FABULOUS

FDMA Access By Using Low-cost Optical network Units in Silicon photonics

S. Abrate

Project overview

Project genesis

- FP7-ICT-2011-8 – Objective 3.5: Core and disruptive photonic technologies

"Application-specific photonic components and subsystems"

"For access networks, the goal is affordable technology enabling 1-10 Gb/s data-rate per client"

FABULOUS at-a-glance

- EU STREP contract 318704

- Total cost: 4,3M€

- EU contribution: 2,9M€

- Project start: 1st October 2012

- Duration: 36 months

FP7-ICT-2011-8 Challenge 3.5 – STREP project n. 318704 – FABULOUS
FDMA Access By Using Low-cost Optical Network Units in Silicon photonics

4

The consortium
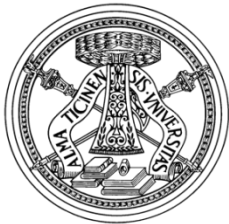
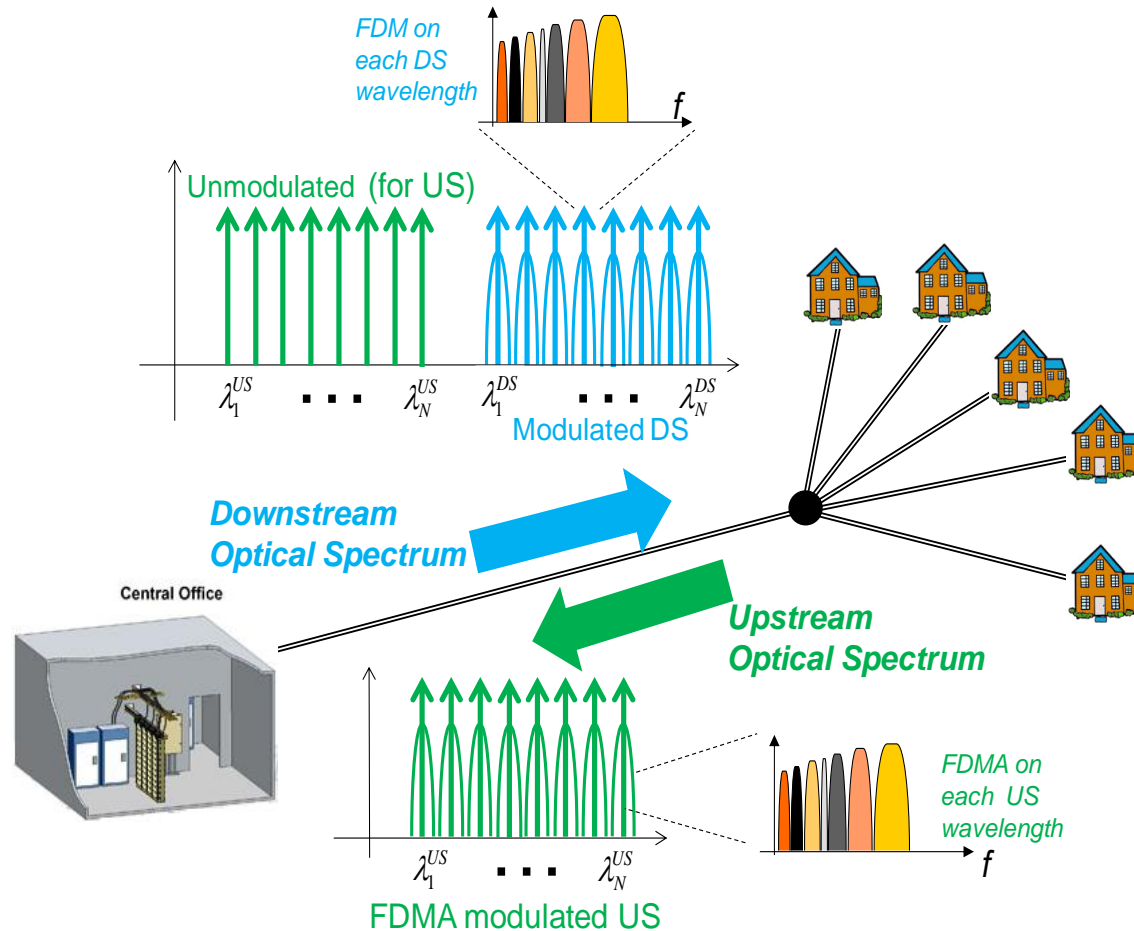A balanced mix of universities, research centers, industries and telecom operators

A flexible architecture compatible with current infrastructures and low cost components based on silicon photonics:

the keys for mass Fiber-To-The-Home ultra-broadband deployment.
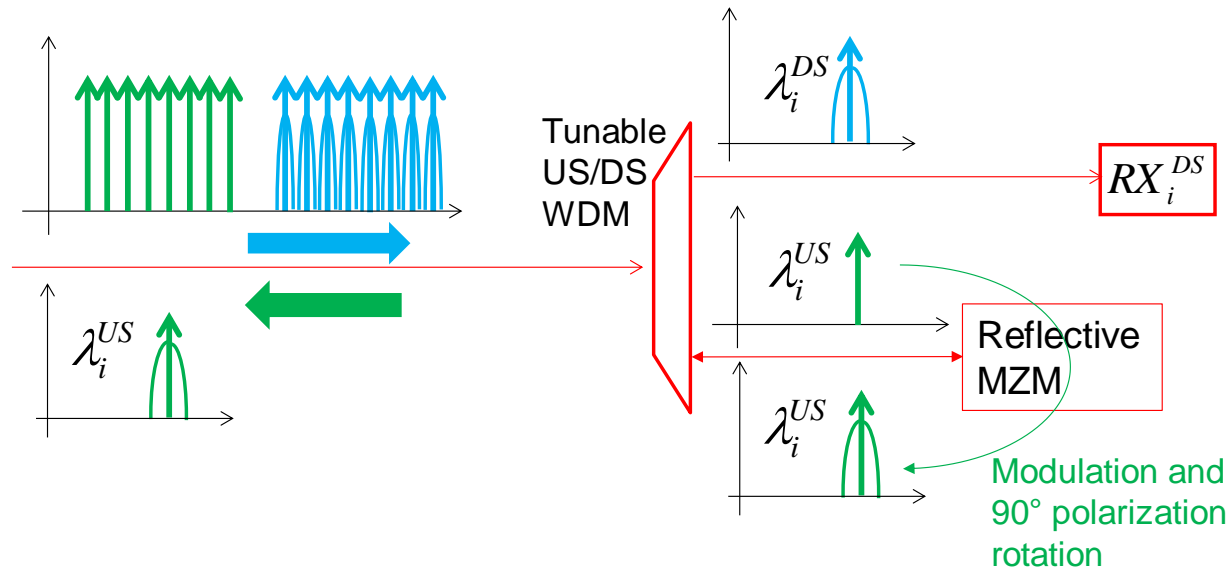
The challenge

To demonstrate a FDMA PON architecture …

FDM on each DS wavelength

f

Unmodulated (for US)

λ_1^{US} • • • λ_N^{US} λ_1^{DS} • • • λ_N^{DS}

Modulated DS

Downstream Optical Spectrum

Central Office

Upstream Optical Spectrum

λ_1^{US} • • • λ_N^{US}

FDMA on each US wavelength

f

FDMA modulated US

fabulous

SEVENTH FRAMEWORK PROGRAMME

… exploiting the R-PON paradigm and Faraday rotation …

Tunable US/DS WDM

λ_i^{DS}

RX_i^{DS}

λ_i^{US}

Reflective MZM

λ_i^{US}

λ_i^{US}

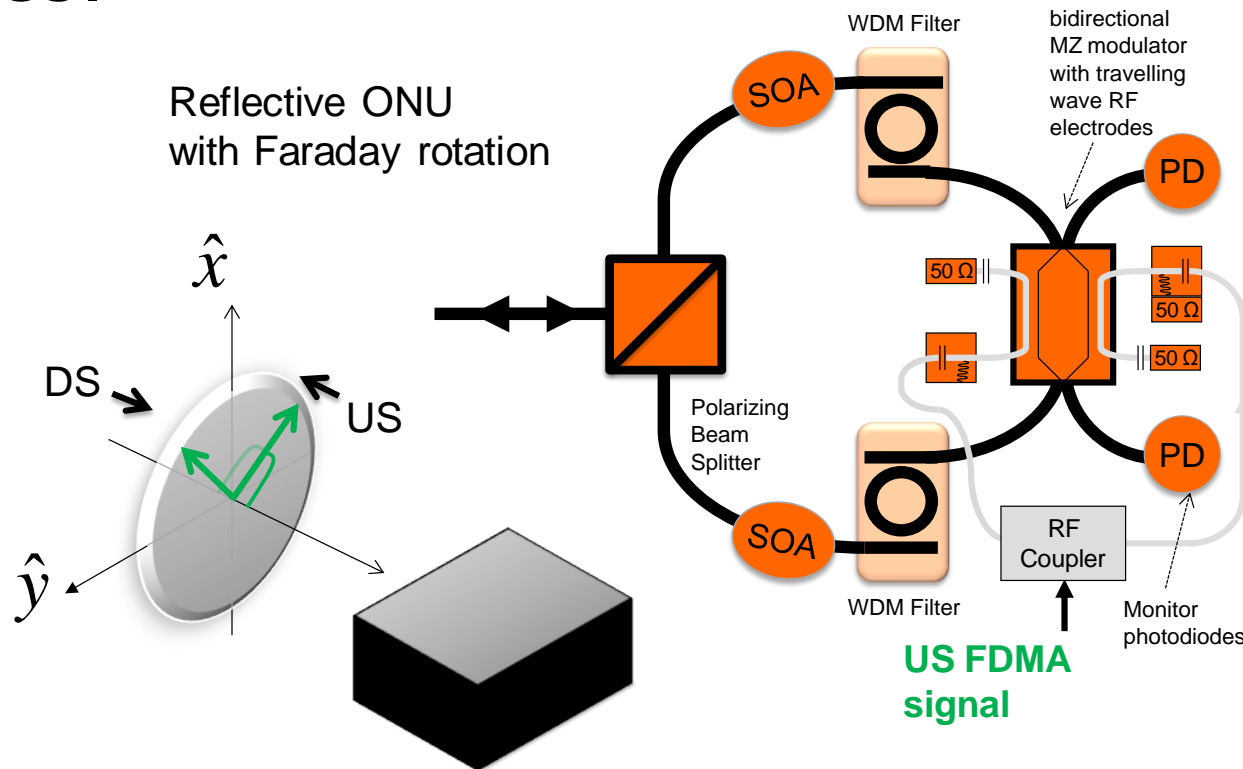Modulation and 90° polarization rotation

The OLT

… allowing for simplified coherent receivers at the OLT side…
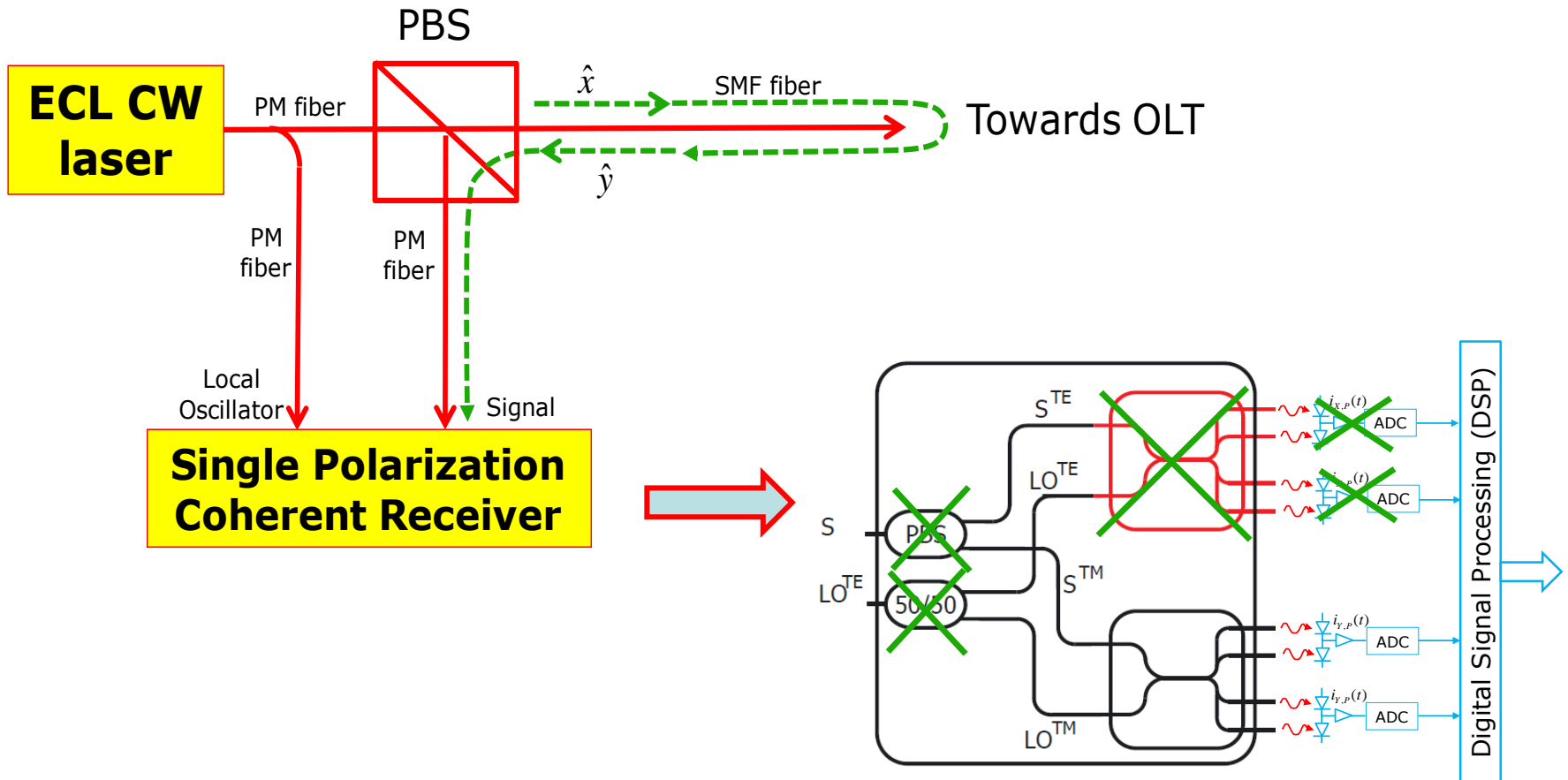
The silicon-photonics integrated ONU

… and producing an integrated revolutionary ONU based on silicon photonics, for low-cost devices.

Reflective ONU with Faraday rotation

WDM Filter

bidirectional MZ modulator with travelling wave RF electrodes

SOA

PD

$\hat{x}$

DS

US

$\hat{y}$

50 Ω
50 Ω
50 Ω

Polarizing Beam Splitter

SOA

WDM Filter

PD

RF Coupler

US FDMA signal

Monitor photodiodes

FP7-ICT-2011-8 Challenge 3.5 – STREP project n. 318704 – FABULOUS
FDMA Access By Using Low-cost Optical Network Units in Silicon photonics

11

Exploitation potential

- Low-cost access devices are important for PON deployment: silicon photonics can be a breakthrough towards low-cost!

- The proposed architecture is flexible and scalable, for OPEX reduction. It is also compatible with current infrastructures.

- Large industries and telecom operators are part of the FABULOUS consortium.

The project organization

The project work-packages

WP-SYST
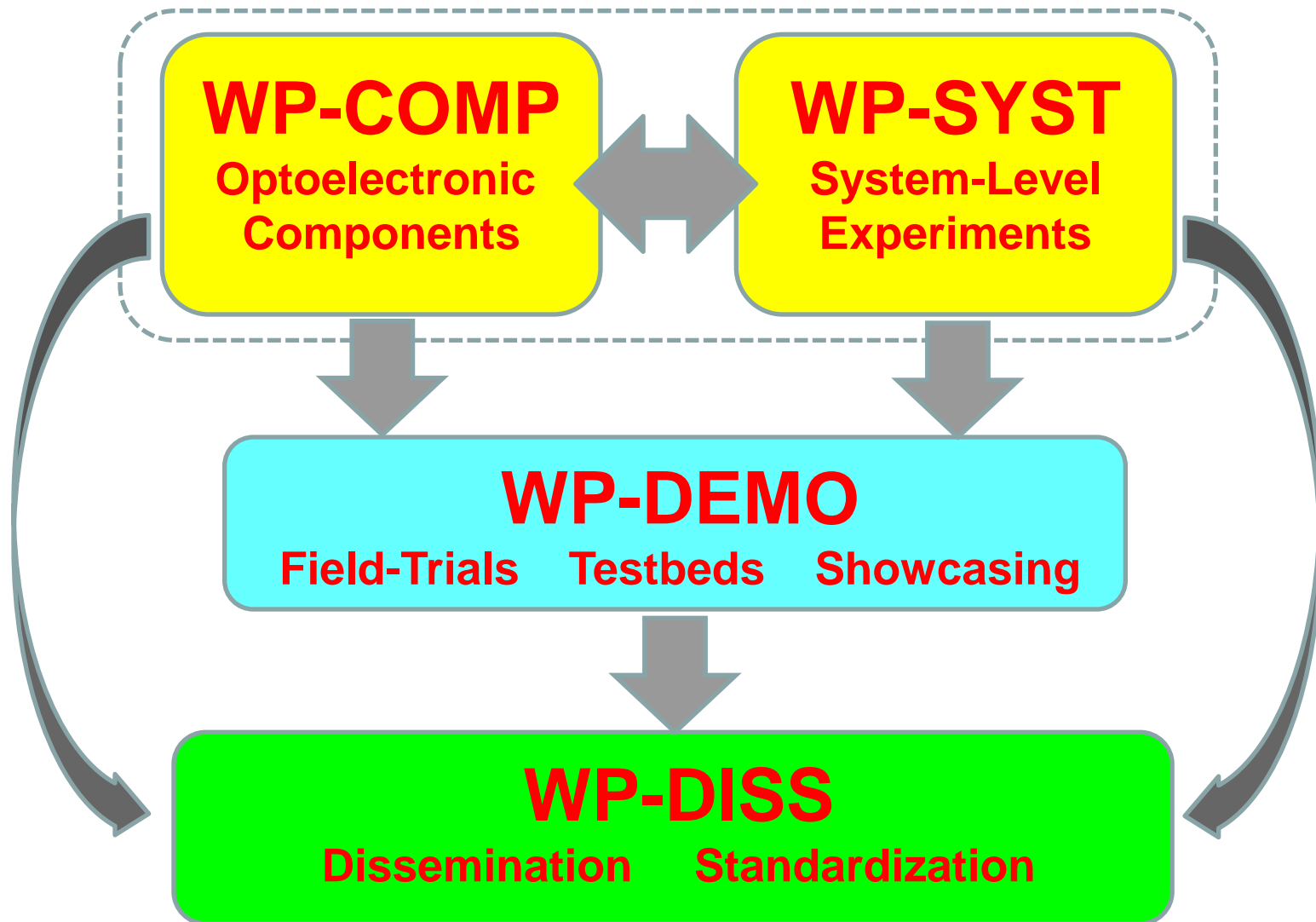
- Definition of the detailed specifications for the components to be developed in WP-COMP

- Comparison of the FABULOUS architecture with other PON architectures in term of performances and cost

- FDMA-PON architecture demonstratio
  - Firstly using discrete optoelectronic components
  - Then inserting the integrated components coming from WP-COMP in the architecture

- Proof of the full architecture in relevant environment (dark-fiber test-beds)

WP-COMP

- Development of standalone opto-electronic components to be used at the ONU side of NG-PON

- Development of custom integrated ONU for the FDMA-PON architecture proposed by the project

WP-DEMO

- Sub-system demonstration: demonstration of the standalone components

- System demonstration: demonstration of the full architecture with the integrated ONU and real-time traffic

WP-DISS

- General dissemination: papers, website, newsletter

- Actions toward standardization, thanks to the partners in the FSAN organization

Acknowledgments

- WEB site:

www.fabulous-project.eu

- To contact the coordinator:

info@fabulous-project.eu

- To contact the author:

Silvio Abrate

E-mail: abrate@ismb.it