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Tunable Optics for Front-Haul Networks

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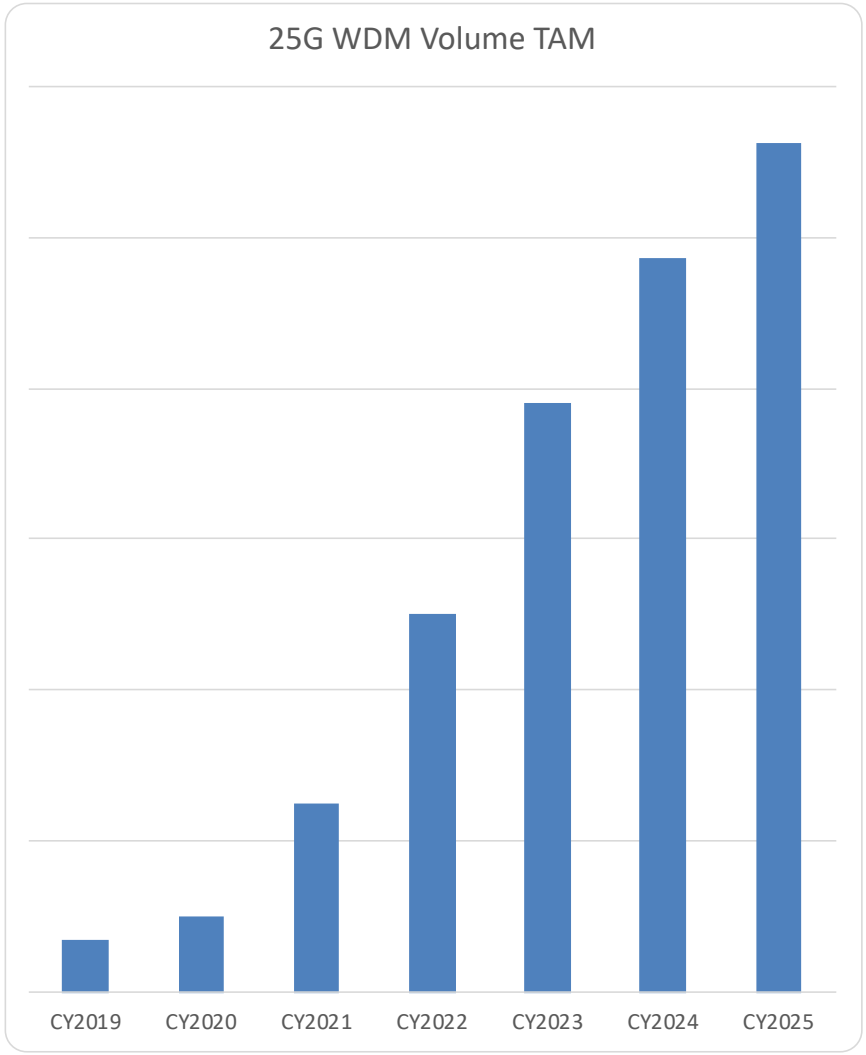
Workshop: Moving from optical components in RAN to optical components for RAN

5G Market Overview: WDM



Lumentum Estimates

Summary:

5G WDM market is here and ramping
- Requires cost optimized solutions with features that are:
  - Standardized and free to all
  - Help reduce service providers OpEx
  - Give service providers visibility and control of the optical modules in the system

LUMENTUM is advancing this through

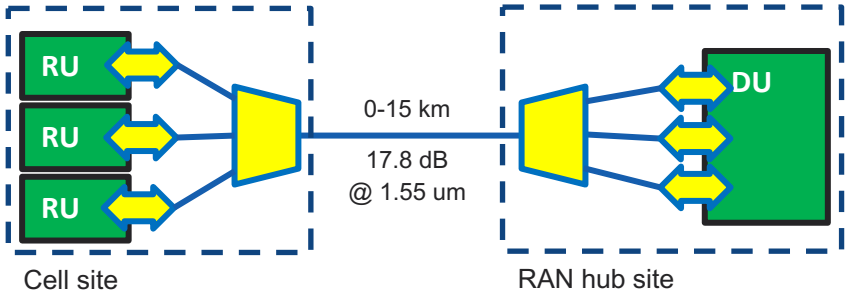
SmartTunable MSA
- Championing self-tuning optics through collaboration with industry partners

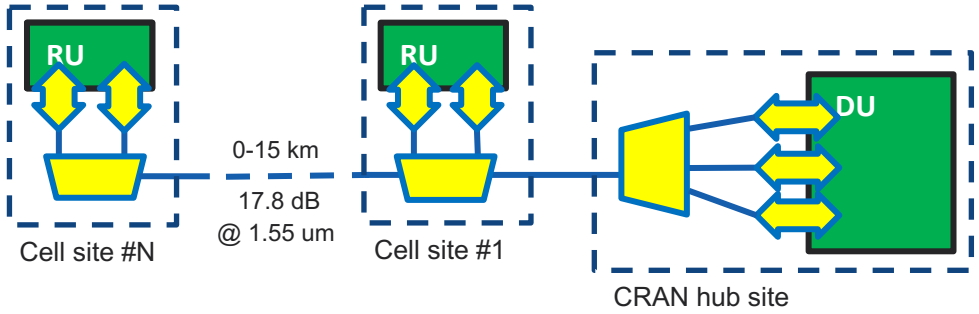
MOPA Mobile Optical Pluggables Alliance
- Defining high-level specs to enable interoperable remote diagnostics and control
- Then share it with the industry!

O-RAN ALLIANCE
- Promoting DWDM optics in WG9
- Demonstrating interoperability at PlugFest events

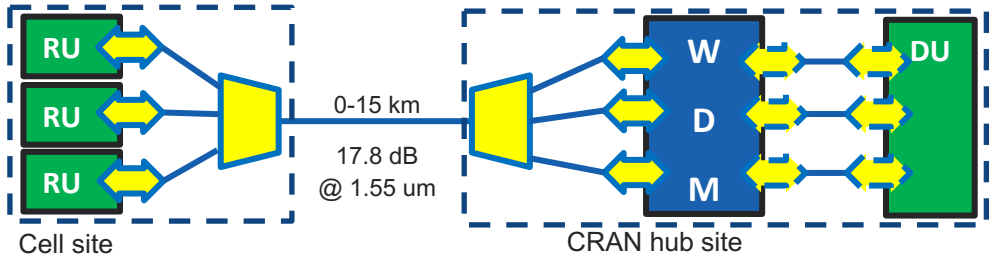
WDM Blueprints (MOPA)

15 km RU-DU, passive DWDM over a single fiber Blueprint





15 km RU-DU, semi-active DWDM over a single fiber Blueprint



WDM Blueprint

- Up to 15 km
- Up to 48 channels
- 17.8 dB power budget
- Primarily CRAN + Fiber Constrained applications
- Option: Fixed or Tunable

Preferred by MOPA

Tunable Advances

- Automatic Wavelength Tuning

SmartTunable MSA

Specification available at:
http://www.smarttunable-msa.org

MOPA
Mobile Optical Pluggables Alliance

Specification publicly available in MOPA V2 Technical Paper
https://mopa-alliance.org

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SmartTunable MSA

- The SmartTunable MSA establishes a standardized approach for self-tuning algorithms within wavelength tunable transceivers such that products from different vendors interoperate and self-tune properly
- The MSA provides a technical framework allowing customers to multisource their wavelength tunable transceivers with compatible STO functions

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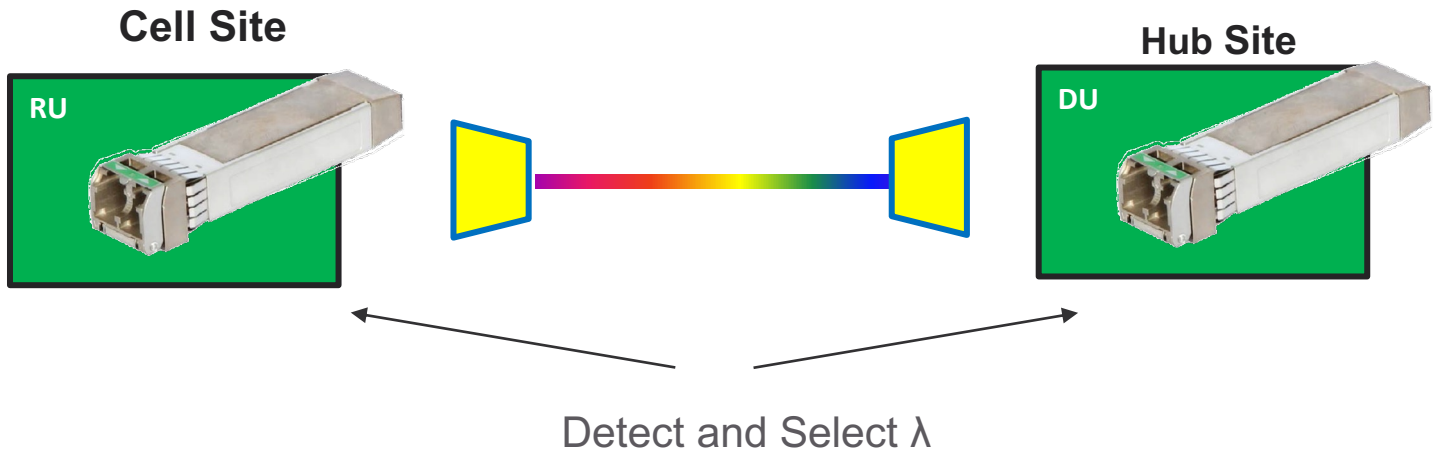
- Website: www.smarttunable-msa.org

Value of Automatic Wavelength Tuning



Does not require anything new from host system

Host system can enable/disable this function

Value Add:

OpEx

- Plug and Play
- Less technician time in the field
- No need to track fibers
- No need to buy tuning boxes

CapEx

- 1 module instead of a box of 48 λs
- Easier forecasting and inventory management
- Reduces the potential for stranded inventory at the “wrong/unused” wavelengths

Operators can realize significant savings

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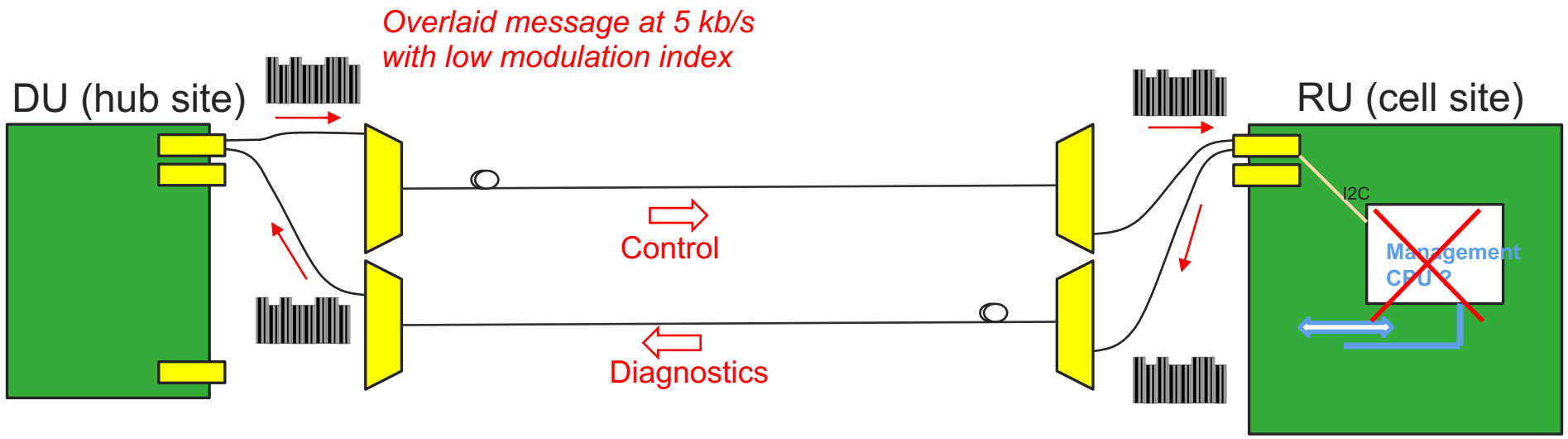
Remote Diagnostics and Control – Method

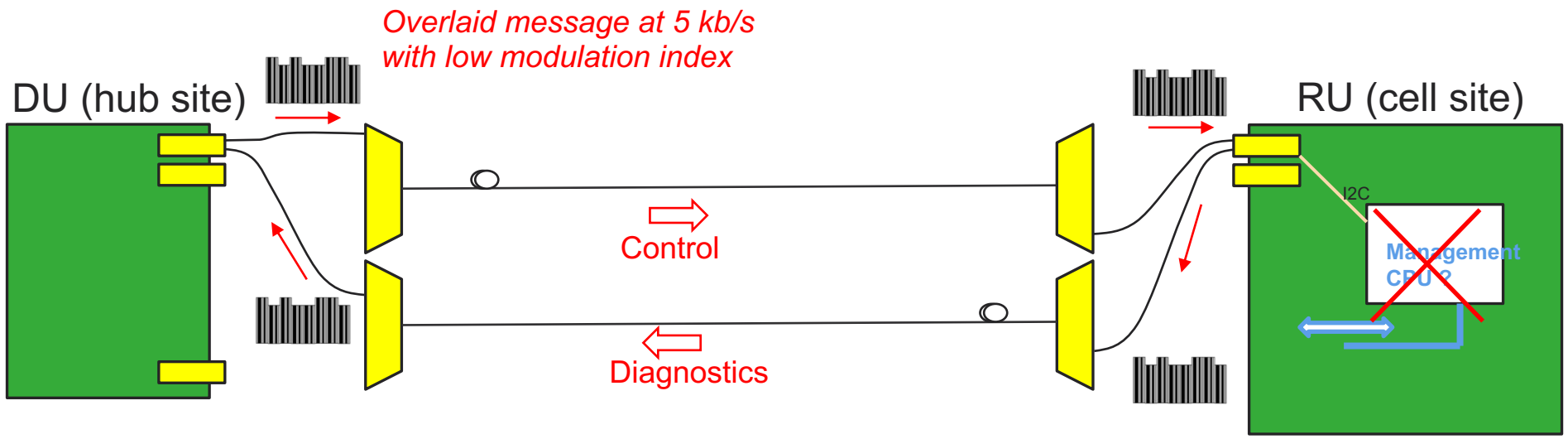
- New feature defined in MOPA white paper v2.0
- Provides option for monitoring and controlling optical modules in a multi-vendor ecosystem
- Like G.metro – but cost optimized for 5G Front Haul
- Detailed recommendation proposed for ITU-T SG15-Q6 standardization



Remote Diagnostics and Control – Method (continued)

- Overview of Remote Diagnostics and Control
  - Low data rate (5 kb/s) RF overlay
  - Messaging based on ITU-T G.698.4 (G.metro) frame format
  - Time to send digital diagnostics from RU to DU is less than 100 ms
  - Avoids the need for in-band supervisory channel as in CPRI

- Comparison to G. metro
  - Messaging not used for module tuning, so high data rate (50 kb/s) is not needed
  - Simplified scheme using existing microcontroller in TSFP module = module redesign not needed



Thank you