Mini-MT Connector Interface

AMP

SIECOR

USCONEC

NTT

Team Mission

- Develop a new interface technology to enable increased panel density and reduced system cost.
- Meet the requirements for an optical transceiver interface rather than just a cabling connector.
- Use active component suppliers' input to develop an optimum solution. No cost shift to active devices

Team Mission (continued)

- Single Mode and Multimode solution.
- Enable multiple sources of transceivers, connectors, and cable.
- Standardize optical connector through TIA and IEC

Current Supporters

- Connectors, Cable, Cable Assemblies
  - Siecor
  - AMP
  - Fujikura
  - Furukawa
  - Sumitomo

Current Supporters

- Transceivers
  - AMP - Lytel Division
  - Hewlett Packard
  - Vixel
  - Fujikura America

Current Supporters

- Molded Ferrule Technology
  - US Conec
  - Fujikura
  - Furukawa/ Europtics
  - Sumitomo

Application Evolution

- High reliability cost sensitive applications
- NTT interoffice network - 1988
- Current
  - Telecoms - FTTH - SM
  - Datacom - backbone, mainframe links - SM&MM
- Future
  - Datacom - Fiber to the desk

MT History and Future in NTT Network

1983	MT Ferrule Developed
1988	4,8 fiber SM MT Deployed in Network
1991	MPO style Connector Deployed
1996	IEC Standard completed for MPO style
1997	New Optical Access System Deployed (Pi System)
2000	FTTH Cost Equals Copper

Statement of Direction

- NTT Has:
  - Developed MT ferrule and MPO applications for many years
  - Developed the Mini-MT connector around the small MT ferrule
  - Planned future major application for two fiber connections

- NTT will provide technical data to support U.S. standards activity through US Conec, an NTT affiliate

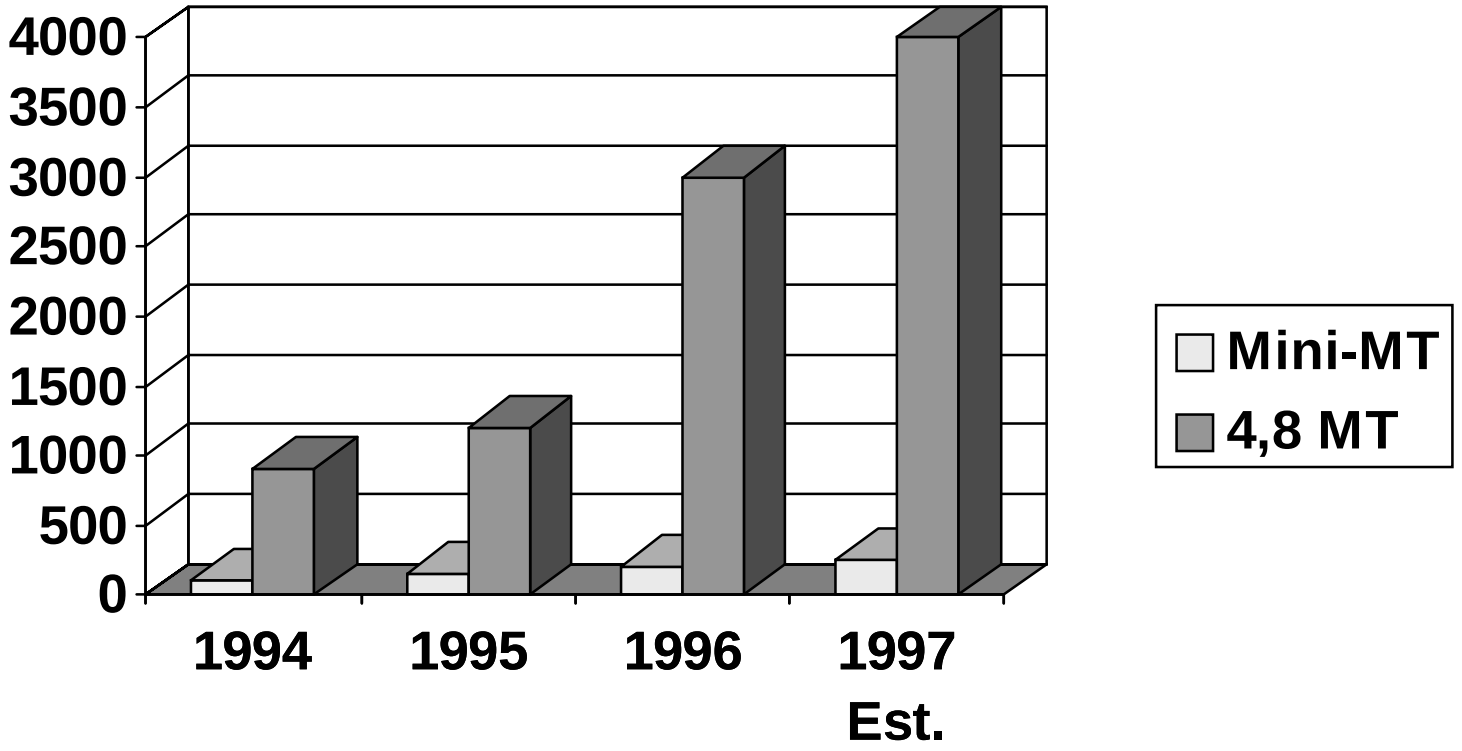
- NTT has submitted the Mini-MT to IEC 86B for approval to start standardization

- NTT is establishing multiple sources today and encourages world-wide supply

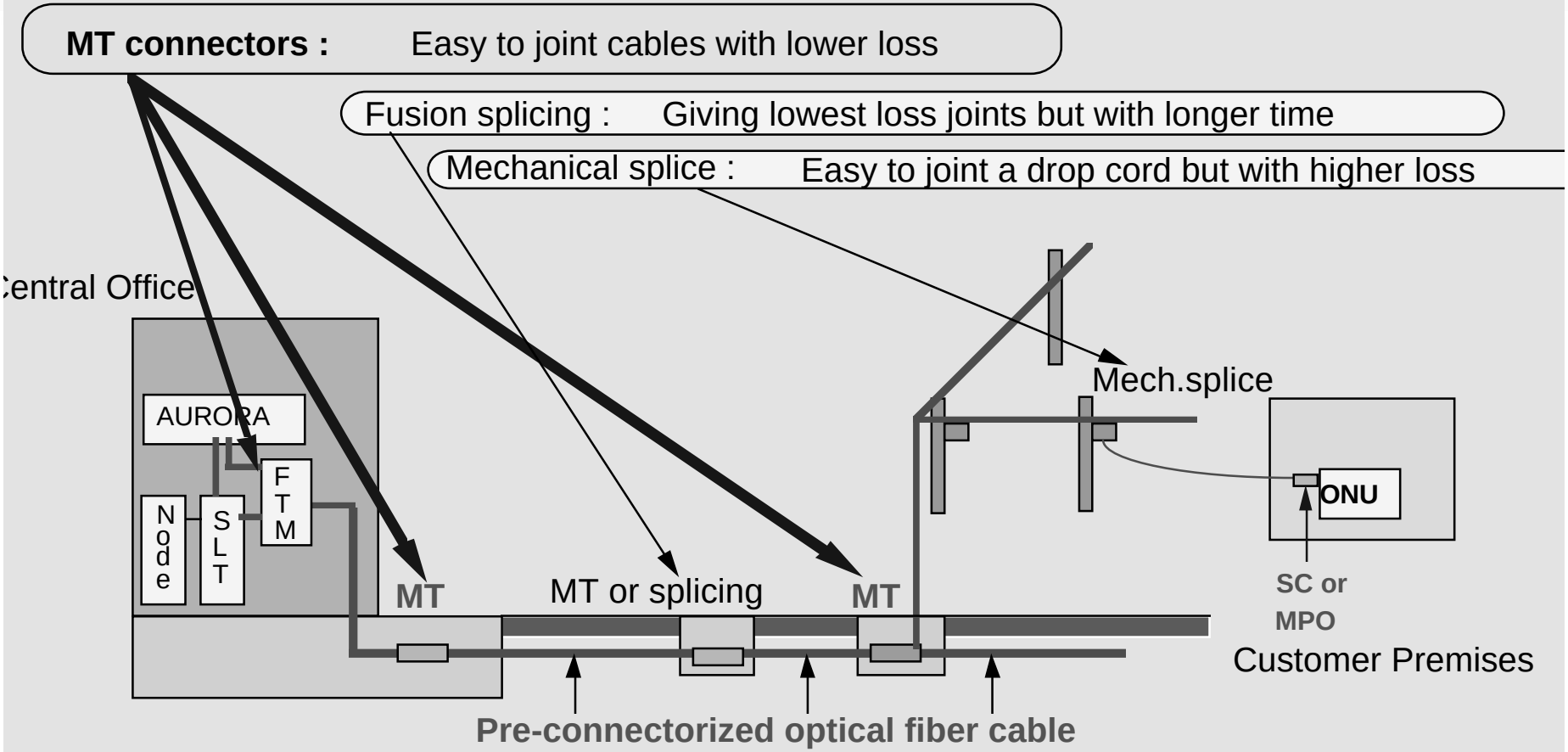
License Policy

- NTT complies with IEC and ANSI licensing requirements
- NTT offers to license its patents which include features of the Mini-MT for reasonable terms to any company

MT Production Volume
(000)



FTTH AND MT TECHNOLOGIES

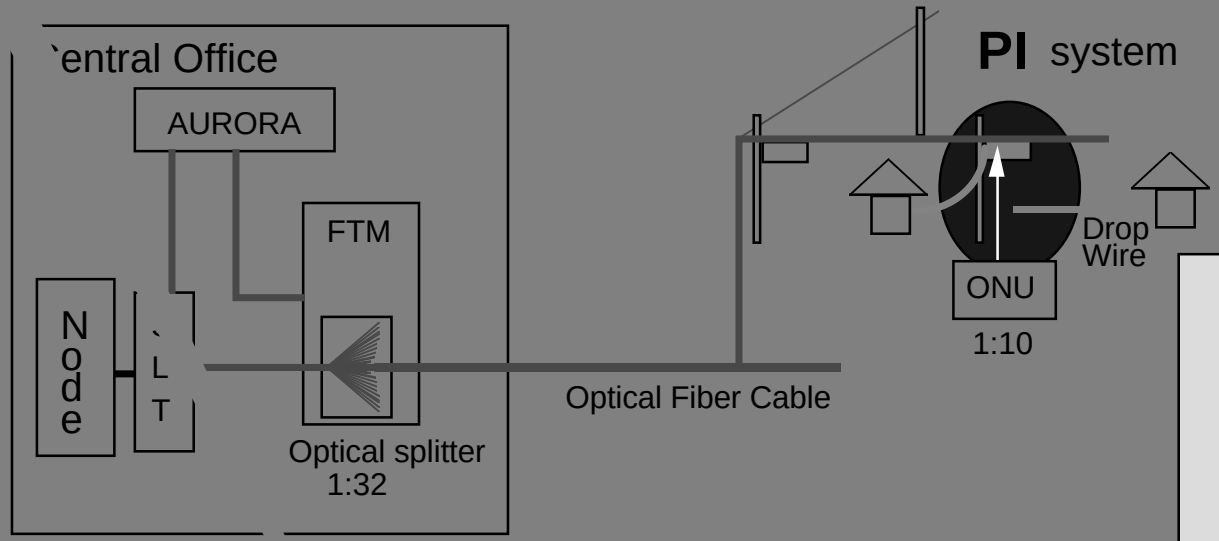


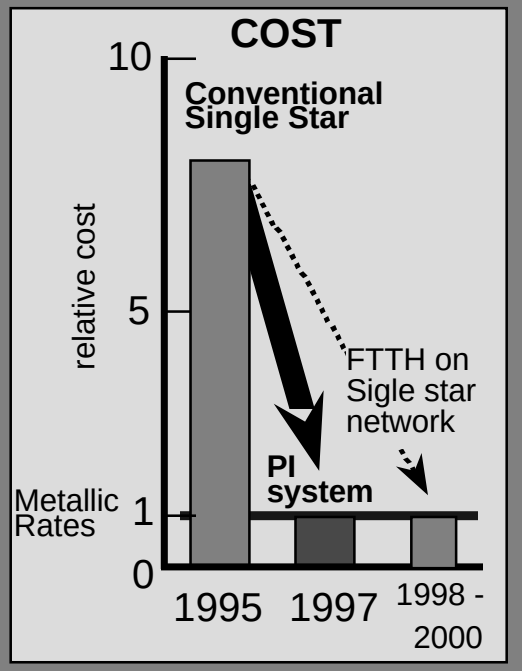
AURORA: Au tomatic Optical Fibe r O pe ra tion Support System

FTM: Fiber Termination Module SLT: Subscriber Line Terminal ONU: Optical Network Unit

THE NEW OPTICAL ACCESS SYSTEM

- THE PI SYSTEM -





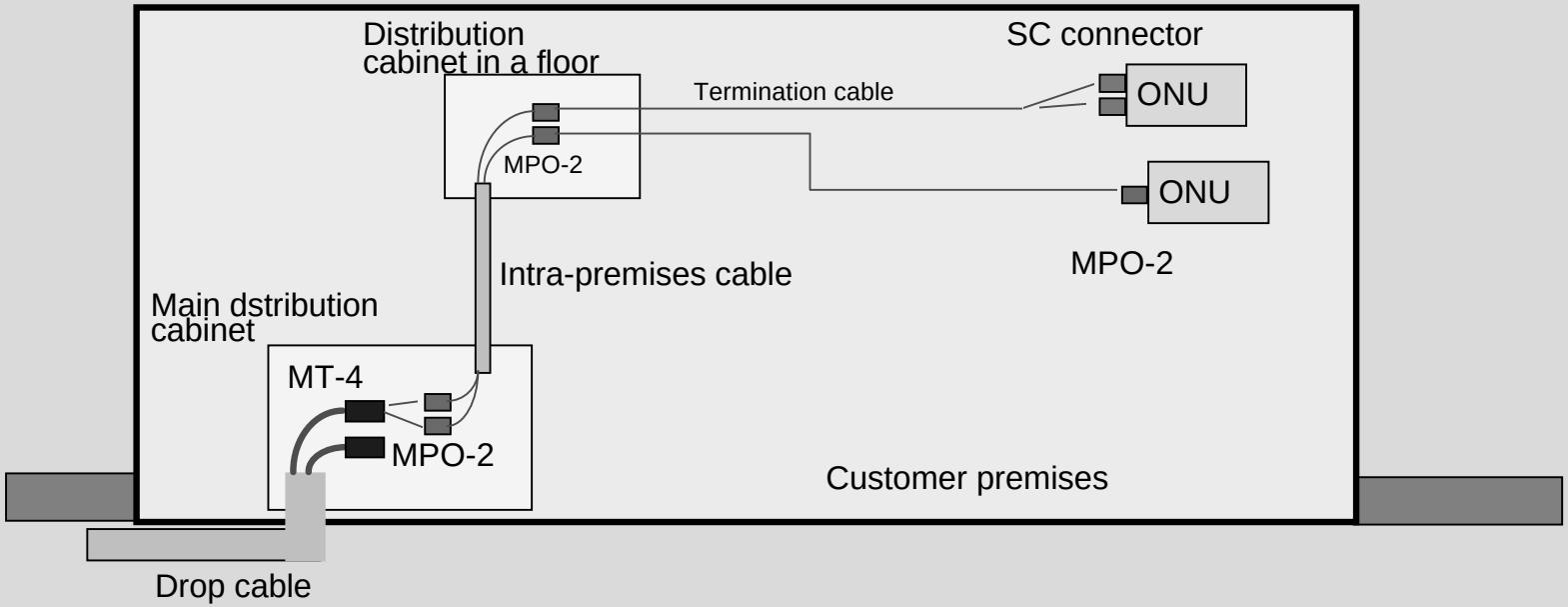
The New Optical Access System is a system for installing Optical Network Units (ONUs) near customers.

Each ONU accomodates a maximum of 10 lines, which will share one SLT at a cost comparable to that of metallic networks.

AURORA: Automatic Optical Fiber Operation Support System

SLT: Subscriber Line Terminal FTM: Fiber Termination Module ONU: Optical Network Unit

OPTICAL FIBER WIRING SYSTEM IN THE PREMISES



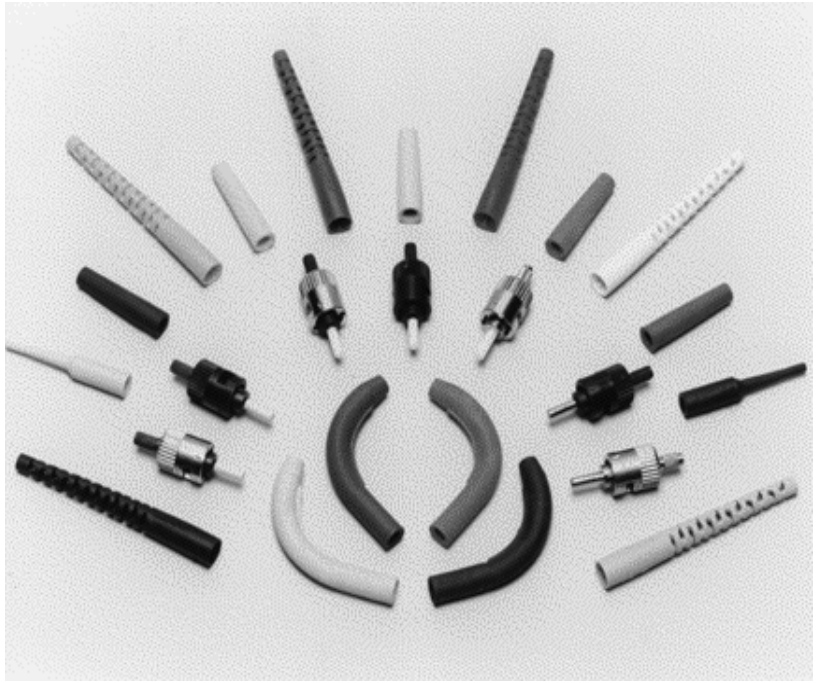
Fibre Channel Requirements

- Half the cost
- Small size (board edge, EMI)
- Multi-Source
- Low Technical Risk
- Market Acceptance

Added Customer Requirements

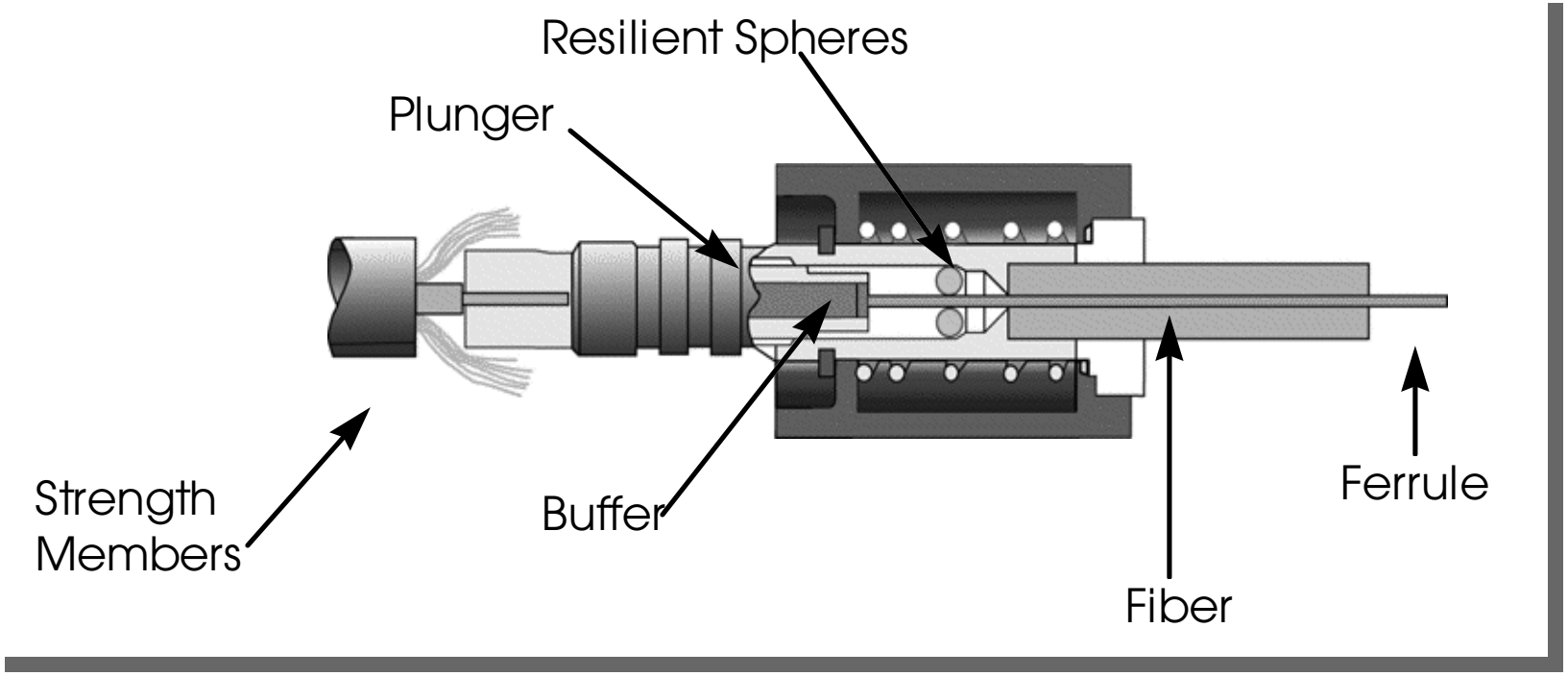
- SM performance = SC
- Telco reliability
- Easy to clean
- Term. technology independent

Variety is the spice of life

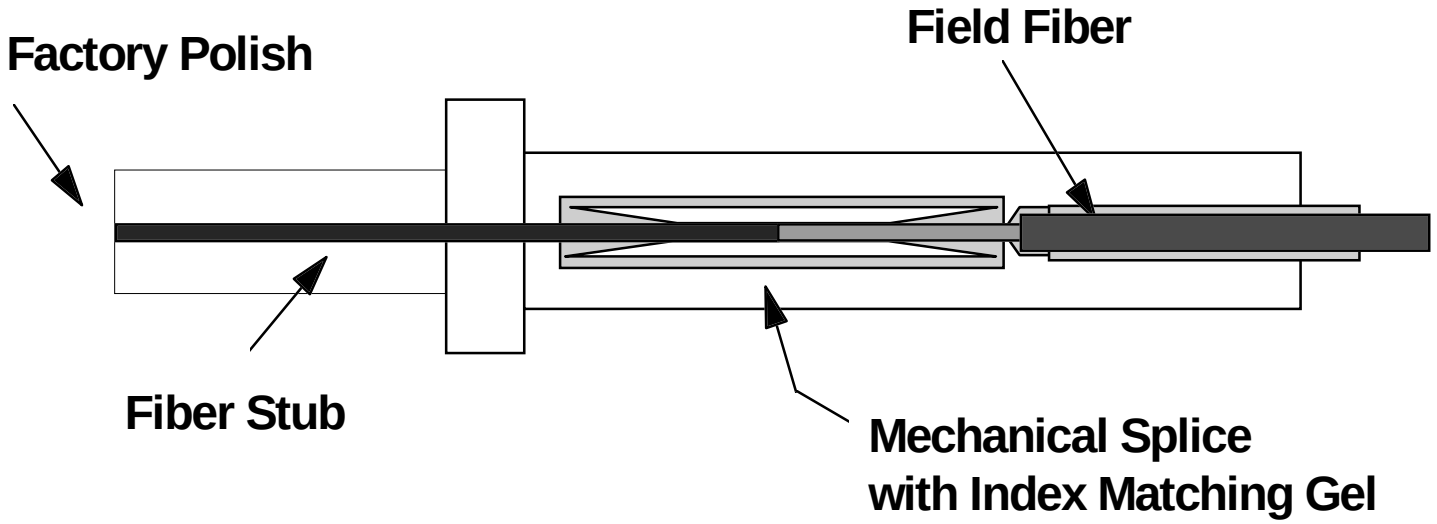


- Termination methods
- Lower parts count
- Improved materials - lower cost

AMP LightCrimp XTC Connector



Siecor Unicam Technology

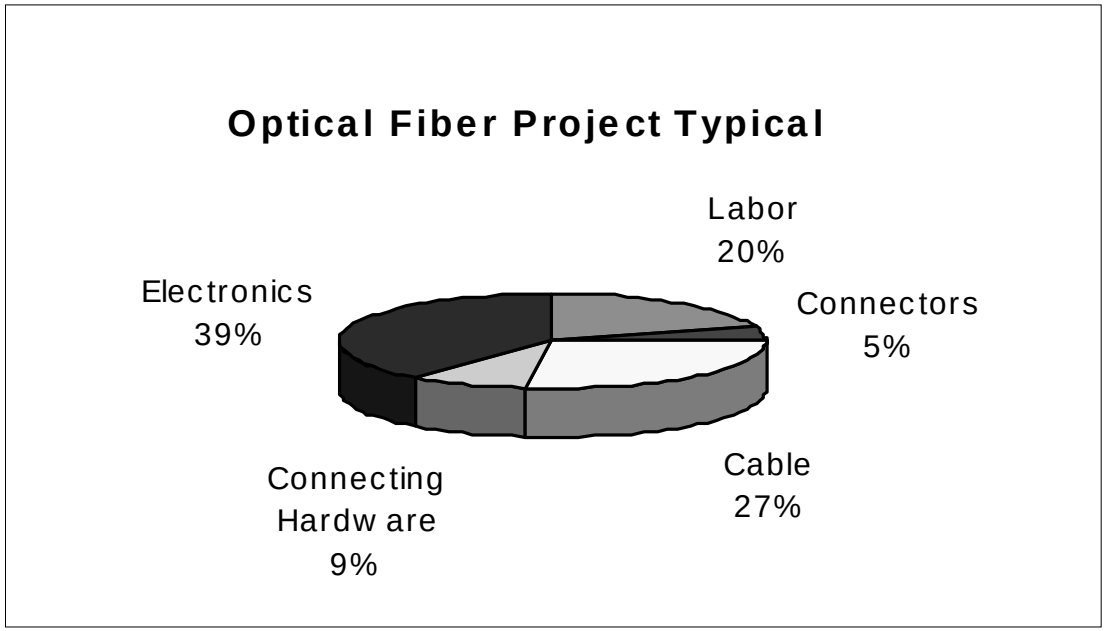


Parts Comparison (mated pair)

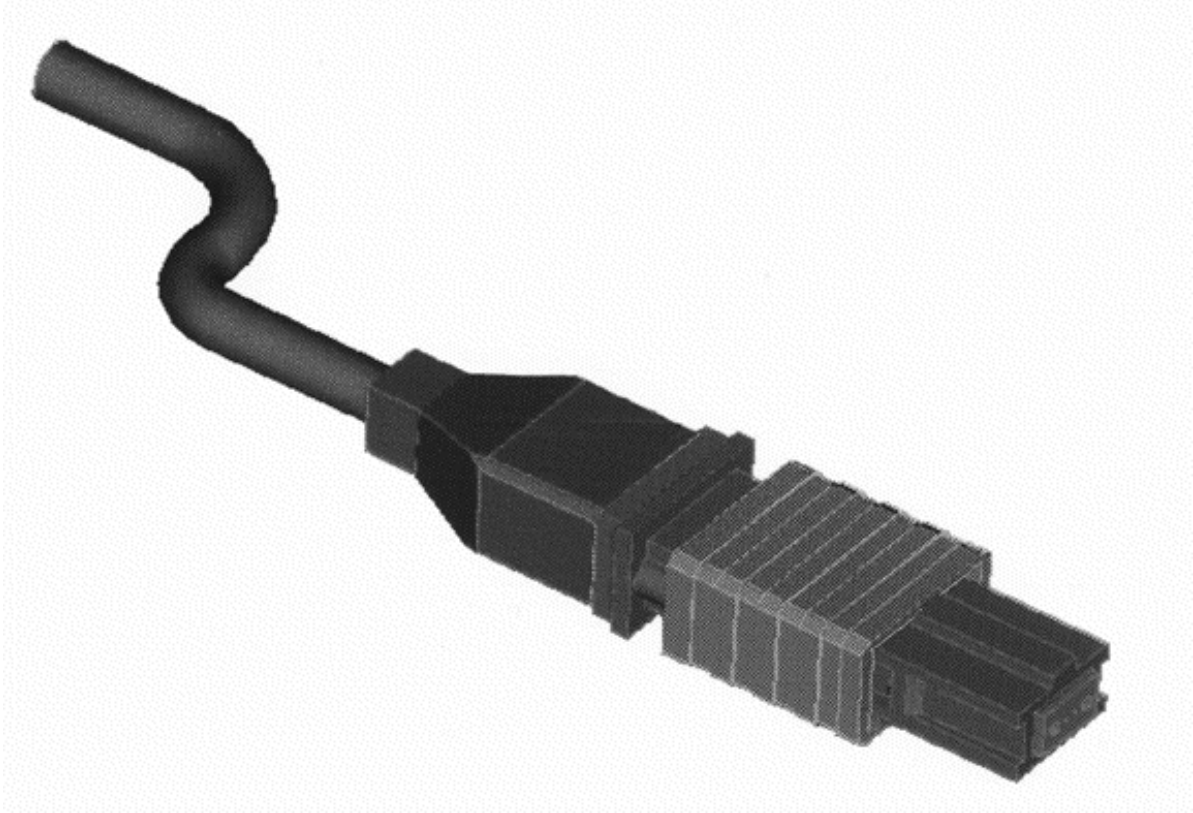
- SC Duplex
  - 48 total parts
  - 6 precision parts
    - (4) ferrules
    - (2) sleeves
- Mini MT Plug & Socket
  - 15 total parts
  - 4 precision parts
    - (2) ferrules
    - (2) guide pins (low cost

Cost / Installed Systems Approach.

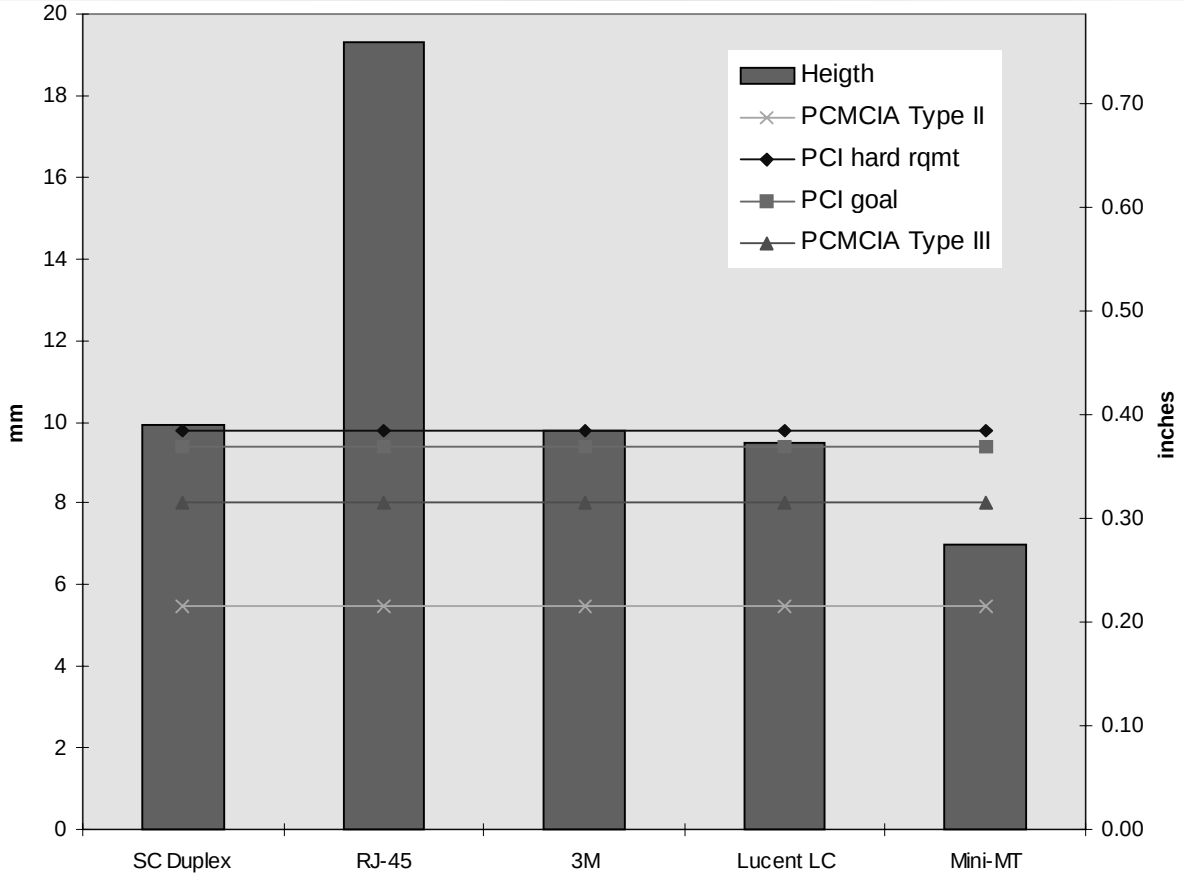
- 39 % Electronics
- 27 % Cable
- 20 % Labor
- 9 % Connecting Hardware
- 5 % Connectors



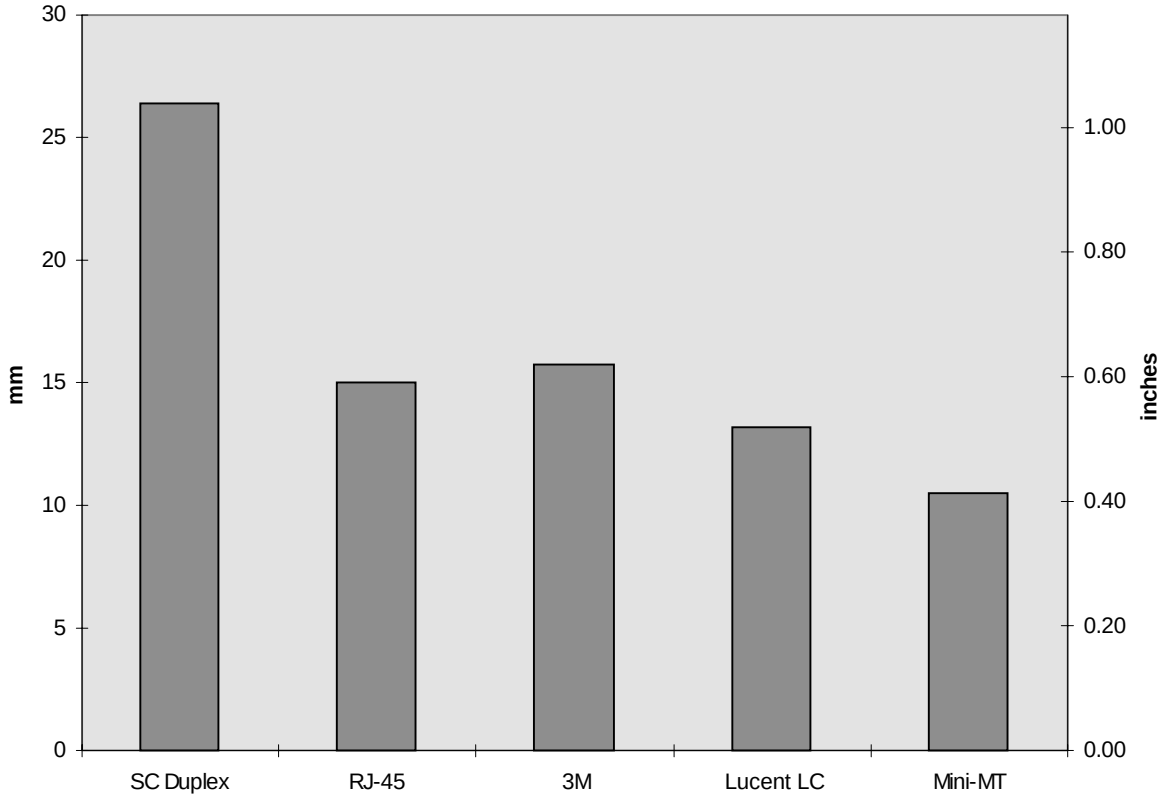
Mini-MT



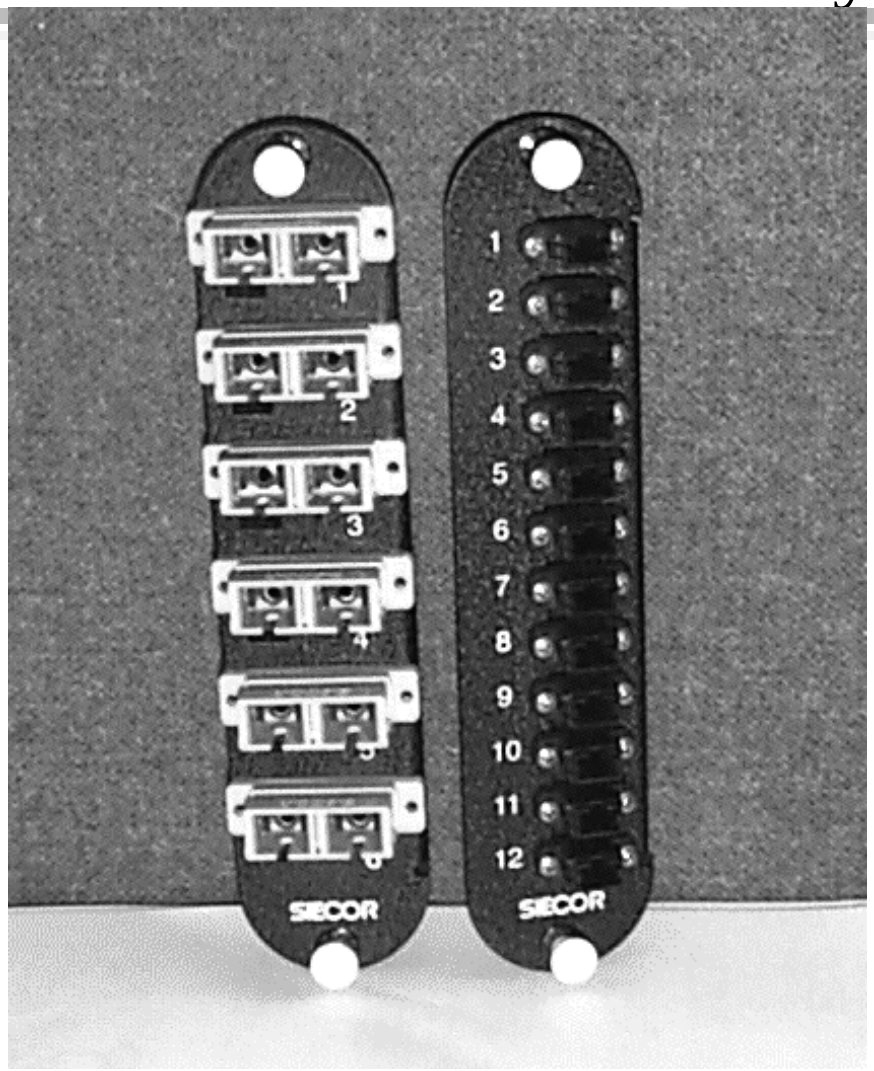
Height Comparison



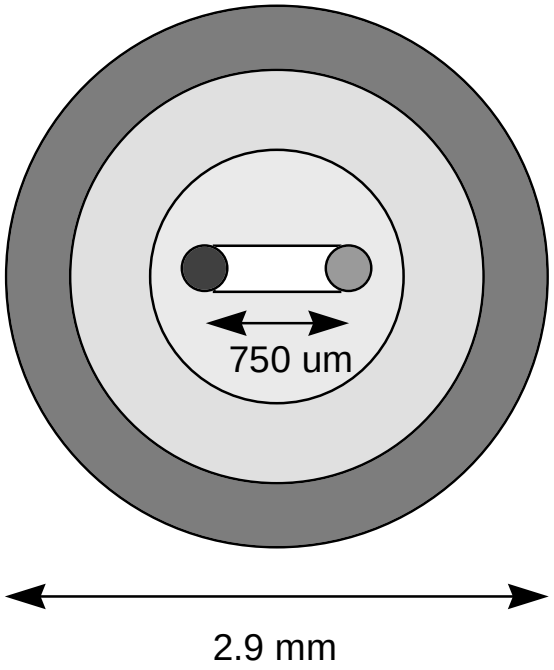
Width Comparison



Increased Panel Density



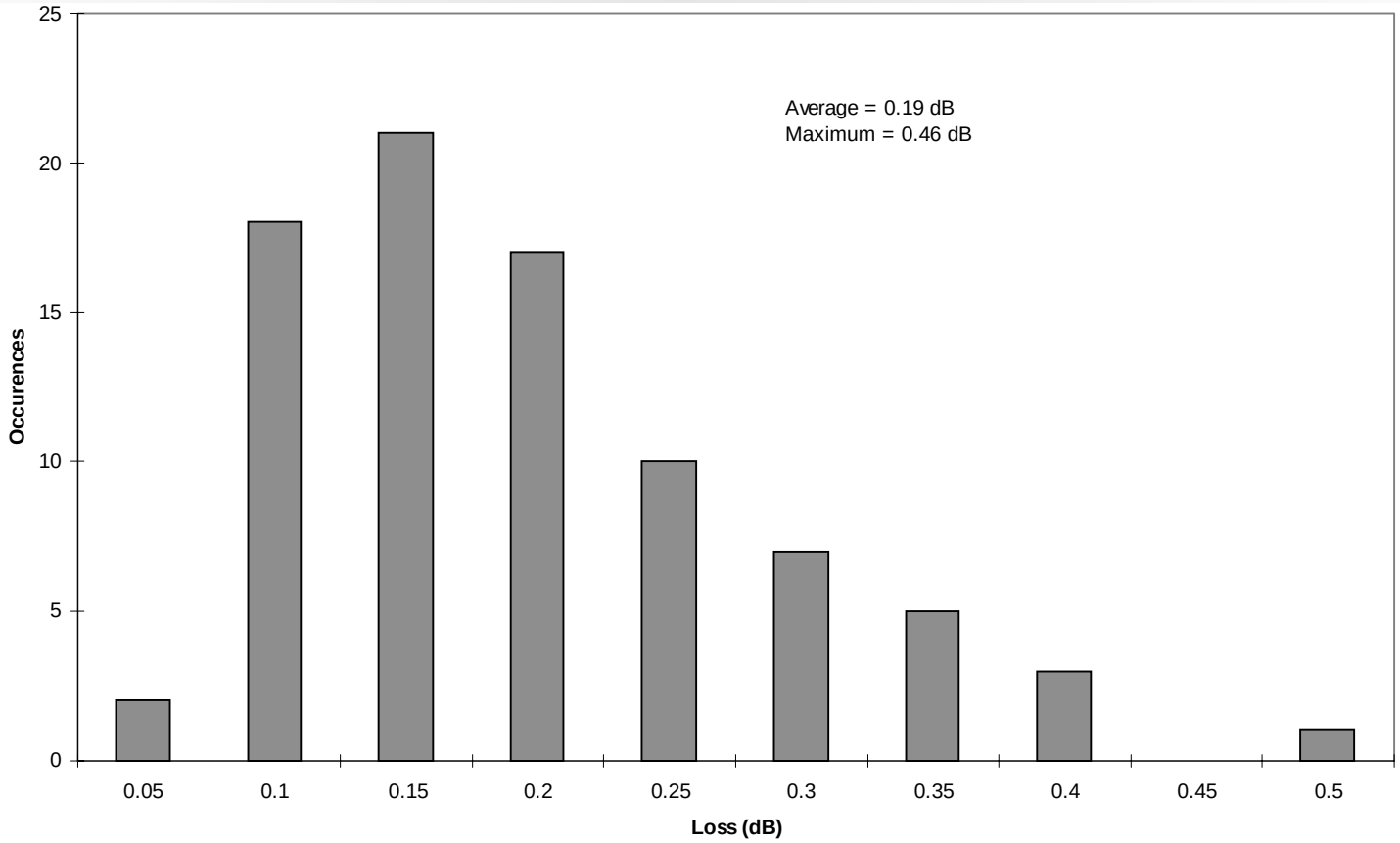
Ribbon Cables Offer 20% Cost Reduction



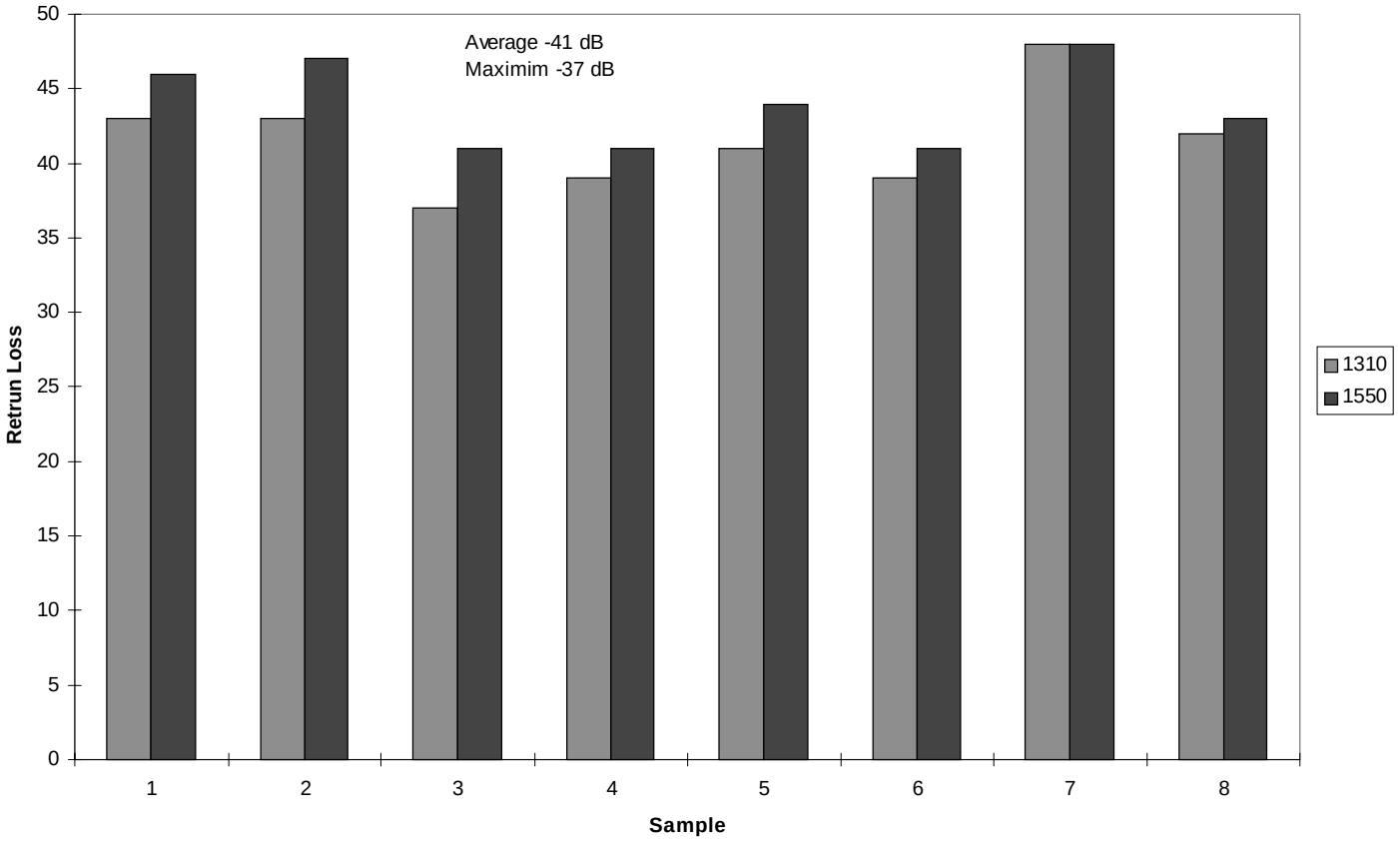
Cost Savings Summary

- Electronics - Increased port density reduces number of cards in hubs and enables limited space applications
- Cable - 20% improvement through ribbons
- Termination and Installation Labor - 2x increase in # of fibers per termination operation
- Connecting Hardware - Low precision parts
- Optical Connectors - 1/2 the cost of SC Dup.

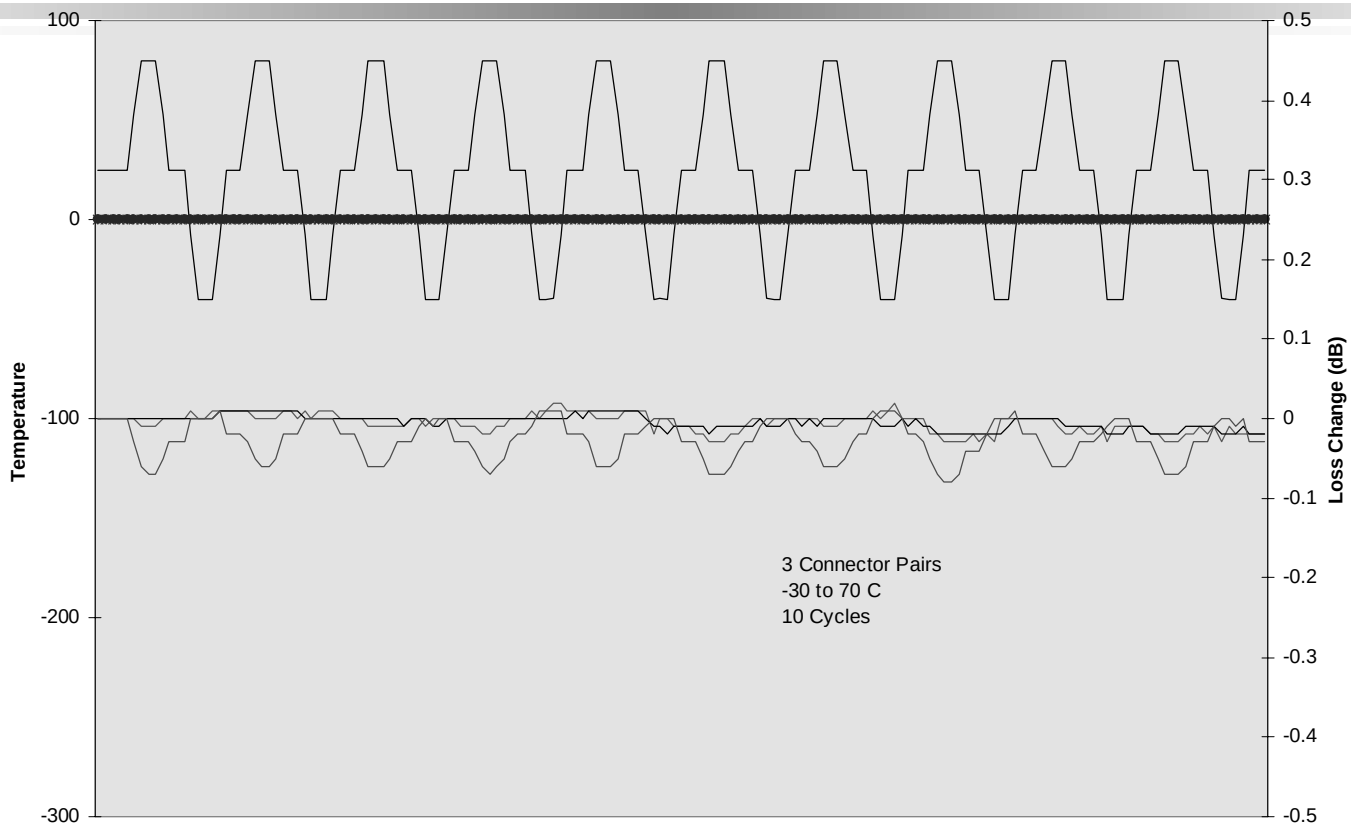
SM Insertion Loss



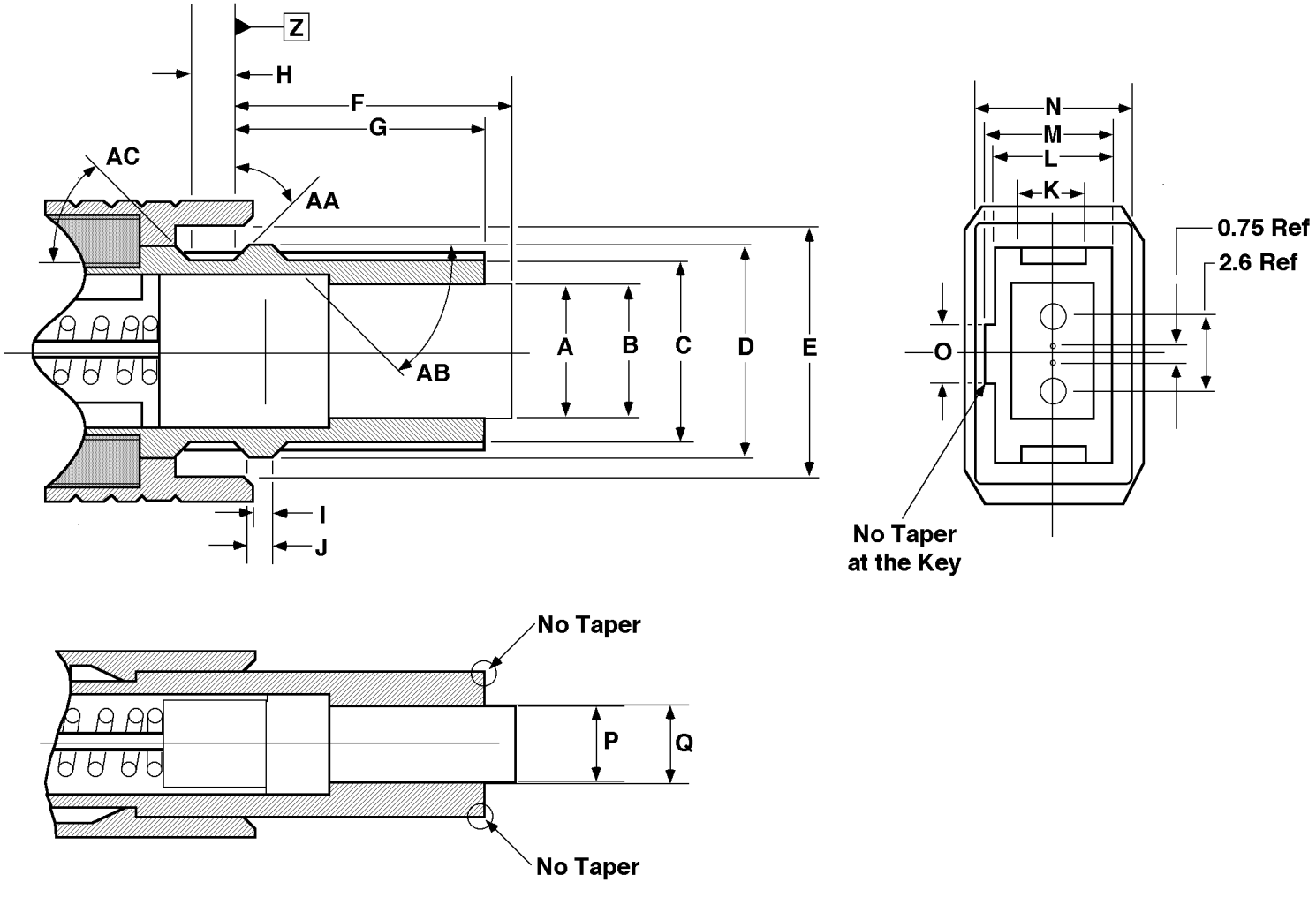
SM Return Loss



SM Temperature Cycle



Mini-MT draft interface



Standardization Track Record

- IEC 874-16 MT Sectional 09/94
- IEC 1754-5 MT Interface 11/96
- IEC 1754-7 MPO Interface 11/96
- TIA FOCIS for MT in-progress
- TIA FOCIS for Mini-MT submitted 1/97
- IEC NWIP presented 2/97
- IEC NWIP to be submitted 3/97

Introduction plans

- First products featuring parts from Japan available 2nd quarter.
- Amp/Siecor can/will provide cable assemblies produced with these parts
- Amp and Siecor versions later this year.

Ferrule Availability

- 4 Manufacturers of MT & Mini-MT
  - Fujikura
  - Furukawa
  - Sumitomo
  - US Conec
- 5 Channels to market
  - Above + Europtics

Mini-MT: The right choice

- Half the size & *cost* of duplex SC
- Telco apps combine to drive volume/cost
- Enables system cost improvement
- SM performance
- Standards momentum for MT style
- Multiple sources today! Globally