Plastic Optical Fiber
Today’s in-home networks

A variety of networks:

- **Twisted pair copper lines:** Telephone, fax, ...
- **Coaxial copper lines:** CATV, videorec, radio, ...
- **Cat-5 cables:** PC-s, routers, hubs, printers, servers, ...
- **Wireless LAN:** Laptops, PDAs, ...
- **Infrared:** remote control, TV/videorec/radio/...

⇒ Complicates maintenance, upgrading, running of services on multiple platforms, interaction of services, ...
Converged in-home network

Converged in-home backbone network, integrating wired & wireless services

- reduces installation and maintenance efforts
- eases introduction and upgrading of services
- integration e.g. by WDM

Converged in-home network on POF
What is POF

• Plastic Optical Fiber (POF) is a transmission medium in which signals in the form of modulated light beams are transmitted

Core Material: PMMA, 980µm
Cladding: Fluorinated PMMA, 20µm
Why use POF

• QUICK, EASY AND INEXPENSIVE INSTALLATIONS
  – POF can be deployed by a home builder, professional installer, or do-it-yourself installer using basic tools

• SMALL AND CONVENIENT
  – At the ultra-thin diameter of 1.5mm, POF can be easily deployed in new construction or retrofit installations either inside wall cavities or outside the wall behind / along baseboards or anywhere cable is typically run

• RUGGED AND DURABLE
  – POF is an extremely rugged and durable technology that can bend and flex without any loss of service, loss of bandwidth, or worry of damaging the cabling
Why use POF

• IMMUNITY TO ELECTRICAL NOISE
  – POF transmits data optically which makes it completely immune to electrical noise
  – This means that POF can even be installed next to electrical wiring
  – This is an important advantage of POF for bandwidth-intensive applications like multimedia data transmission as the signal delivered over POF will not degrade or be impacted negatively by external noise
Why use POF

• QUICK TROUBLESHOOTING
  – Troubleshooting is quick and easy as POF uses a visible eye-safe red light to transfer data from one device to another
  – POF is the only interconnect technology where the signal can be seen at both ends which makes troubleshooting very easy
  – A quick glance inside the cable will indicate successful connectivity to the network by showing a red light

• WIDELY USED
  – POF is a proven technology in many markets and is widely used in the automotive industry
  – There are over 20 million cars using Plastic Optical Fiber to deliver high speed in-car infotainment
## Technical features POF

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SUPPLY UNIT</strong></td>
<td>500m</td>
</tr>
<tr>
<td><strong>WEIGHT</strong></td>
<td>7.8kg/km</td>
</tr>
<tr>
<td><strong>PULL STRENGTH</strong></td>
<td>max. 5N, max. 15N</td>
</tr>
<tr>
<td><strong>BEND-RADIUS</strong></td>
<td>min. 20 mm, min. 10 mm</td>
</tr>
<tr>
<td><strong>MECHANICAL STRENGTH</strong></td>
<td>max. 4N/cm, max. 30N/cm</td>
</tr>
<tr>
<td><strong>TEMPERATURE</strong></td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td><strong>ATTENUATION (660NM)</strong></td>
<td>max. 160dB/km</td>
</tr>
<tr>
<td><strong>NUMERICAL APERTURE</strong></td>
<td>0.485</td>
</tr>
</tbody>
</table>

- **FEATURES**
  - 100Mbps, 1 Gbps data rate
  - Standard IEC 60793-40, Klasse A4a.2
  - Flame retardant
  - Easy and fast installation
  - Connector-less installation
How to use

- Connector-less installation (Optoclamp)

1. CUT TO LENGTH
   USE SIMPLE CUTTER

2. INSERT
   IN RX/TX HOLES

3. LOCK
   MOVE LOCKER IN POSITION
How to use

• Connector-less installation (Optolock)

1. CUT TO LENGTH
   USE SIMPLE CUTTER

2. OPEN
   REMOVE PROTECTION CAP
   PULL LOCKER OUT

3. INSERT
   IN RX/TX HOLES

4. LOCK
   MOVE LOCKER IN POSITION
POF network solution
## Overview of symbols

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>DEVICE INTERFACE</th>
<th>NETWORK INTERFACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1X MEDIA CONVERTER</td>
<td>1XRJ 45</td>
<td>1XPOF</td>
</tr>
<tr>
<td>1X MEDIA CONVERTER (POWER-ON-DEMAND)</td>
<td>1XRJ 45</td>
<td>1XPOF</td>
</tr>
<tr>
<td>1X MEDIA CONVERTER (TABLETOP DEVICE)</td>
<td>1XRJ 45</td>
<td>1XPOF</td>
</tr>
<tr>
<td>1X NETWORK INTERFACE DEVICE</td>
<td>1XRJ 45</td>
<td>2XPOF</td>
</tr>
<tr>
<td>2X NETWORK INTERFACE DEVICE</td>
<td>2XRJ 45</td>
<td>2XPOF</td>
</tr>
<tr>
<td>1X POF INTERCONNECT UNIT</td>
<td>1X POF</td>
<td>1XPOF</td>
</tr>
<tr>
<td>2X POF INTERCONNECT UNIT</td>
<td>2X POF</td>
<td>2XPOF</td>
</tr>
<tr>
<td>PLACE HOLDER SOCKET</td>
<td>NONE</td>
<td>NONE</td>
</tr>
<tr>
<td>SFP TRANSCEIVER</td>
<td>SFP</td>
<td>1XPOF</td>
</tr>
<tr>
<td>PCI NETWORK INTERFACE CARD</td>
<td>PCI</td>
<td>1XPOF</td>
</tr>
<tr>
<td>WIRELESS ACCESS POINT</td>
<td>WIFI</td>
<td>1XPOF</td>
</tr>
</tbody>
</table>
POF network platform
## POF economics

(based on market price surveys)

<table>
<thead>
<tr>
<th></th>
<th>Cat-5E</th>
<th>POF</th>
<th>SMF</th>
<th>MMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installed cable costs</td>
<td>1.8 €/m</td>
<td>1.7 €/m</td>
<td>1.74 €/m</td>
<td>1.95 €/m</td>
</tr>
<tr>
<td>Max. link length</td>
<td>100 m</td>
<td>70 m</td>
<td>1000 m</td>
<td>550 m</td>
</tr>
<tr>
<td>Mounted connector costs</td>
<td>13 €</td>
<td>3 €</td>
<td>15 € *</td>
<td>14 € *</td>
</tr>
<tr>
<td>Media converter costs; power consumption</td>
<td>(negligible): 0.65 W</td>
<td>30 €; 0.85 W</td>
<td>70 €; 1.15 W</td>
<td>40 €; 1.15 W</td>
</tr>
<tr>
<td>Hub/tap costs; power consumption</td>
<td>20 €; 0.2 W</td>
<td>20 €; 0.2 W</td>
<td>20€; 0.2 W</td>
<td>20€; 0.2 W</td>
</tr>
<tr>
<td>Switch costs, power consumption</td>
<td>10 €/port; 0.3 W/port</td>
<td>10€/port; 0.3 W/port</td>
<td>10 €/port; 0.3 W/port</td>
<td>10 €/port; 0.3 W/port</td>
</tr>
</tbody>
</table>

* these prices vary considerably for the various connector types and their mounting methods; we assumed SC connectors, and about 10 minutes in-field mounting time per connector (labour costs about 10€)
POF economics

- bus topology
- buried ducts

No duct sharing

Duct sharing

Duplex POF competitive with CAT-5E (when duct sharing)