Chromis Fiberoptics

a new light on
PLASTIC OPTICAL FIBERS

Products and Technologies for Commercial Deployment of Gigabit POF Communication

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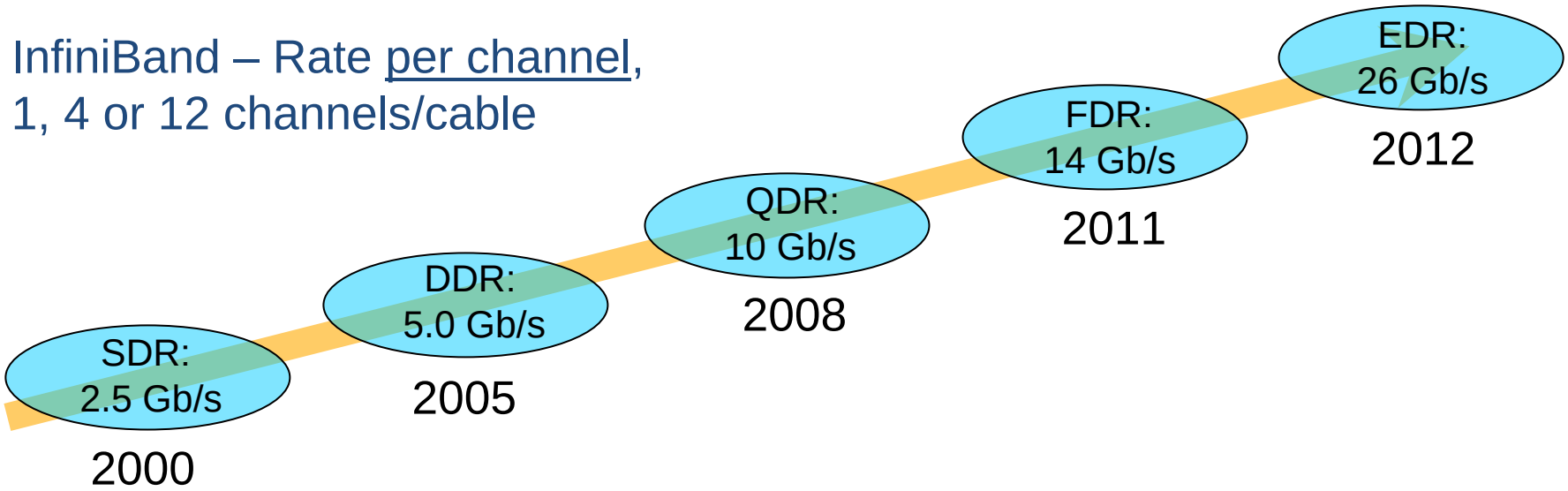
Evolving Needs for High-Speed Interconnect Cabling

Data Centers

InfiniBand – Rate per channel,
1, 4 or 12 channels/cable



Copper cables max. about 5 meters at QDR (15 meters w. active copper)

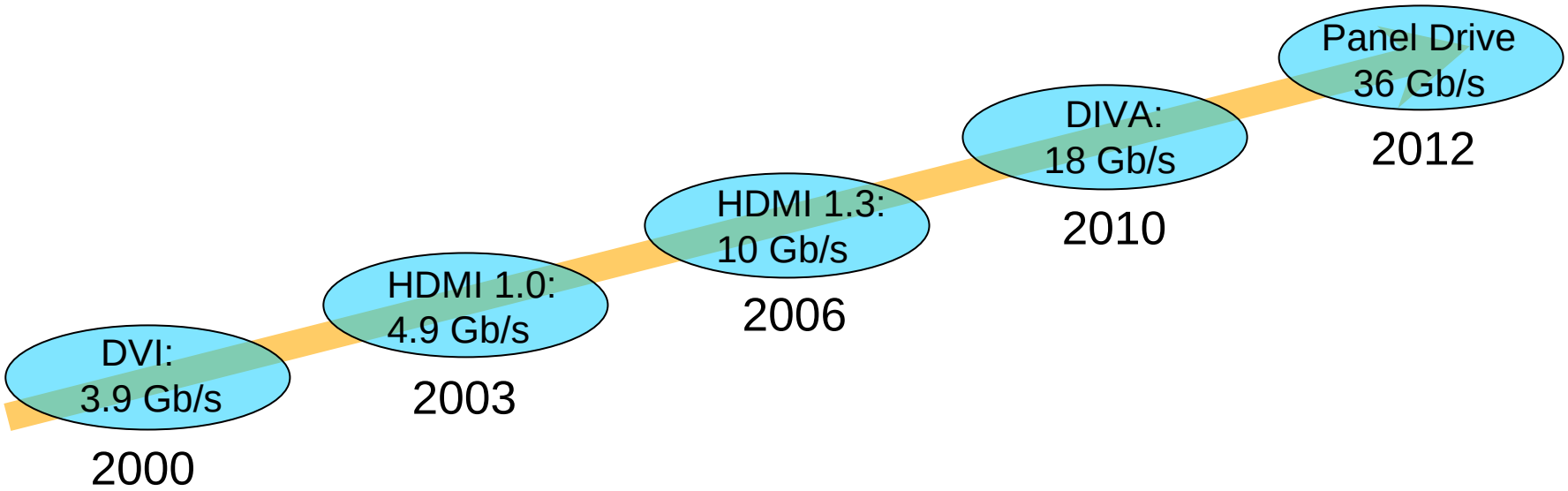
Even when copper works, optical is about 80% lighter and much smaller

Longer distances, higher data rates are almost wholly optical

Similar considerations for Ethernet and FibreChannel

Evolving Needs for High-Speed Interconnect Cabling

Consumer Electronics



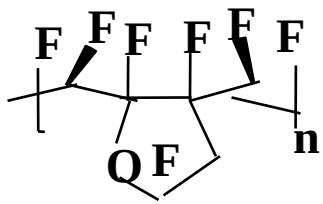
Again, copper has problems beyond ~few meters and 10 Gb/s

Optical solutions superior in size, weight, reliability and durability

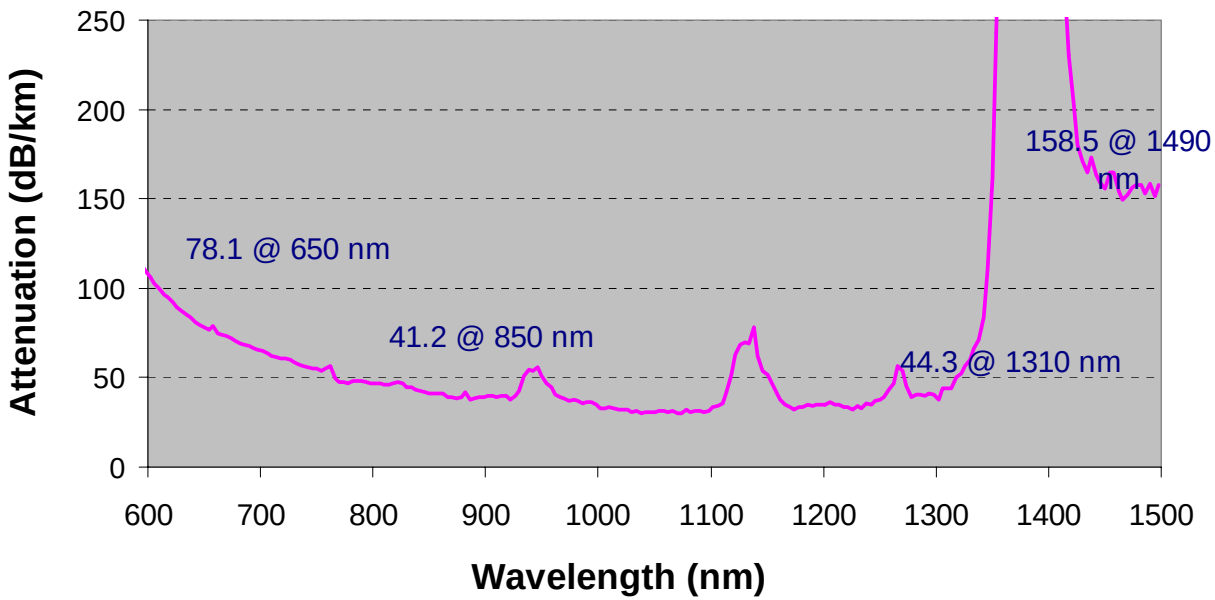
A big opportunity for POF, but only at low, low prices.

Perfluorinated, Graded-Index POF

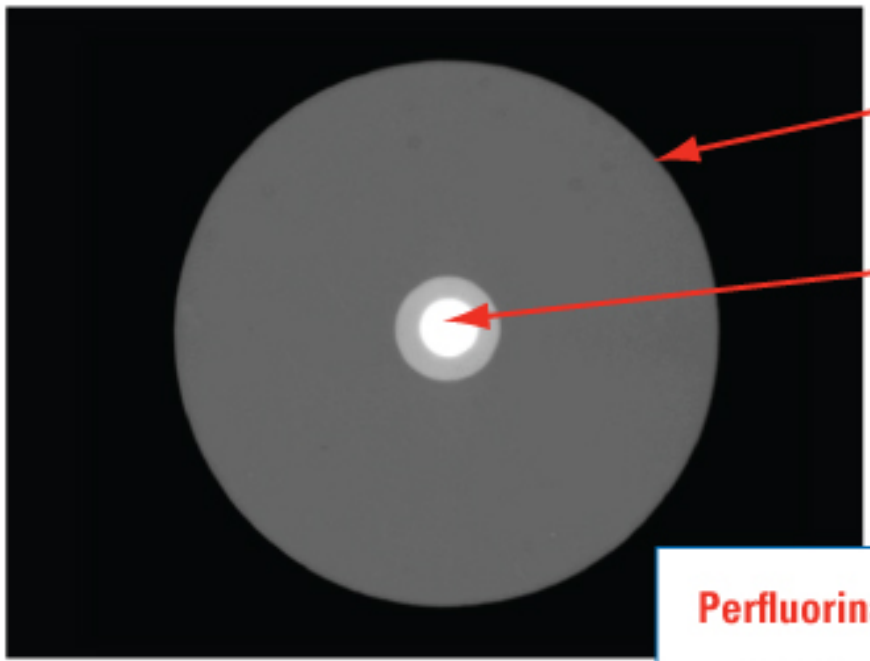
- **Extruded perfluorinated polymers**
- **Very accurate geometries**
- **Wide useful spectral range**
- **High Bandwidth Graded Index**
- **Safe and easy to use**



Amorphous fluoropolymers



New levels of geometric control



Over cladding:
250 to 1000 ± 3 µm

Graded index core:
50 ± 3 µm

Concentricity of Core/Over clad:
< 3.5 µm

Perfluorinated Plastic Fiber Features

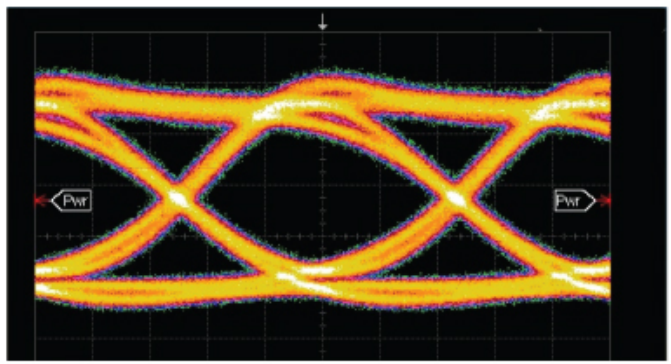
1) Simple end face preparation

2) Over cladding provides strength and the alignment feature

Gigabit Performance

- Typical overfilled BW >1000 MHz-km
- Latest transmission experiments
  10 Gb/s x 220 m transmission,40 Gb/s x 100 m transmission

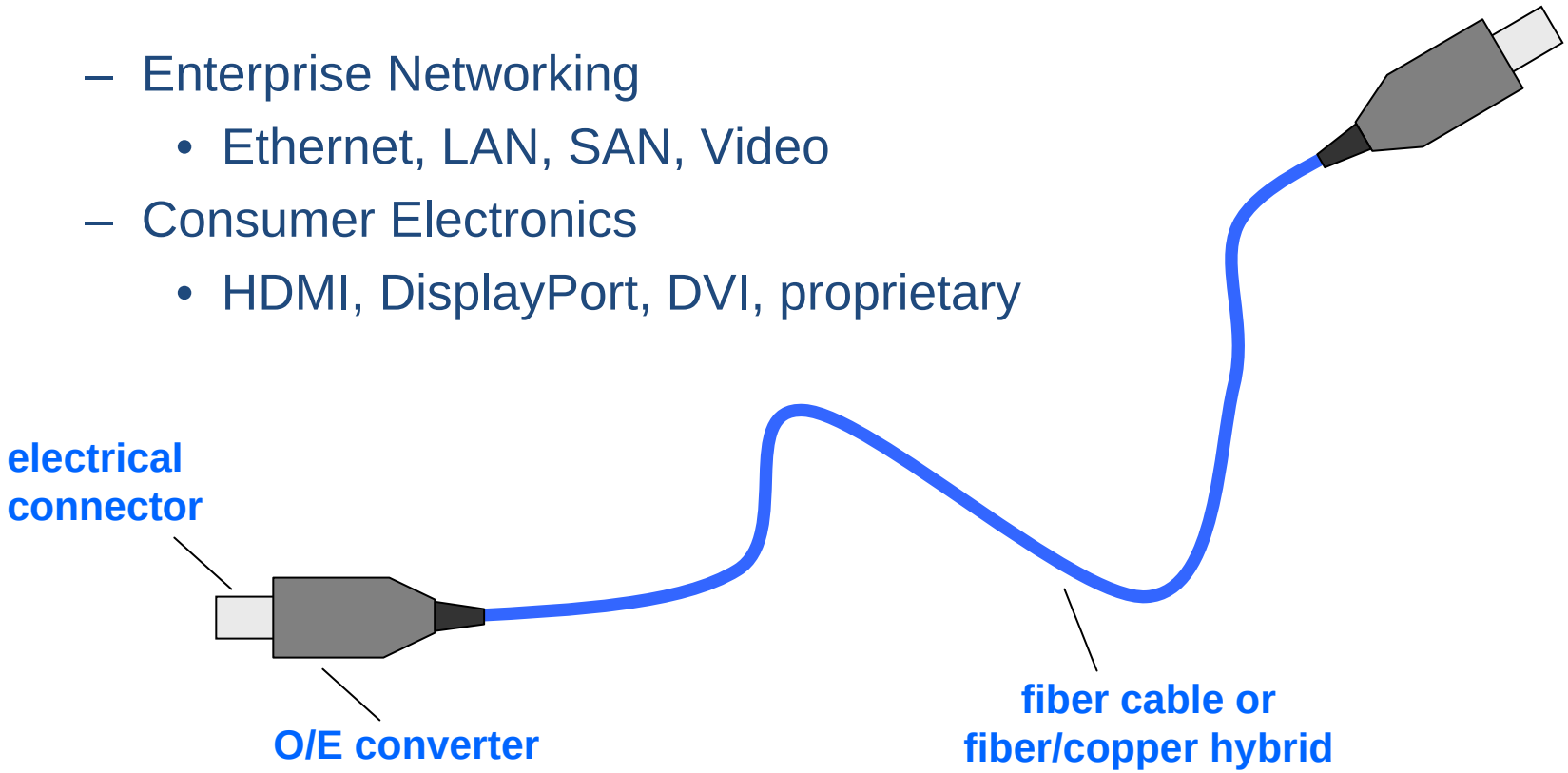
100 Meter GigaPOF: 10Gbps Eye-Pattern



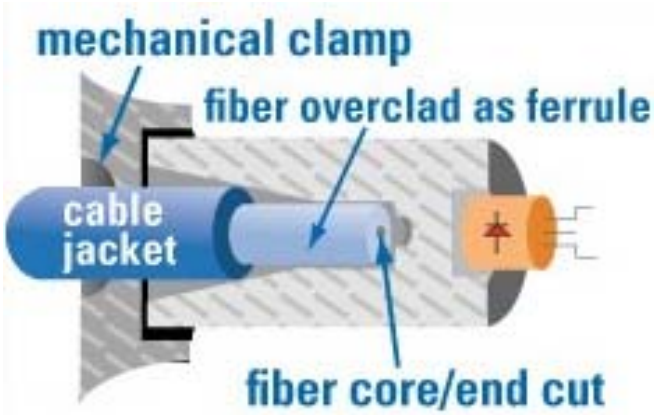
•Mode Coupling simplifies launch conditions and improves skew
  "Just get the light in the fiber"

Active Cable and Backplane Solutions

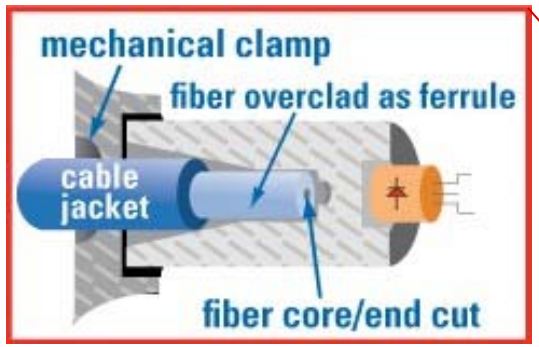
- Enterprise Networking
  - Ethernet, LAN, SAN, Video
- Consumer Electronics
  - HDMI, DisplayPort, DVI, proprietary



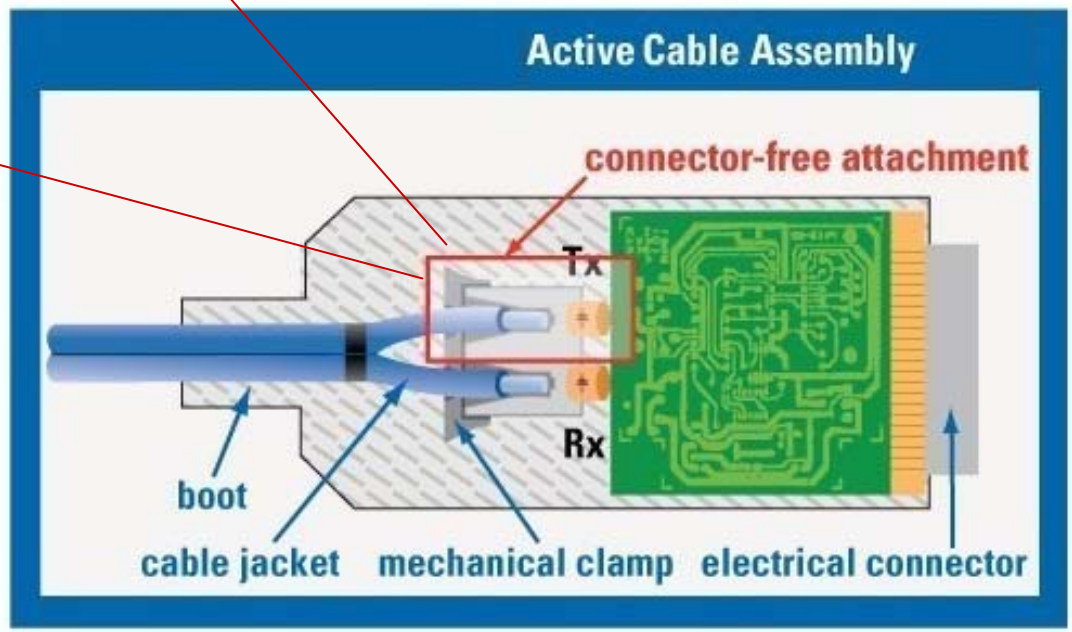
Connectorless Transceiver Concept



- VCSEL-based, 850 nm (can use CW source for visible red tracer)
- Alignment sleeve (~765 μm ID) aligns POF with active devices
- 75 μm fiber core diameter ⇒ low cable cost
- Takes “cut and plug” termination from 100 Mb/s to 1 Gb/s and 10 Gb/s



Key cost reducer: Connectorless termination

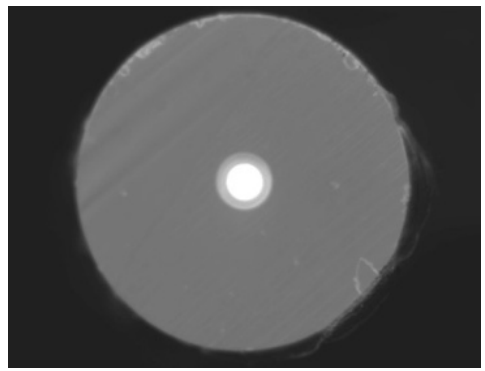


- zero piece part cost
- secure with clamp or with adhesive
- large fiber OD enables standard lens designs

Key cost reducer: automatic termination

- Diamond blade cutting tool
- bare cable end or with connectors
- < 10 second cycle time
- Smooth, clean, endface, negligible loss
- Terminate multiple fibers simultaneously

Fiber termination cost
Glass : $1.50 per fiber end
GigaPOF: ~zero



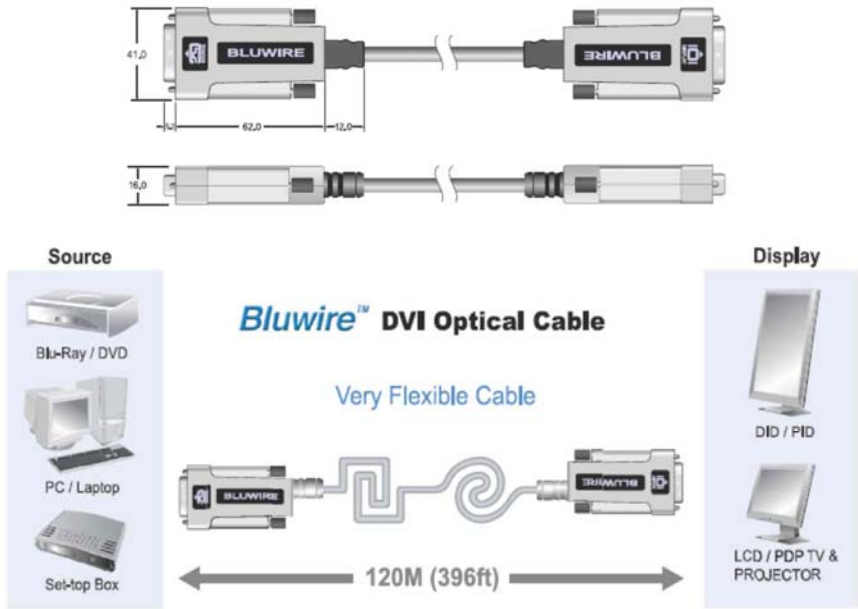
Finisar Laserwire

Connector-free OSA with GigaPOF®

- 10 Gb/s active optical cable
- Ethernet, Fibre Channel, etc.
- Custom cable w. GigaPOF-75LD

NGCO Bluwire

Connector-free OSA with GigaPOF®



- 4 channels, ~3 Gb/s each
- HDMI, DVI, etc.
- GigaPOF-120LD, 3 fibers

Home networking with Step-Index PMMA POF

Even at 100 Mb/s, POF has many advantages vs copper, wireless

- No electromagnetic interference
- Smaller (2X) and lighter (3X) than Cat 5
- Ease of installation – cut and plug like speaker wire
- Non-conducting – no grounding needed, runs in power conduit
- Reliability – historically ~80% less downtime with optics

So far, cat 5 copper has dominated home/office cabling due to

- Lower cost – optical endpoints typically $100-200
- Wide availability of system components (switch, wallplate, etc.)
- High flammability of PMMA cables
- But, all of these advantages have recently disappeared

Off-the-Shelf Portfolio

UL-listed plenum cable
$0.60/m

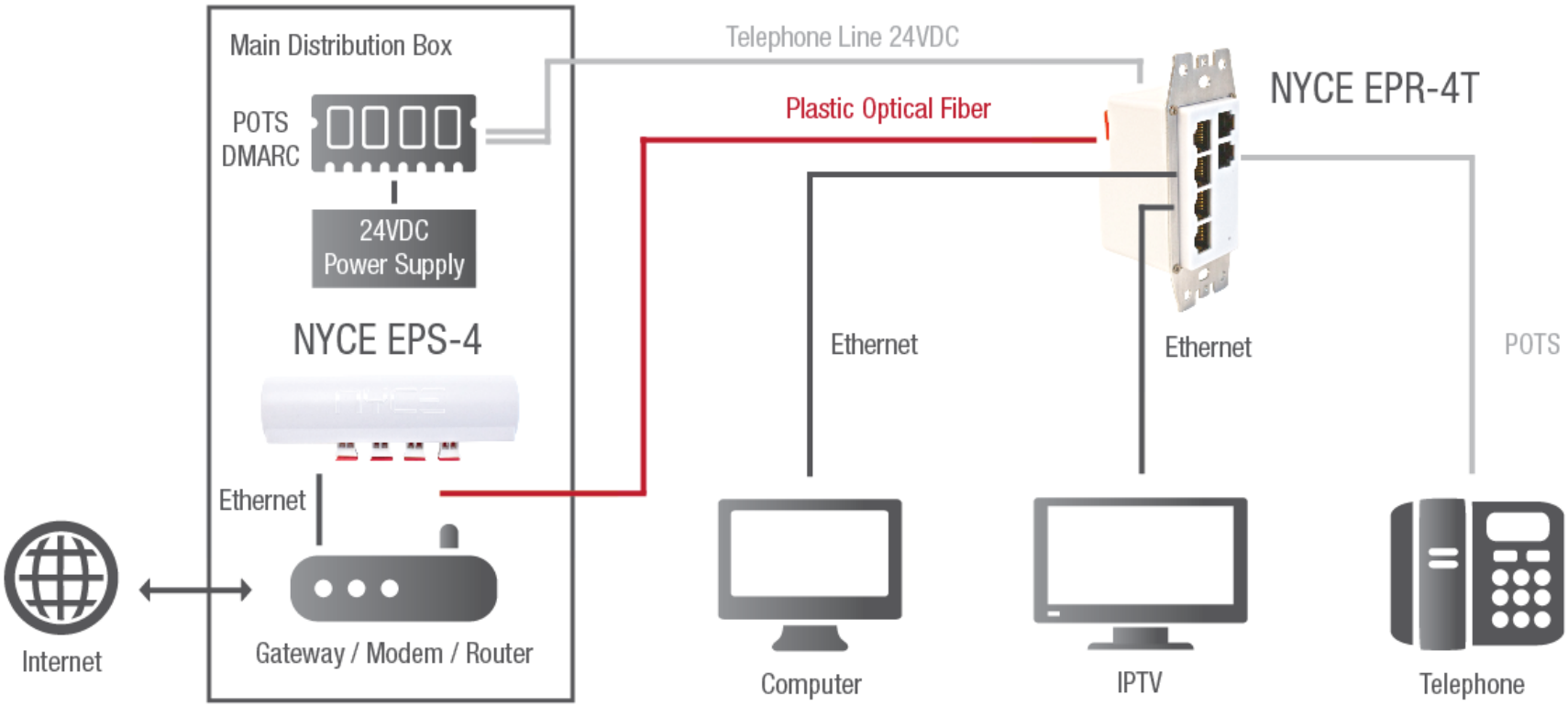
Wallplate media converter
$60

Optical switch
$40-65

Plug-in media converters
$40-65

Products - Deployment Methods

- Greenfield – In-wall Solution for new builds



Products - Deployment Methods

- Brownfield – Quick and Easy Retro-fit Solution

Example of Success – POF IPTV

USA:
• AT&T is partnering with NYCE in a proof of concept study to 4 Regions. To include brownfield and greenfield deployments to 500+ units. & have installed 75,000m of NYCE POF

Canada:
• TELUS is trialing NYCE EPM2 kits for a hospitallity application and testing NYCE equipment in Lab.
• Cressey Development has partnered with NYCE to install POF in 68 Unit Greenfield MDU

Chile:
• Telefonica de Chile has completed initial lab installation and testing. They are arranging meetings with their ONT and STB vendors to review POF port integration options for their FTTx initiative.
• Telefonica del Sur has recently obtained POF equipment to begin its lab and for initial installer field testing.

France:
• France Telecom/Orange have successfully completed trials with installers and home users. FT/Orange are currently testing NYCE EPM2 and Plenum POF in Labs

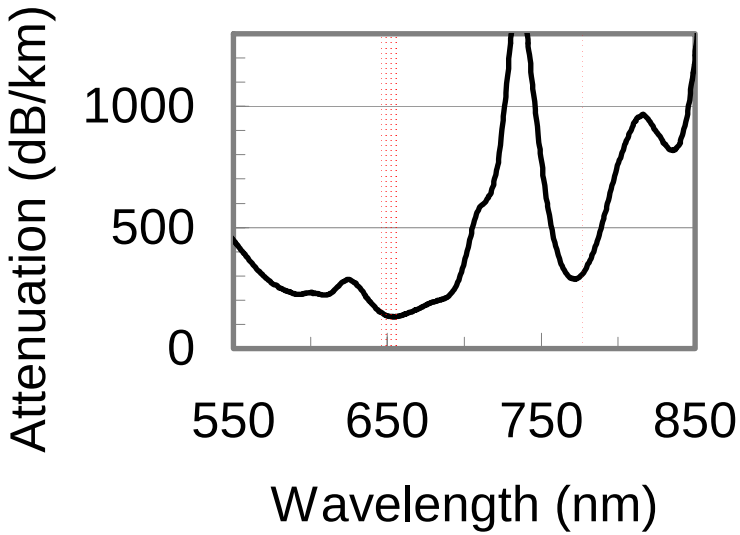
Switzerland:
• Swisscom have released a POF kit product for self install users (2008). Country-wide trials running August through September.

Portugal:
• Trials running through 2010 with some initial deployments planned.

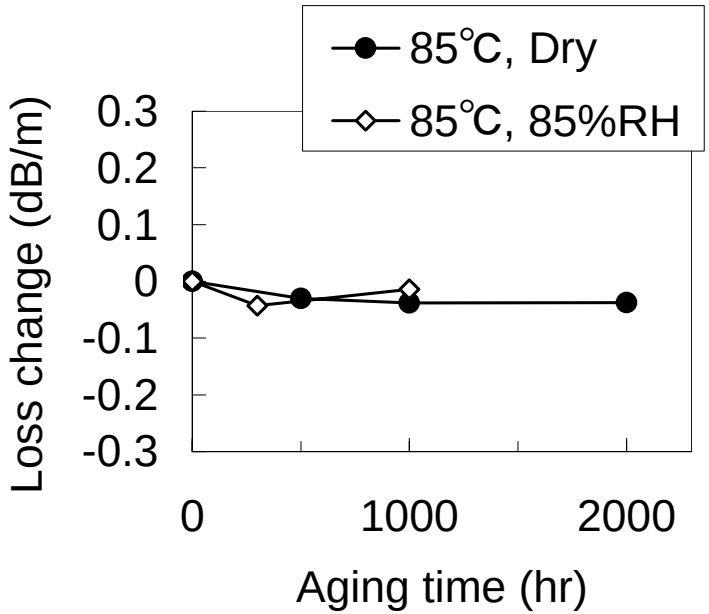
Italy:
• Telecom Italia has engaged in several enterprise and consumer trials for home networking through end 2009 into 2010.

Partially-Chlorinated GI POF

- Attenuation spectrum suitable for visible light sources

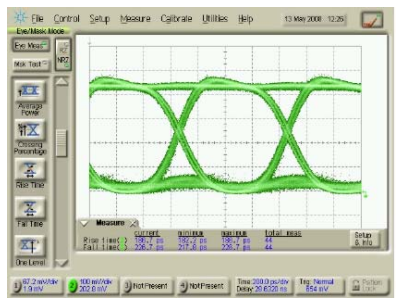


- High thermal stability



- Ultimate easy connection
  - Large core and high NA POF makes it possible to connect to the Optolock™.

Coupling loss dispersion in cutting: within 2.5dB



GINOVER GI POF lineup

No.	<VT250>	<VT120>	<ID120>	<ID062>
Material	Partially Chlorinated (PCP)		Perfluorinated	
Cut surface				
Core diameter	250 µm	120 µm	120 µm	62.5 µm
Outer diameter	750 µm	490/750 µm	490/750 µm	490/750 µm
Light source	650 nm	770 nm	850 nm	850 nm
Bandwidth	2.5 GHz/ 50m	5 GHz/ 20m	3 GHz/ 100m	10 GHz/ 30m
Working temp.	85°C	100°C	70°C	70°C
N. A.	0.3	0.3	0.185	0.190
Features	Connector-less Eye Safety	High-thermal Easy connection	High Speed Easy connection	Super- High speed
Typical Application	IPTV System Residential	Inside TV OA / FA / Medical	Digital Signage	AV Link Datacenter

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perfluorinated OPTICAL FIBER

FASTER than wire

FARTHER than plastic

SAFER than glass

SIMPLER than all

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