OCTAPUS

Building the Next Generation Central Office for the 5G and beyond era

Infocom World 2022 – 29 November 2022

Optical circuit switched time sensitive network architecture for high-speed passive optical networks and next generation ultra-dynamic and reconfigurable central office environments

HORIZON-CL4-2021-DIGITAL-EMERGING-01-06 Advanced Optical Components

Presentation outline

- General Information
- Project consortium
- Overall goals of the project
- Technology enablers
- OCTAPUS Architecture
- OCTAPUS demonstrators
- Contact us

General Information

- **Grant Agreement:** 101070009 (HORIZON-CL4-2021-DIGITAL-EMERGING-01)
- **Duration:** 42 months
- **Starting date:** 01/09/2022
- **Total budget:** 5,883,941.25 Euros
- **EC funding:** 4,789,661.00 Euros
- **Total PMs:** 508.6
- **Contact persons:**
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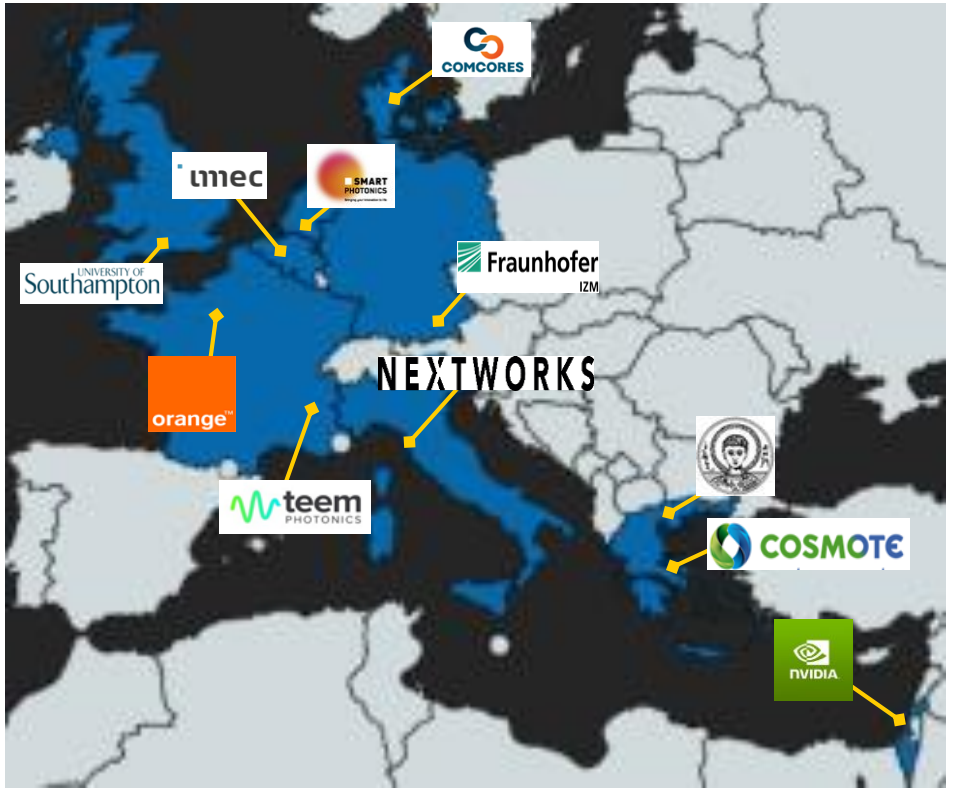
- **URL:** www.octapus-ict.eu

OCTAPUS Consortium

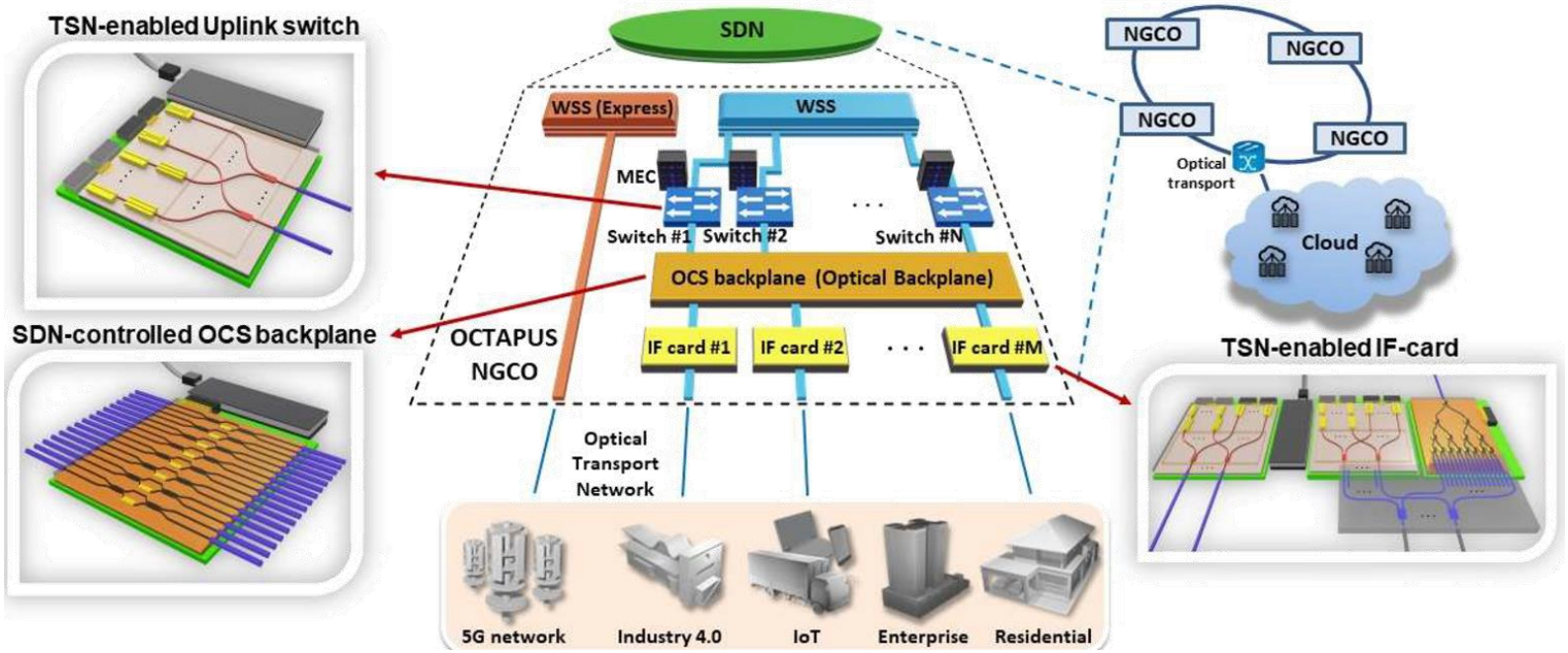


- 11 partners
- 7 companies
- 2 research inst.
- 9 countries
- 2 MNOs
- 2 universities

Project Goals

- Increase capacity at the Next Gen Central Office (NGCO)
- Efficiently support Disaggregated RAN (emph. Fronthaul and TSN) and URLLC services.
- Consolidation of SDN with NGCO PHY layer
- Increase energy efficiency

"OCTAPUS aims to deliver an agile, low-cost and energy efficient PIC technology framework that will re-architect the Next Generation CO ecosystem, transparently upgrading its capacity to 51.2Tb/s and beyond, through an innovative optically-switched backplane and transceiver toolkit".

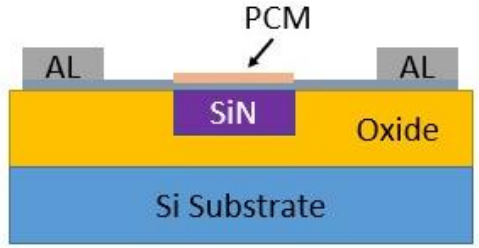


OCTAPUS concept and vision

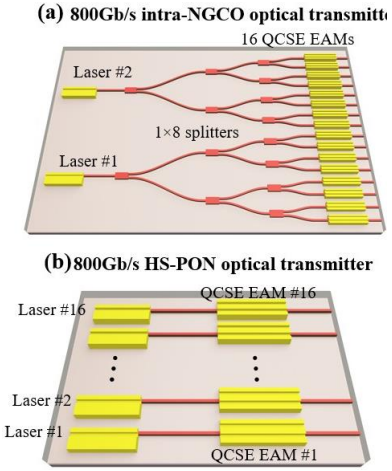
Technology enablers

- To achieve its ambitious goals OCTAPUS combines the following novel concepts/technologies:

OCTAPUS will deploy novel phase change materials (PCMs) to develop a range of zero-power and ultra-low loss switches, featuring ns-scale reconfigurability



OCTAPUS will develop O-band 50GHz I/O portfolio and demonstrate up-to 800G optical transceivers for board-to-board and long-reach PON communication with an impressive 8× energy consumption improvement



O-band DBR lasers

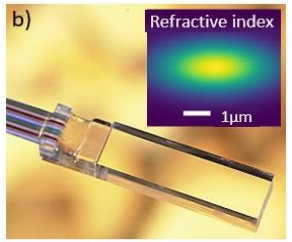
- >15dBm, semi-cooled 45ºC

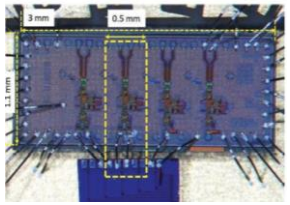
O-band InP EAMs

- 50GHz @ <2V & <2dB losses

O-band high-speed p-i-n PDs

- >50GHz BW @ >0.76A/W





Glass WAFT interposers

- <2dB losses & O-/C-band Diplexer

50G Electronic ICs

- Low-power Driver/TIA
- MHz-scale IC for switch

Technology enablers

Deploy a pool of advanced optical components to demonstrate a low-power and ultra-fast reconfigurable optically-enabled backplane technology for next generation Central Offices (NGCO).

OCS backplane array of 2x2

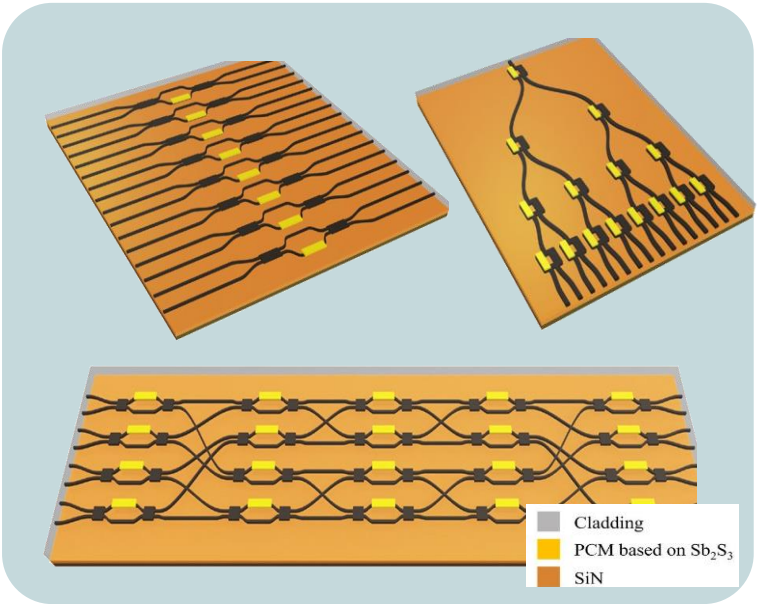
- Optical Circuit Switch for 50Tb/s switching
- 16x parallel O-band 2×2 PCM switches

8x8 Benes Layout

- Capacity scaling to 200Tb/s switching
- Can connect multiple Uplink Switches

1x16 Tree-switch layout

- Establish all-optical alternative express paths



OCTAPUS architecture

Connection to Metro Network

- Up to 8 Uplink switches @25.6Tbps each connect to MNO metro/backhaul

Connection to Transport Network

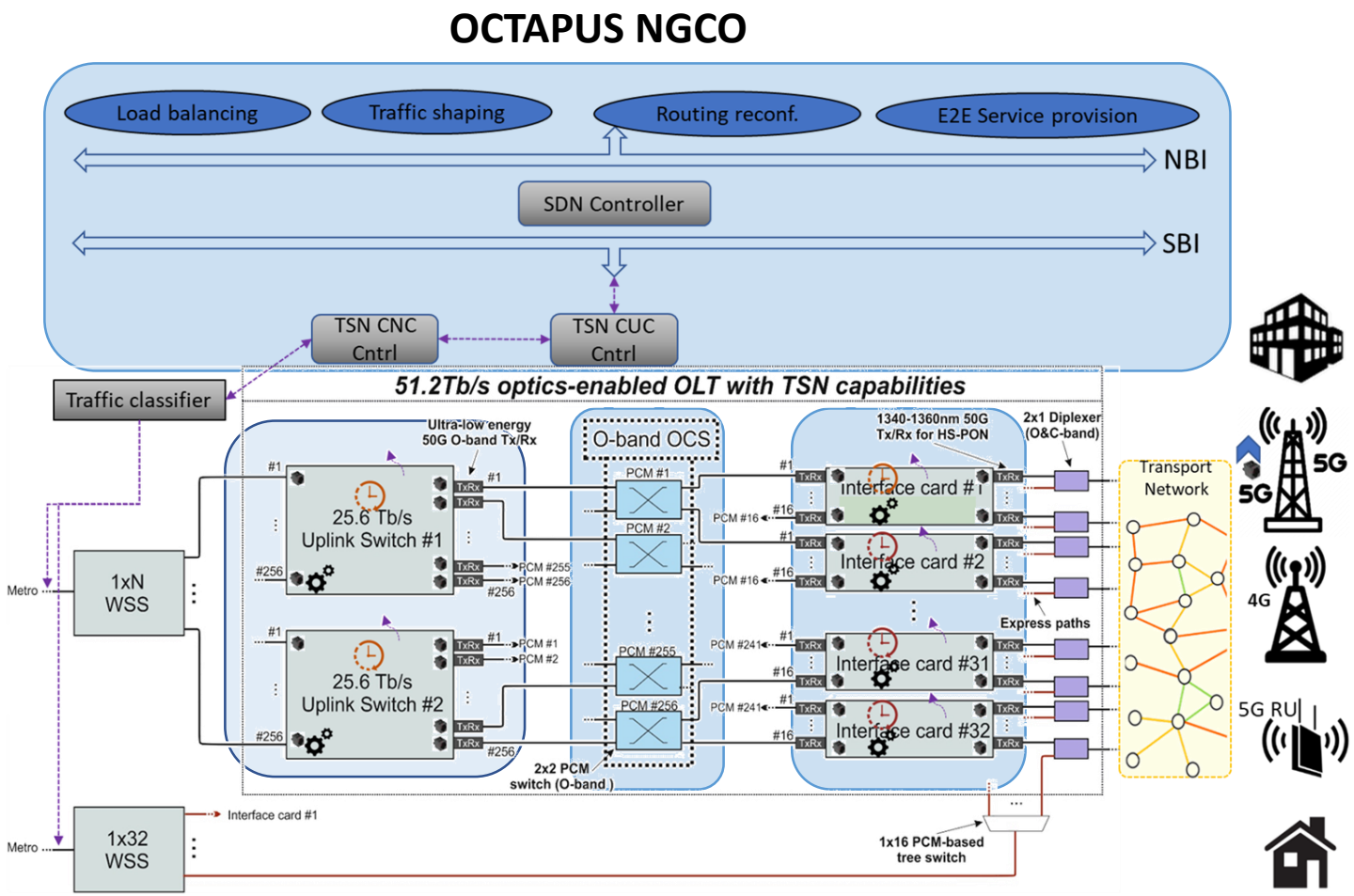
- Up to 16 Interface cards per Uplink Switch connect to the transport network

OCTAPUS Switching Fabric

- Ultra-fast, ns-scale reconfigurable, low-loss, transparently scalable, low power all-optical switching

OCTAPUS Control Plane

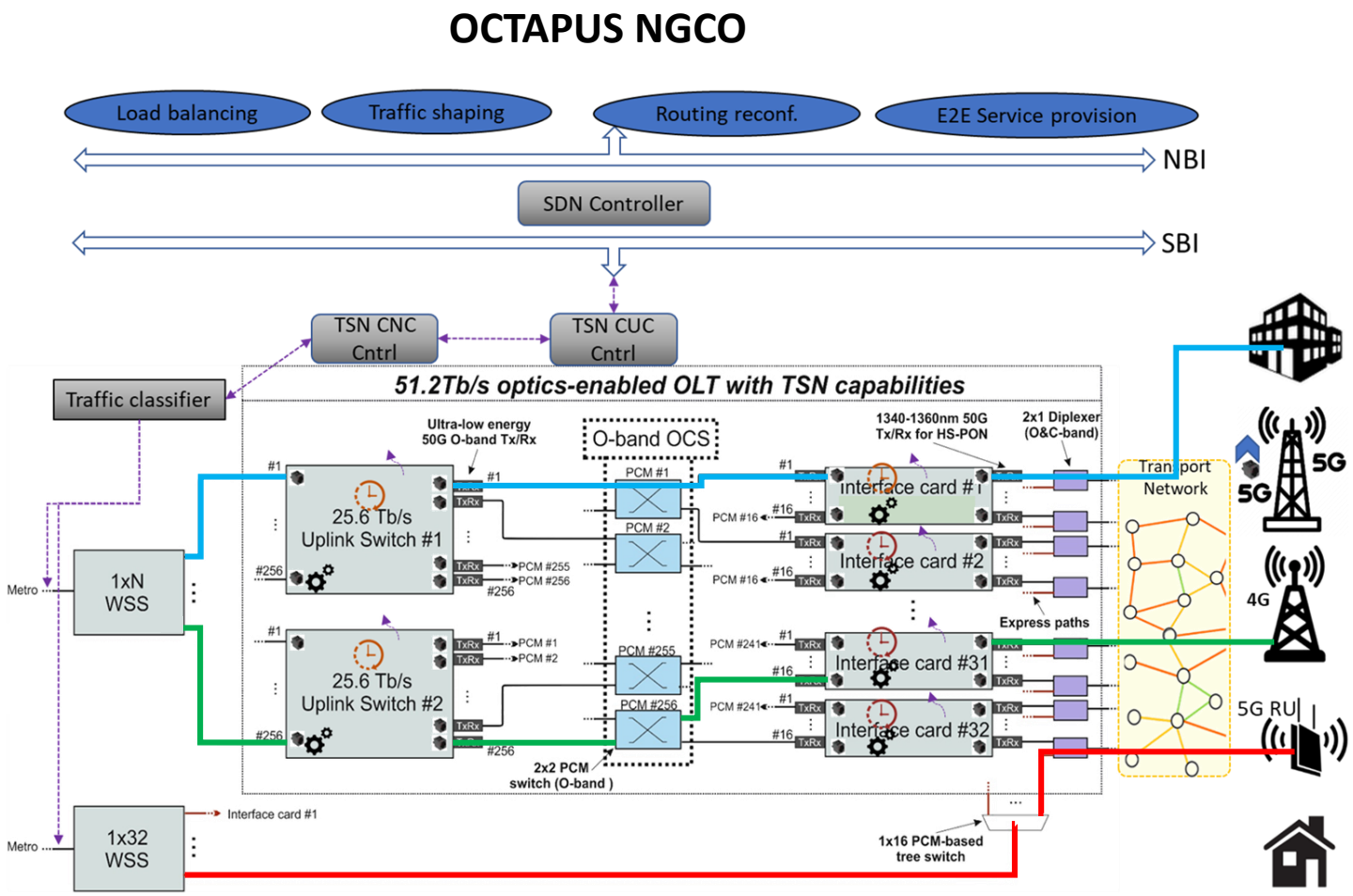
- Unified NGCO control plane with strongly coupled TSN and SDN controllers



OCTAPUS architecture

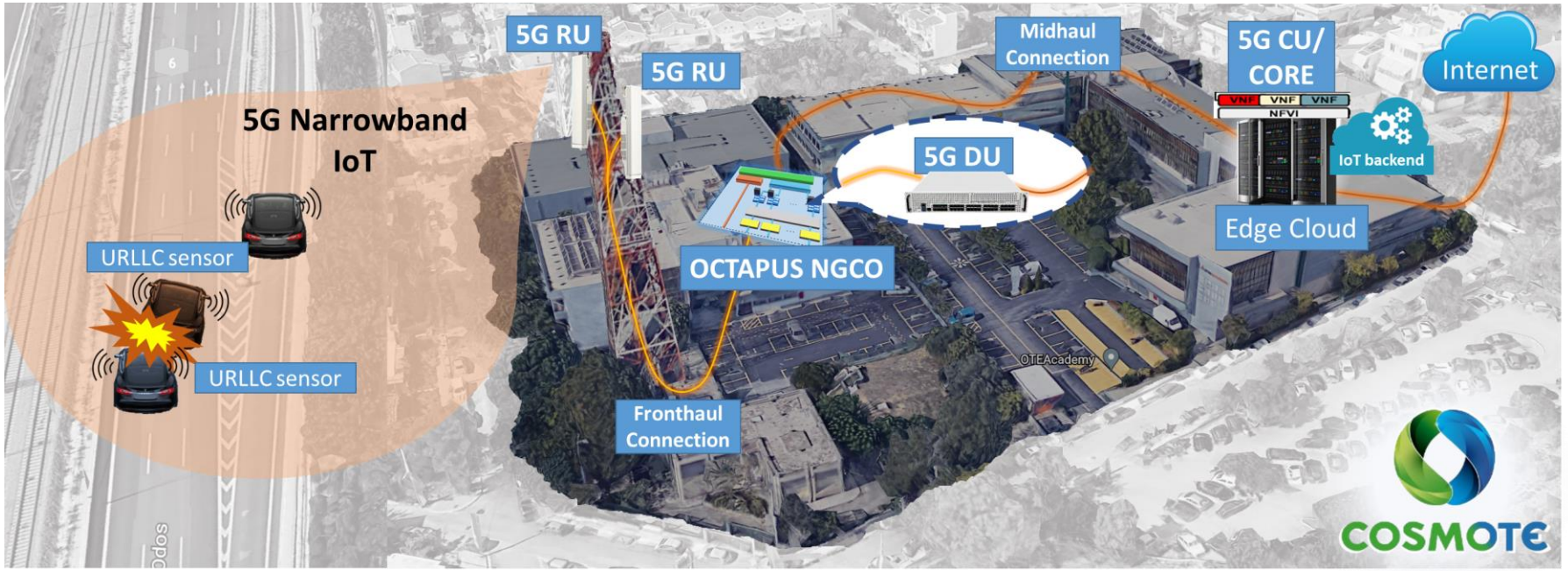
Three layers of service provisioning

- OCTAPUS defines three levels of paths for the various NGCO services
  - Best effort paths for services with relaxed constraints that can tolerate delays.
  - TSN-enabled paths for services that require deterministic guarantees to operate.
  - Express paths that bypass all intermediate NGCO components for services with extreme delay requirements and/or traffic-congestion mitigation.
- The SDN controller monitors the network, registers incoming requests and chooses the correct path for each service
  - SDN Controller interacts closely with TSN CNC/CUC to deploy TSN-enabled flows.
  - Automatic flow re-route in case of congestion or load increase.
  - Prediction schemes are envisioned for quick responsiveness.



OCTAPUS Demonstrator

- OCTAPUS will demonstrate a scalable NGCO architecture with up-to 200Tb/s capacity and validate its advanced optical component technologies through a series of lab and field trials in time-sensitive applications scenarios.
- The final project demonstrator will take place at COSMOTE premises in Athens and will focus on showcasing the full OCTAPUS functionality with emphasis on delivering real Fronthaul and URLLC services.



OCTAPUS final demonstrator vision @ COSMOTE, Athens

Thank you!

You can find more information at our website octapus-ict.eu and at our social media:

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https://twitter.com/octapus_ict

https://www.linkedin.com/groups/9249210/