
Secure Your Selection Against Unforeseen Future Cost

Tony Breach, Optical Network Manager

13. marts 2007



Index

What is this about?

Securing DF Investment

Penalty examples related to DF

Securing Equipment Investment

Penalty examples related to Equipment

Summery

What is this about?

1. You want your peak performance from your network
2. If that is not possible – when you want some compensation



Securing Dark Fibre Investment

Exceeding specified BOL and EOL values = Penalty

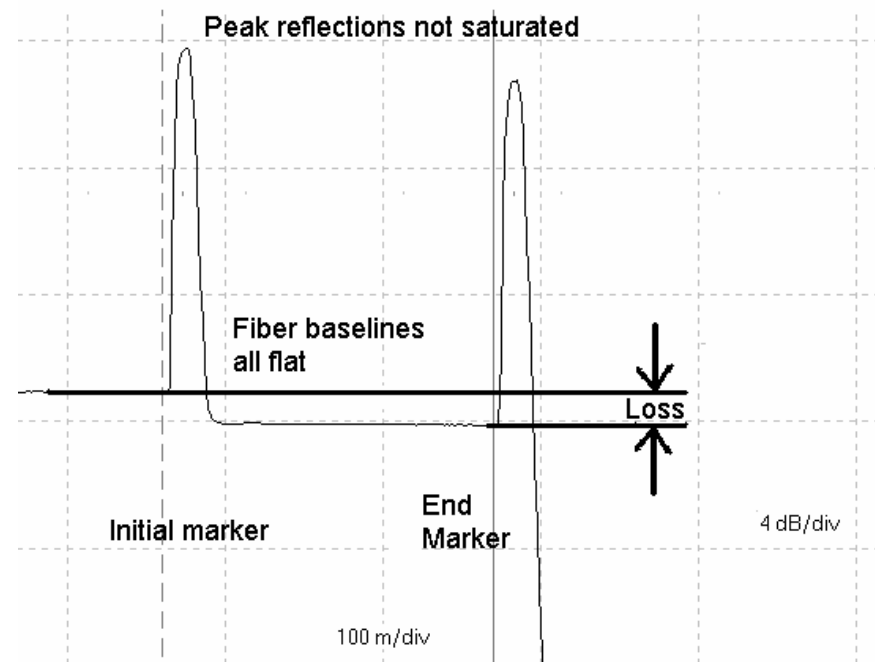
- Attenuation at 1550 and 1310 nm ⚠
- Chromatic Dispersion at 1550 and 1310 nm ⚠
- Polarisation Mode Dispersion at 1550nm ⚠
- Bend losses and Seasonal variations in the fiber parameter
- Connector losses
- Reflection
- Average DF Span splice attenuation ⚠
- Reflection and attenuation for connections
- The attenuation for a connector splice



SPAN and OTDR Measurement

Span and OTDR Measurement

- Is your most important documentation now and in the future
- If you can have the CMD and PMD Measurement – Brilliant



| | |
|---------------------------|---------------------------|
| Fibre Type: | ITU-T G.652 |
| CMD@1550nm | < 18.5 ps/nm/km |
| PMD | < 0,2 ps/√km |
| Attenuation@1550nm | < 0,22dB/km |

| Span | | Distance km | Attenuation @ 1550nm | | | Attenuation @ 1310nm | | |
|-------|-------|----------------|----------------------|-----------|----------------|----------------------|-----------|----------------|
| | | | BOL dB | EOL dB | Measured dB | BOL dB | EOL dB | Measured dB |
| POP A | ILA 1 | 6,00 | 1,50 | 1,60 | 2,00 | 3,00 | 3,20 | 4,00 |
| ILA 1 | ILA 2 | 73,00 | 15,40 | 17,40 | 13,20 | 30,80 | 34,80 | 26,40 |
| ILA 2 | ILA 3 | 58,70 | 12,10 | 13,91 | 12,23 | 24,20 | 27,82 | 24,46 |
| ILA 3 | ILA 4 | 70,10 | 14,75 | 15,00 | 14,00 | 29,50 | 30,00 | 28,00 |
| ILA 4 | ILA 5 | 57,87 | 10,36 | 12,31 | 11,05 | 20,72 | 24,62 | 22,10 |
| ILA 5 | POP B | 85,91 | 17,57 | 19,90 | 17,10 | 35,14 | 39,80 | 34,20 |

Penalty examples related to Dark Fiber

Peak Performance Network

- Your fiber supplier swaps the violating fiber span with another pair – free of charge
- During transition your supplier provide a temporary fiber span – free of charge

Compensation

- Availability measures on a regular basis – Compensation enabled crossing the threshold

The Ultimate Worst Case

- Escape and Termination Clause that secure your fiber network operations during a transition into a new fiber network

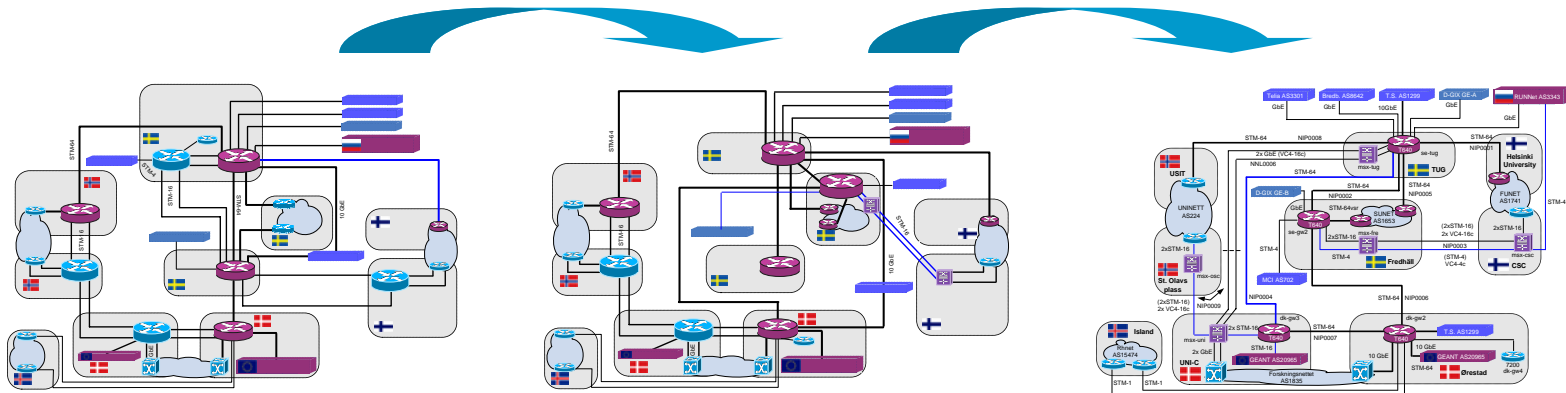
Securing Equipment Investment

- Secure your investment against a unforeseen cost
 - Initial deployment
 - During expansion
- This is a green field scenario you don't need an interoperability test - But the functionality must be complied when Ready for Service
- But you need to verify that client interfaces can interoperate seamlessly to your existing equipment



Initial Deployment

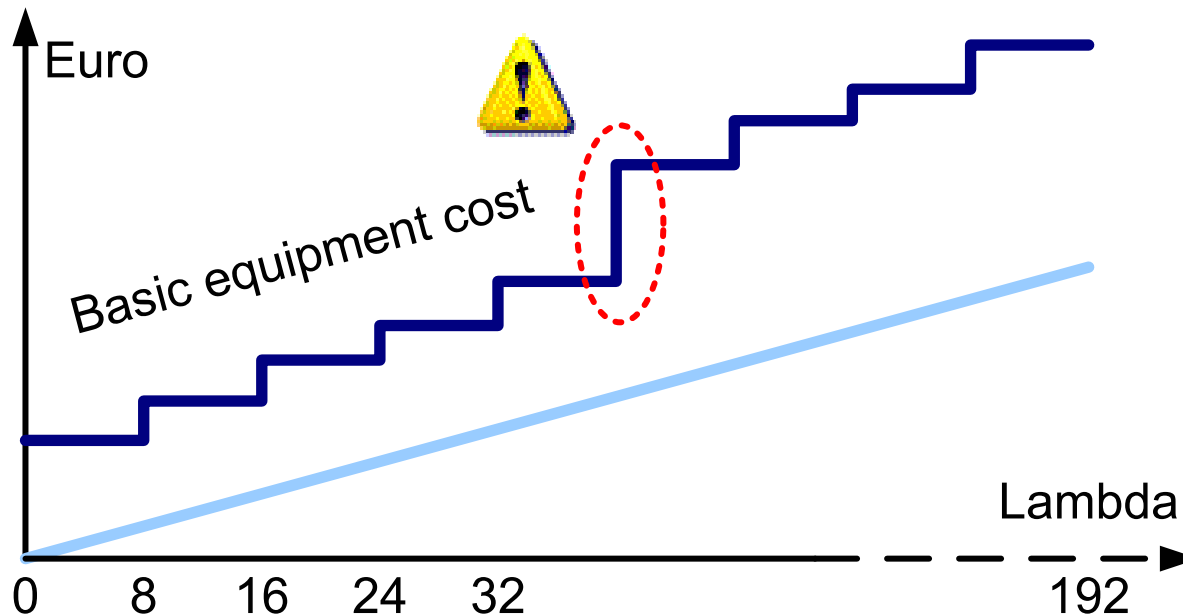
1. You must perform a network analysis of your current network resulting in:
 1. Current Network design description layer 1 - 3
 2. New Network design description layer 1 - 3
 3. Physical and logical connectivity matrix
 4. Migration plan STEP by STEP "Cartoon"
2. Your Supplier will make a Bill Of Material based on your input and that should secure your initial Deployment



During Expansion

- Supplier Marketing – **We can do a million Channels**
- Make your supplier state and comply to this DF Section expansion scheme
 - i.e. Couplers, splitters, Amplifiers, Add/drop multiplexer, DCM etc.

State the cost of the basic network and transponders pr DF section



| Channel or Lambda No. | POP A - POP B |
|-----------------------|---------------|
| 0 | €356.717 |
| 1 | €393.887 |
| 2 | €410.261 |
| 3 | €427.635 |
| x | x |
| x | x |
| 11 | €579.580 |
| 12 | €596.954 |
| 13 | €614.328 |
| x | x |
| x | x |
| 192 | €5.000.000 |

Connectivity Matrix

- The Supplier must state the maximum amount of transponder for a lambda between POP's
 - Primary and Resilient Route
 - Avoid multiple regenerations
 - For 10 G lambda
 - For 40G lambda

Validated for the 1 – 40 Channels

| | POP A | POP B | POP C | POP D |
|-------|----------|----------|----------|-------|
| POP A | NA | 2 | 4 | 2 |
| POP B | 2 | NA | 2 | 2 |
| POP C | 4 | 4 | NA | 2 |
| POP D | 4 | 4 | 6 | NA |

- Rule of thumb
 - Every lambda having optical pass through in an intermediate POP (without regeneration) consumes the equivalent of 3 lambdas on the complete section

Validated for the 41 – 96 Channels

| | POP A | POP B | POP C | POP D |
|-------|----------|----------|-----------|----------|
| POP A | NA | 2 | 6 | 4 |
| POP B | 2 | NA | 2 | 4 |
| POP C | 4 | 4 | NA | 4 |
| POP D | 8 | 6 | 10 | NA |

Penalty examples related to Equipment

Peak Performance Network

- Your Equipment supplier undertakes some re-engineering and supplies the missing or lacking functionality – free of charge
- During transition your supplier provide a temporary solution– free of charge

Compensation

- Missing or lacking functionality – Compensation enabled when Ready for Service Network don't comply to specifications in the contract

The Ultimate Worst Case

- Escape and Termination Clause that secure your network operations during a transition into a new network base on other equipment

Summery

- Perform as a minimum a layer 1 – 3 analysis of your current network and your target network
- Secure your investment by means of simple tools
 - Dark Fiber Suppliers must understand that performance data more than attenuation and theoretically data is required today
 - Equipment suppliers must show the offered equipment limitations
- Let your supplier comply to the initial and full load setup
 - That will bring them out of bush
- You must be innovative and see new possibilities in the offered solutions



End Of Presentation

Tony Breach
Optical Network Manager, M.Sc.EE
tony@nordu.net

