

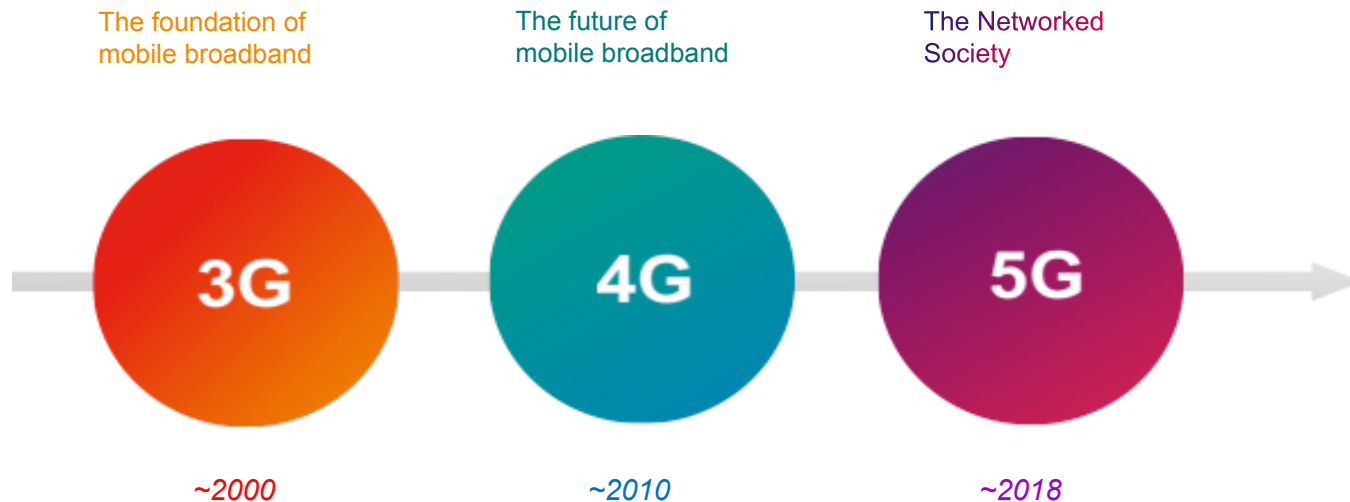


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OPTICAL TECHNOLOGIES FOR 5G

Dr. Gemma Vall-Ilosera
Ericsson Research

- The network transforms from a single service, telephony/MBB, network into a multipurpose, distributed platform
- In 5G everything moves in to the Cloud



New Behaviors





Data rates



Latency



Traffic Volume Density



Energy Efficiency



Reliability



Device Density



One Network –
Multiple Industries

Platform for 50 Billion
Open Innovation



Industry Journey

Global developments
Global standard



Technology Evolution

Milestones every year
Research & Development
5G System View

- 5G will encompass changes in the:
 - Transport network
 - Radio network
 - Data center network

- ... and for that we need an optical toolbox!

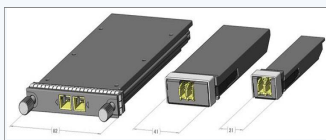
› Transponder modules

- 300-PIN, 168-PIN



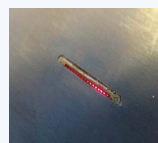
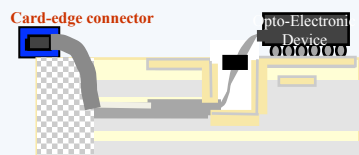
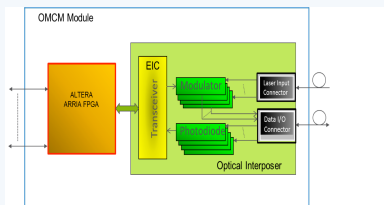
› Optical modules

- DWDM, C-band tuneable
- CFP, CFP2, CXP, QSFP+, CFP4/QSFP25
- Other optical engines



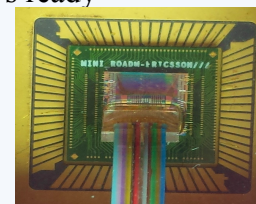
› Optical chip to chip interconnects

- Organic interposer
- Photonics enabled Si interposer



› All-optical switch

- Silicon photonics Reconfigurable optical add-drop multiplexer (ROADM): switches traffic at a wavelength level
- 100Gbit/s ready

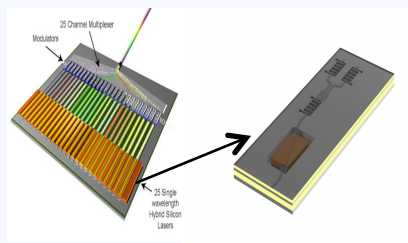


› Microstructural dispersion compensating fibres



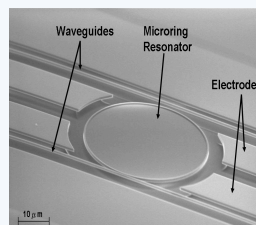
Transceivers

- Multi-channel WDM transceiver based on silicon hybrid lasers

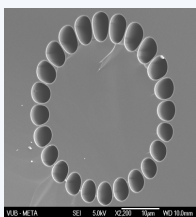


Silicon photonics

- Micro ring resonator
- modulators

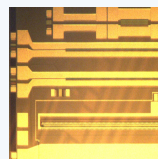


Microstructural dispersion compensating fibres

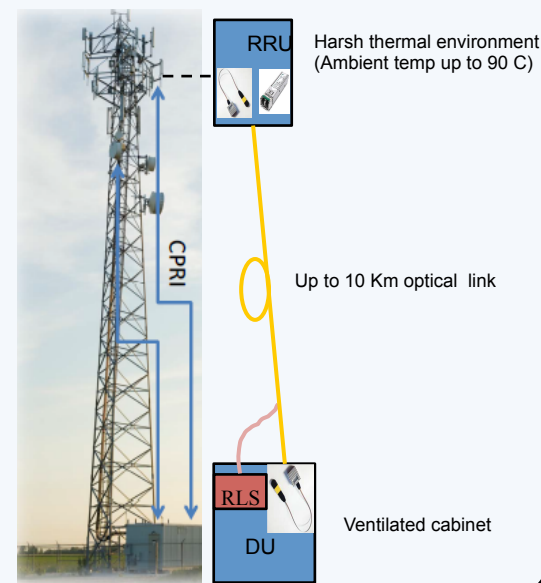


Backplane 200G

- Multiplexed PAM-4 Signals Using 1310nm SiPh Intensity Modulator and a Direct-Detection MIMO-based Receiver
- Tx and Rx fully integrated in SiPh



Remote radio unit interconnect



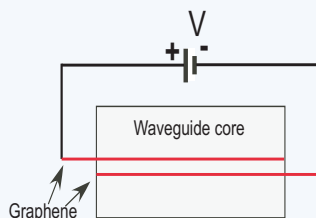
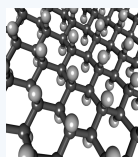
› Transceivers

- Board mounted
- pluggables



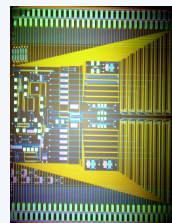
› Carbon family

- Graphene embedded in SiPh



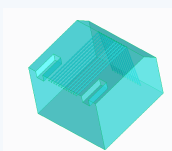
› All-optical switch

- Silicon photonics Reconfigurable optical add-drop multiplexer (ROADM): switches traffic at a wavelength level



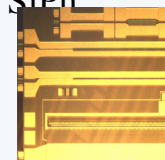
› Bits and pieces

- Silica coupler for optical connectors
- Optical shuffles



› 200G SiPh die

- Multiplexed PAM-4 Signals Using 1310nm SiPh Intensity Modulator and a Direct-Detection MIMO-based Receiver
- Tx and Rx fully integrated in SiPh



1. Photonics is an enabler of transport solutions in new network segments

- Fronthaul: high-capacity interconnects are needed
- Fronthaul networks (e.g. C-RAN): low-latency and high flexible network solutions
- Xhaul networks: to simultaneously support fronthaul and backhaul in the last 10-20 Km segment
- Small cells transport: optical DAS, radio DOT systems
- Optical offload in aggregation (backhaul) networks characterized by high capacity and low-costs

2. Optical enablers for 5G radio

- Realise key subsystems leveraging on optical properties. Example of this are the optical blocks for the beamforming antennas

3. Solutions for data centers

- Use of optical transmission and switching to boost performance of packet-based modules, simplify the architecture, and lower costs and power consumption



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