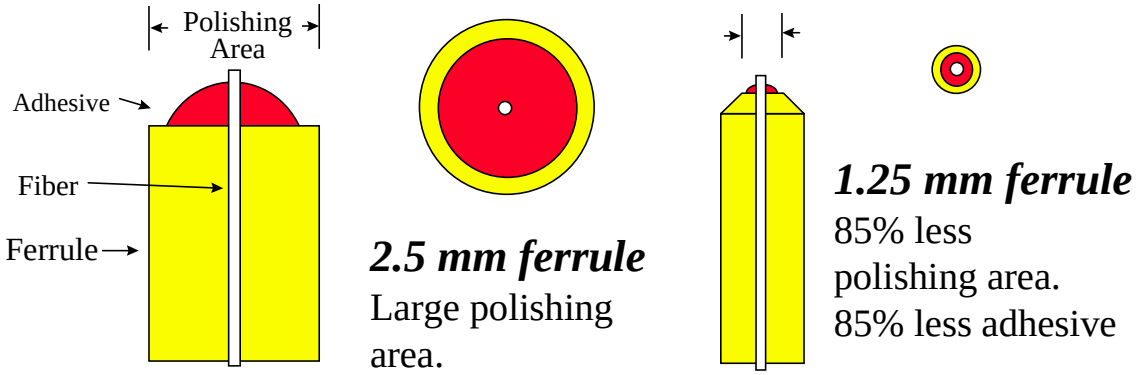
- **80% less ferrule material than 2.5 mm ferrules**
- **55% less machining than 2.5 mm ferrules**
- **Alternate material ferrules under development**
- **Simple injection molded plastic housing and adapter**
- **Behind the wall springless version under development**
- **60% less material in minicord**

Duplex Minicord



LC Connector
Low Complexity

Simple field termination for both outlet and BTW



2.5 mm ferrule
Large polishing area.

1.25 mm ferrule
85% less polishing area.
85% less adhesive

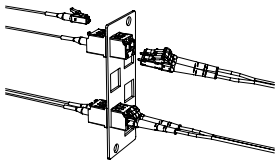
- **Polishing time reduced 80% due to smaller tip area**
- **Familiar process = reduced craft training, greater acceptance**
- **Less opportunity for installation failures and downtime**

LC Connector
Size

LC **SC**

- 51% smaller than SC
- Adapts to copper modular jack openings

LC Connector
Duplex with Polarity



- Duplex adapter labels meet TIA polarity labeling requirements
- Behind the wall plugs reversible to easily correct polarity problems

LC not limited to hard duplex-supports more applications:

- Simplex needed for Video Surveillance
- Triplex required for RGB Video

LC Connector
Multimode and Singlemode

Unmatched Performance

- 0.1 dB avg. Insertion Loss - MM and SM

  Gigabit applications require low loss links.
  - Loss Budgets will shrink by up to 80%

- 55 dB avg. Return Loss - SM

  Increasingly popular **video applications** need > 50 dB return loss.

Gigabit and Video Applications must be supported.

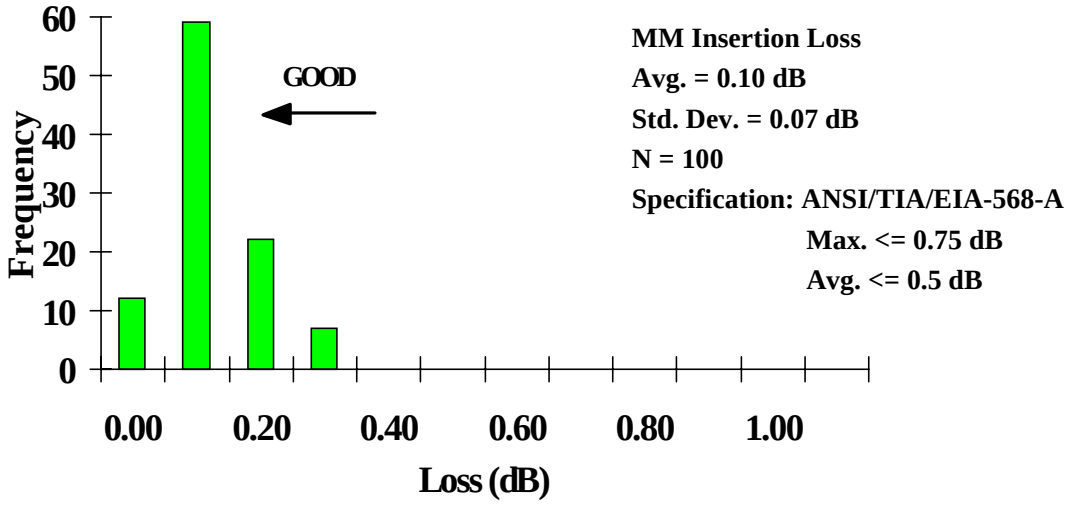
LC Connector
Multimode and Singlemode

Performance Comparison

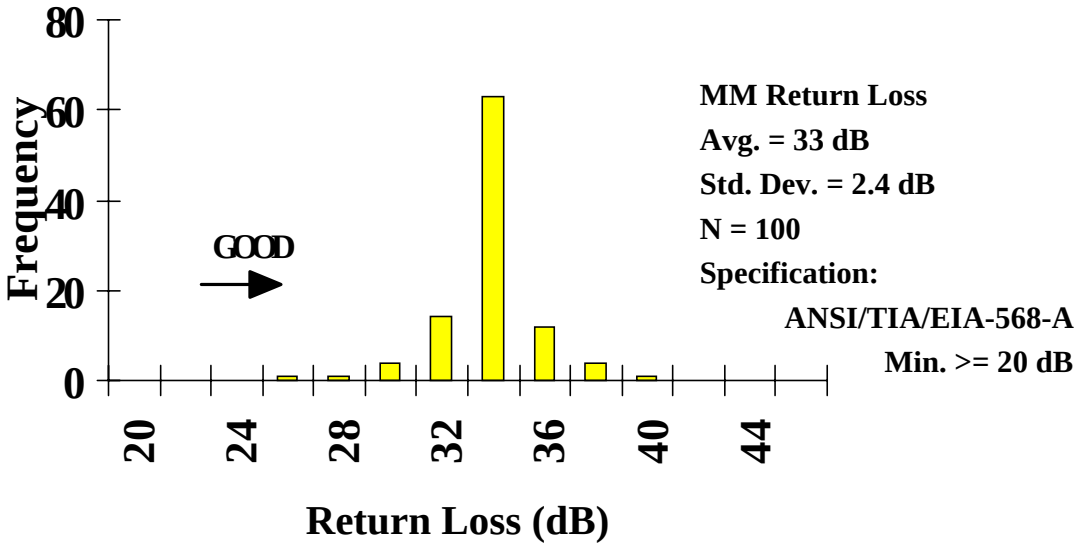
	LC	Volition	Mini-MT	OptiJack	SCDC
Loss MM & SM (avg. dB)	**0.1**	?	?	?	?
Return Loss SM (avg. dB)	**55**	?	?	?	?

LC best meets the needs of Gigabit and Video Applications.

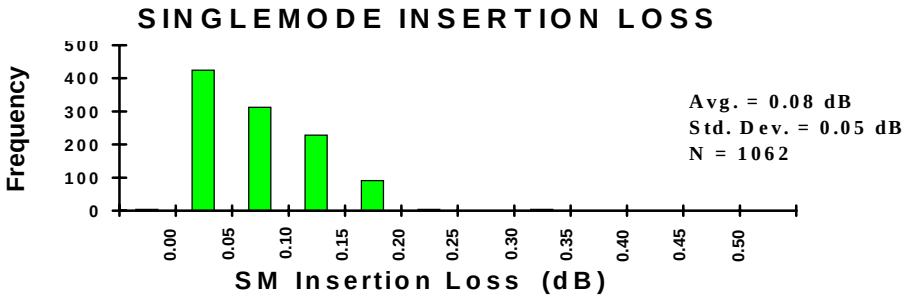
LC Optical Performance
Multimode - Insertion Loss

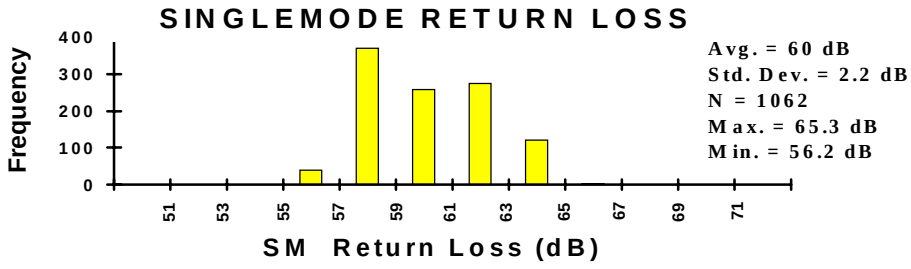


LC Optical Performance
Multimode - Return Loss

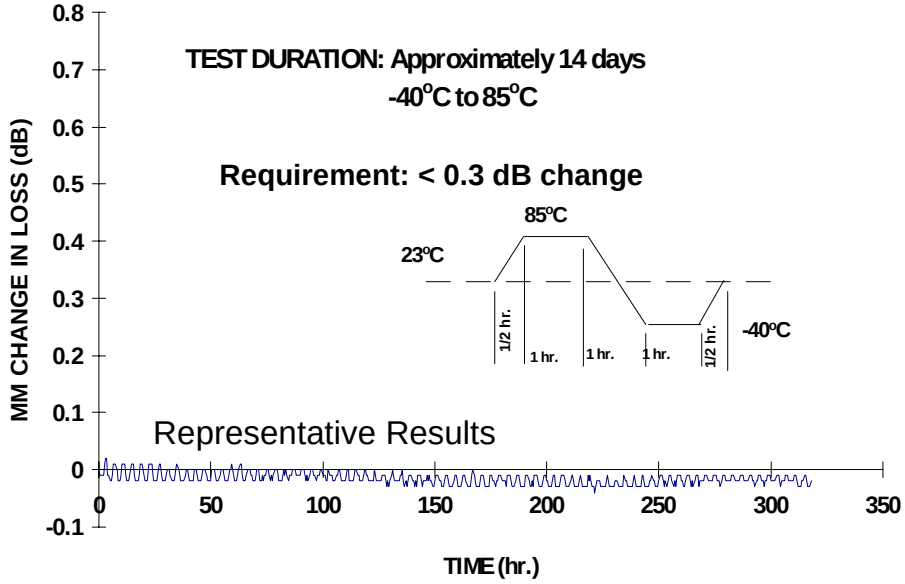


LC Optical Performance
Singlemode

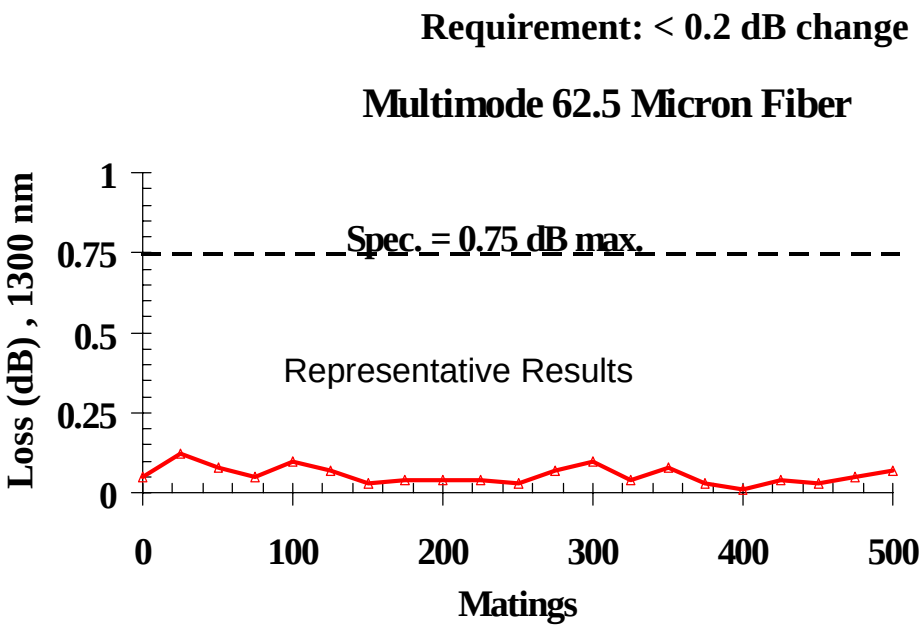




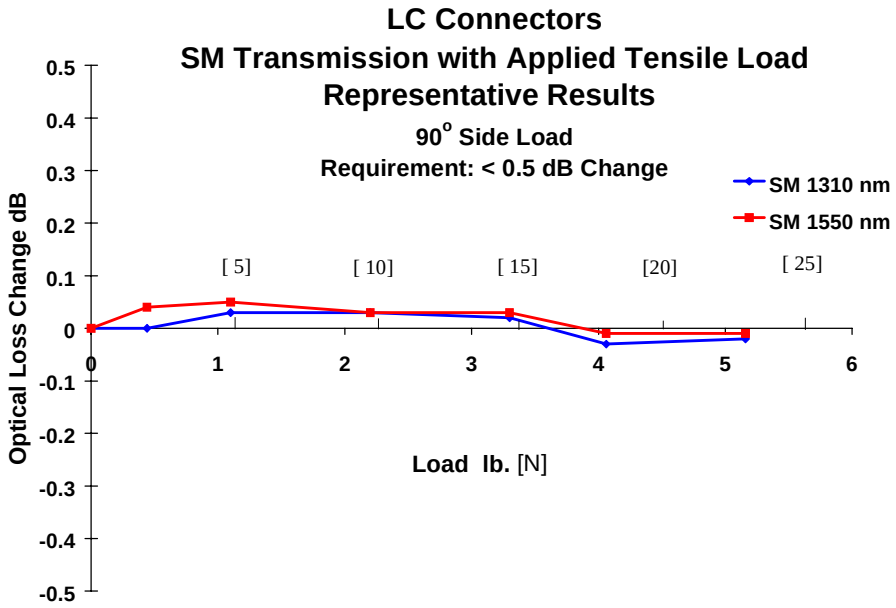
LC Environmental Performance
Multimode



LC Mechanical Performance
Mating Durability



LC Mechanical Performance
Tensile Load - Singlemode



LC - Suitable as an equipment connector

Transceivers in Development

- Lucent Microelectronics
- Working with others

LC interface superior

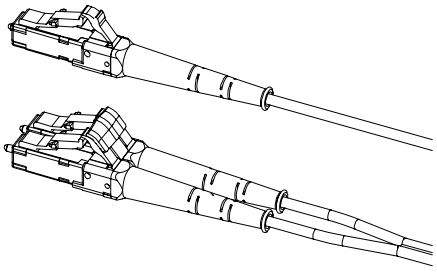
- Low insertion/withdrawal force
- No interfering pins
- Easy to clean
- Intuitive engagement
- Stable ferrule alignment

LC Connector Solution
Dust Protection

Effective Cleaning crucial to performance

- Easy to wipe endface
- Easy to clean coupling
- Craft familiar with cleaning process
- Dust caps for Adapters and Connectors
- No pins to collect debris
- No exposed fibers to break during cleaning

LC Connector
Ergonomics



- True RJ-45 Style
  - **User friendly**
  - **Familiar copper style thumb latch**
  - **Intuitively obvious engagement**
  - **Audible click assures full insertion**
  - **Improved anti-snag latch**
  - **No tools required**

LC Connector

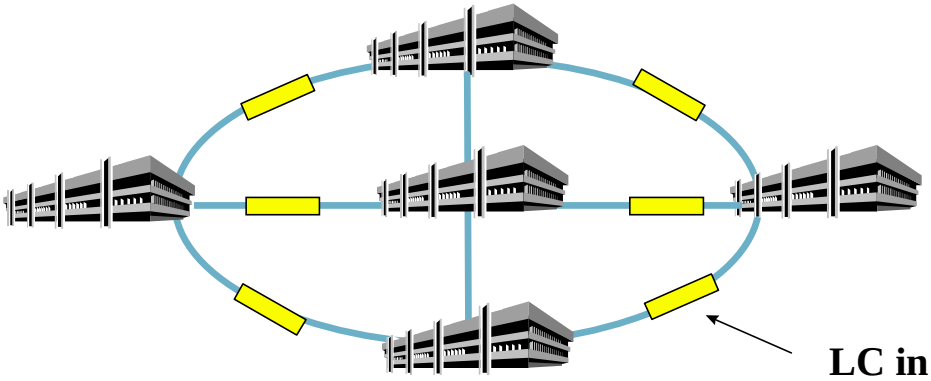
Availability of Detailed Specifications

- Detailed specifications available.
- FOCIS-10 LC Intermatability submitted to TIA 6.3.4 working group.
- LC product and data sheet general availability since 8/97.

LC Connector

Outdoor Use

The right candidate for Campus environments.



LC in Closure

Bellcore GR326 Compliant
- Aging to 85C
- Cycling -40C to +85C
- Humidity 75C , 95% RH

LC Connector
Summary

LC combines

- Proven technology of the ST and SC
- Miniaturized and embodied in a modular plug

Examine all facts from a total system perspective

- Suitable and reliable for all segments
- Lower overall complexity - System and Component
- Craft friendly and familiar
- Performance supports pending Gigabit Applications

The LC is the best choice.

Conclusion

This contribution provides a description for a Glass Optical Fiber (GOP) connector, which is referred to as the LC connector, it is recommended for consideration for use in future IEEE 802.5 specifications.

Features

Cost Low	System cost compared to UTP-5 is 1.2X-1.5X times for system consisting of connectors, patch cords, panels, and outlets and cable
Density (Size)	Both simplex and duplex connector fits into space allocated for an RJ45 connector
Duplex	May be used as both a simplex and a duplex connector.
Speed Of Termination	3 minutes
Simplicity of Termination	Electrical Contractor/Owner-User
Performance and Reliability	Meets ANSI/TIA/EIA-568-A, ISO/IEC 11801 and Bellcore
No Transfer of Complexity	Reduced Complexity
Ease of Use (ergonomics)	RJ45 type positive latch; an audible click during insertion.
Patent letter filings	Patent letters have been filed with both IEEE and ANSI
Mechanical Specifications	- Submitted to TIA FO6.3 FOCIS - Submitted to IEC 86B WG6 (submission approved by USTAG
Connector Availability	Since August 1997
Connector Configuration	Design permits two simplex connectors to be connected together to form a duplex connector
Use With Fiber Types	Can be Used with Both Single Mode and Multi Mode Glass Fibers
Ease of Reconfiguration at Interfaces	Since the connector consists of two single units clipped together to form a duplex unit, the two single units can be rearranged to provide a crossover or straight through configuration at interfaces.
Optical Performance	Insertion Loss (mean): 0.1 dB Return Loss Single Mode (mean): 55 dB Multimode: 33 dB