1. Plug & Play Component
2. Methods
3. 40/100G upgrade path
4. MTP12 & MTP8
What is it?

Plug and Play is a complete fibre system composed of pre-terminated assemblies and cassettes that can be rapidly installed and activated via simple insertion of multi-fibre connectors.

Products include: Factory-terminated, multi-fibre MTP (Mechanical Transfer Push-on) trunk cable assemblies
MTP to duplex trunks and hydra assemblies
MTP Systems

- MTP systems are mated connections male to female
- Different applications may require different ‘polarity’ options – A, B or C
- MTP connections can be converted to LC connections via the use of cassettes or hybrid cords
Different Designs

For Different Situations
Product Level

- What are the main concerns regarding fibre designs:
  - Optical Loss (attenuation)
  - Length Limitation
  - Polarity
- Each Application will have its own very specific needs… Get this wrong and the system may not work!
This is Serious Stuff

- IEEE: 802.3 – 10BaseFL
  - Maximum Loss (OM3/OM4) 12.5dB
- IEEE: 802.3 – 10GBaseSR
  - Maximum Loss (OM3) 2.6dB
  - Maximum Loss (OM4) 2.9dB
- IEEE: 802.3 – 40GBaseSR4
  - Maximum Loss (OM3) 1.9dB
  - Maximum Loss (OM4) 1.5dB

- Designers need to know what the client is planning to run over the fibres
- From and to details
- How many hops:
  - Layout of hardware, Network Cabinets, Server Cabinets etc.
- Once we know this we can correctly select components:
  - Meeting todays needs and any trying to cater for tomorrow
Understanding Losses

Standard Loss Performance

0.25dB 0.40dB
Understanding Losses

Low Loss Performance

0.15dB
0.2dB
## Understanding Losses

### LC Duplex Design

<table>
<thead>
<tr>
<th>Application</th>
<th>Fibre Type</th>
<th>Max Length</th>
<th>Maximum Loss dB</th>
<th>2 Cassettes 50m</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Standard Loss</td>
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<tr>
<td>10GBase-SX</td>
<td>OM3</td>
<td>300</td>
<td>2.6</td>
<td>1.45</td>
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<tr>
<td></td>
<td>OM4</td>
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### Understanding Losses

**LC Duplex Design**

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**Higher Data Rate Design**

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<tr>
<th>Application</th>
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<td></td>
<td>Standard Loss</td>
</tr>
<tr>
<td>40GBase-SR4</td>
<td>OM3</td>
<td>100</td>
<td>1.8</td>
<td>0.9</td>
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<tr>
<td></td>
<td>OM4</td>
<td>150</td>
<td>1.5</td>
<td>0.9</td>
</tr>
<tr>
<td>100GBase-SR4</td>
<td>OM3</td>
<td>70</td>
<td>1.8</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>OM4</td>
<td>100</td>
<td>1.9</td>
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## Understanding Losses

### Higher Data Rate Design

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Polarity

Tx  Rx
A fibre duplex link should always connect Transmit (TX) to Receive (RX).
In all fibre connectivity it is important to maintain the correct polarity so the signal goes from the optical transmitter to the optical receiver. For duplex transmissions.
Reverse Pair Polarity

The standards define how this is achieved
Polarity options

The standards allow three methods to achieve this using array connectivity

Method A
Method B
Method C

Other manufacturers have proprietary offerings
Method C
Method A – 10G

Method A - Array

Tx Rx

Bicsi
Method B – 10G

Method B - Array
Method B – 40/100G
Method C – 10G

Method C - Array
Method C – 40/100G

Method C - Array

Method C - Array

Method B - Array
The Standard offer 3 type of polarity A, B and C on MTP assemblies. Be careful with non standard polarity.

Who should think about polarity and gender in a Channel?

- End users
- Installers
- Designers

<table>
<thead>
<tr>
<th>Application</th>
<th>Polarity Type</th>
<th>Installer</th>
<th>End User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex Application (LC based)</td>
<td>A</td>
<td>Medium</td>
<td>Hard</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Medium</td>
<td>Easy</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Easy</td>
<td>Easy</td>
</tr>
<tr>
<td>Parallel Optics (MTP Based)</td>
<td>A</td>
<td>Medium</td>
<td>Hard</td>
</tr>
<tr>
<td></td>
<td>B</td>
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<td>Easy</td>
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<tr>
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<td>Hard</td>
<td>Hard</td>
</tr>
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Array Application

MTP 12

MTP 8
Migration Path : 12Core Array

33% unused
Migration Path: 8Core Array

10G Channel
Example Channel Model

Existing Backbone Fiber Trunk

Cassettes and LC jumpers removed

Base 8 40G Channel
Example Channel Model

Existing Backbone Fiber Trunk

MTP jumpers added

100% Utilization

MTP Adapter Plate with Opposing Key

MTP Adapter Plate with Opposing Key
Thank You