Data Transport

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Fibre review

- functions
  - transport 3 x 1.7 Gb/s sample data
  - distribute clock timing and epoch to nodes
  - bi-directional M&C data (gigE rates)
Patch Panels
### Optical Power Budget

#### System Elements and Losses

<table>
<thead>
<tr>
<th>System Element</th>
<th>Optical Loss</th>
<th>Number of Elements</th>
<th>Total Loss (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectors</td>
<td>0.5 dB/connector</td>
<td>2 connectors</td>
<td>1</td>
</tr>
<tr>
<td>Optical Fibre</td>
<td>0.36 dB/km</td>
<td>3.2 km (maximum)</td>
<td>1.2</td>
</tr>
<tr>
<td>Patch Panels</td>
<td>2 dB/panel</td>
<td>2 panels</td>
<td>4</td>
</tr>
<tr>
<td>Dispersion in fibre</td>
<td>1 dB</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>Safety Margin</td>
<td>3 dB</td>
<td>N/A</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total optical loss in system:** 10.2 dB

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xmtr: -5dBm  
rcvr: -18dBm  
additional margin: 2.8dB
Fibre review

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  - bi-directional M&C data (gigE rates)
- single mode fibre - Prysmian Sm@rtCore
  - $4.80/m for 72 fibres
  - $1.80/m for 12 fibres
Prysmian Sm@rtCore Fibre

Cable description:
Cable containing up to 72 optical fibres in water blocked loose tubes (Maximum 12 fibres per tube) and solid polyethylene fillers laid-up around a glass reinforced plastic (GRP) central strength member, water blocked interstices, taped*, polyethylene overall sheathed and integrally bonded nylon jacketed

Construction details:
Number of elements : 6
Tube/Fibre identification : Colour coded
Central strength member : Glass reinforced plastic (GRP)
Fibre protection (tubes) : Polybutylene terephthalate (PBT)
Fillers : As required
Water blocking : Thixotropic gel (tubes)
             : Water swellable yarns (interstices)
Core wrapping : Polyethylene terephthalate tape*
Sheath : Polyethylene
Jacket : Nylon (UV stabilized) - Blue

Note (*) : Except 72 fibre cable

Cross sectional drawing:

Dimensions and mass:
Overall cable diameter (nominal): 9.1 mm
Mass (nominal) : 60 - 65 kg/km
Fibre review

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• single mode fibre - Prysmian Sm@rtCore
• Finisar transceiver set - FTLF1421S1MCL
• Gennum dual Rx - GO2920
PRODUCT FEATURES

• Up to 2.67Gb/s bi-directional data links
• Standard 2x10 pin SFF footprint (MSA compliant)
• Analog diagnostics functions
• Uncooled 1310nm DFB laser transmitter
• Duplex LC connector
• Very low jitter
• Metal enclosure, for lower EMI
• Single 3.3V power supply
• Low power dissipation <700 mW typical
• Extended operating temperature range: -10°C to 70°C

APPLICATIONS

• SONET OC-48 IR-1 / SDH STM S-16.1
• SONET OC-12 IR-1 / SDH STM S-4.1
• SONET OC-3 IR-1/ SDH STM S-1.1
• Gigabit Ethernet / 1x2x Fibre Channel
### GO2920
1310nm Dual Optical Receiver

<table>
<thead>
<tr>
<th>Description</th>
<th>Features</th>
<th>Applications</th>
<th>Downloads</th>
</tr>
</thead>
</table>

- SMPTE 297-2006 compatible
- Robust error free reception of signals from 50Mbps to 3Gbps
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Hot-pluggable
- Digital Diagnostic functions available through the $I^2C$ interface including:
  - Monitoring of receive optical power, supply voltage and module temperature
  - Alarm reporting
  - Module ID polling
- Single +3.3V power supply
- Low Power Consumption—typical 470mW
- RoHS compliant
- Operating temperature range: 0°C to 70°C
- 56.5mm x 13.4mm x 8.6mm SFP Package

#### Ordering Information

<table>
<thead>
<tr>
<th>Part No</th>
<th>Package</th>
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<tbody>
<tr>
<td>GO2920-CM</td>
<td>SFP</td>
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</table>
AgFo-AgFo Link Tests

- performed by Deepak Kumar at RRI
- used AgFo board to receive node data (in place of PFB)
- 2.5 Gb/s in 1024 byte test packets
- tested without error for 10h
- fibre was only 3m, will test with 3km in July
- in July will also test with properly formatted node packets -- tested and properly working
Architecture

- hub offset from array center with patch panel connections going to each node
- 7x72 fibre bundles correlator to hub
Questions to be Resolved

- Is the Prysmian Sm@rtCore cable sufficiently armored to withstand rocks, rodents, etc.?
- How best to distribute /drop-off the cables at each node?
- To what extent can connectors be pre-attached (at factory or possibly in the lab)?
- If project schedule is stretched out, should we revisit decision to use SFF transceivers? - Gennum dual Rx adopted
More Questions to be Resolved

- Is Prysmian quote still accurate?
- What volume discounts are available?
- What is the detailed topology of fibre distribution network? (e.g. do we route each node independently from hub or break out wider cables at branch points of the Steiner tree?)
- 3 km of 7x72 fibre bundles from correlator to hub would cost $100K -- who’s paying?
- Do we have an active, committed WP manager?
- Could DT/WPM also oversee the transport of data (via photons or Fe atoms) off-site?