Toward 20 Gbps upstream FDMA-PON real-time and low-speed DSP demonstrator

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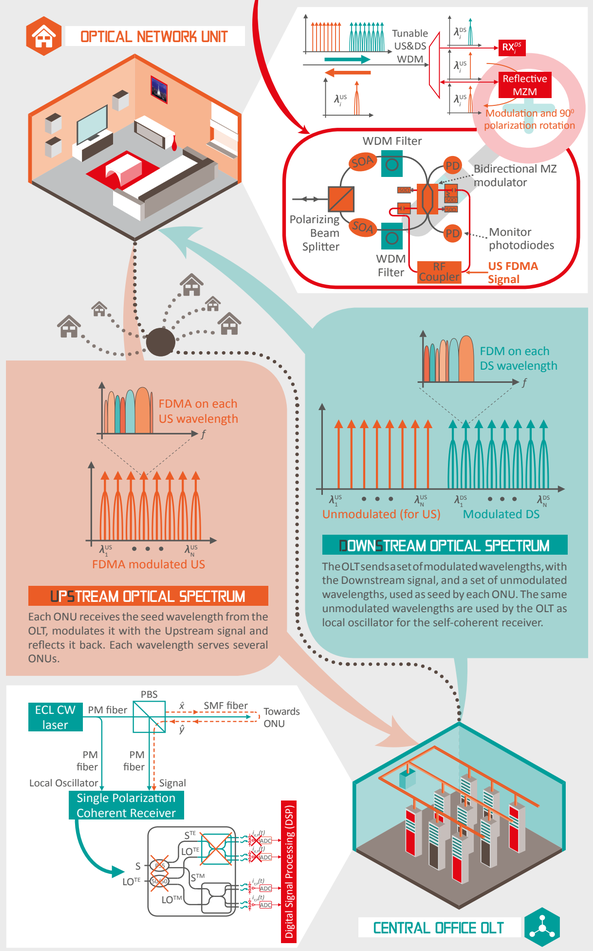
Fabulous
FDMA Access By Using Low-cost Optical Network Units in Silicon Photonics

PROJECT DESCRIPTION

FABULOUS will design, develop and characterize new Silicon Photonics components for application in next-generation passive optical networks, particularly in a WDM/FDM architecture based on a reflective ONU. **These components will be integrated onto a multi-functional optoelectronic chip** that will then be the core of a full-blown system demonstrator.



SYSTEM REQUIREMENTS

TARGET PERFORMANCES

- ODN Loss ≥ 29 dB
- At least 16 users per wavelength
- 1 Gbps per user

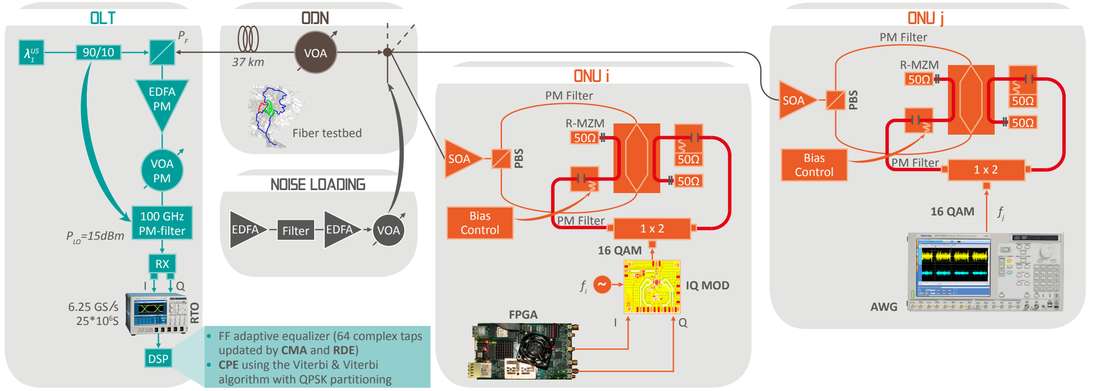
SYSTEM CHOICES

- 16 QAM modulation per electrical sub-carrier
- Raised cosine shaping (with roll-off 0.1)
- FEC with 10^{-3} input BER

MODULATION PARAMETERS

- Bandwidth of each electrical channel: 330 MHz
- Minimum bandwidth of the optical modulator: 6 GHz

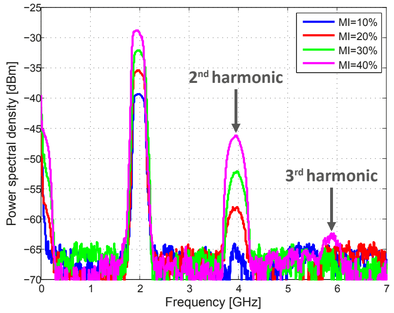
EXPERIMENTAL SETUP



- FF adaptive equalizer (64 complex taps updated by **CMA** and **RDE**)
- **CPE** using the Viterbi & Viterbi algorithm with QPSK partitioning

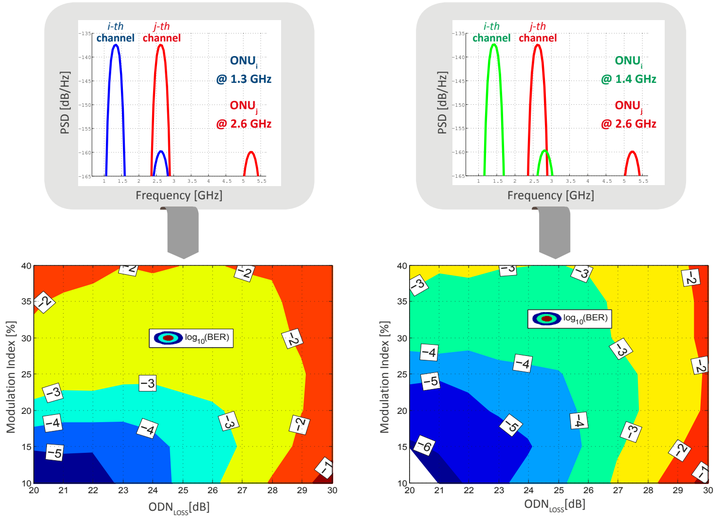
EFFECT OF ELECTRICAL PARAMETERS

The modulation index $MI \triangleq \frac{V_{SIGNAL}}{V_{\pi}}$ impacts on the level of 2nd and 3rd harmonics. It can be chosen to minimize them.



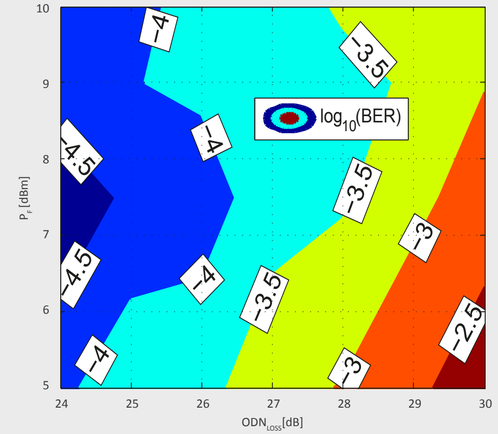
In order to minimize inter-channel inteference it is possible to select a frequency allocation for the FDM signal that avoids 2nd harmonic of *i-th* channel to have central frequency of useful *j-th* channel.

WORST FREQUENCY ALLOCATION



BEST FREQUENCY ALLOCATION

BEST FREQUENCY ALLOCATION, 16 ONUs, MI = 0.2



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SEVENTH FRAMEWORK PROGRAMME