



14:00-16:30 Sunday, 1 October, 2023, M2-M4 - First Floor
ECOC 2023 Workshop Su.B.7:

F5G Optical Network Technologies towards 2025 and 2030 - What, Why and How?

Co-organisers: Xiang Liu, Huawei Hong Kong Research Center, China
Philippe Chanclou, Orange, France

Invited Speakers:

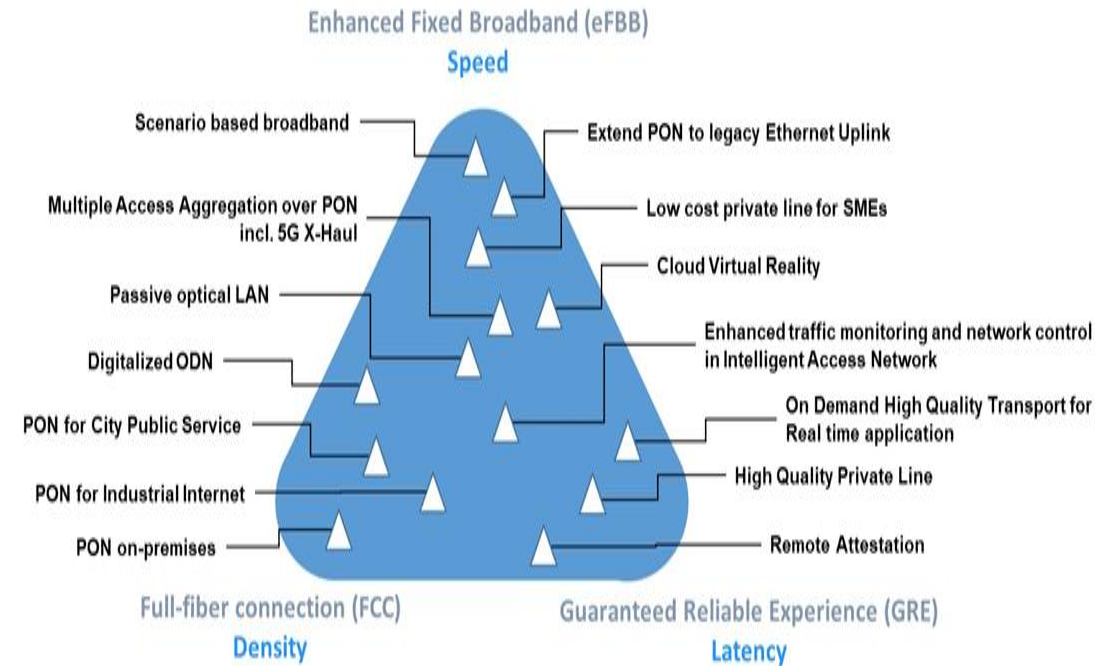
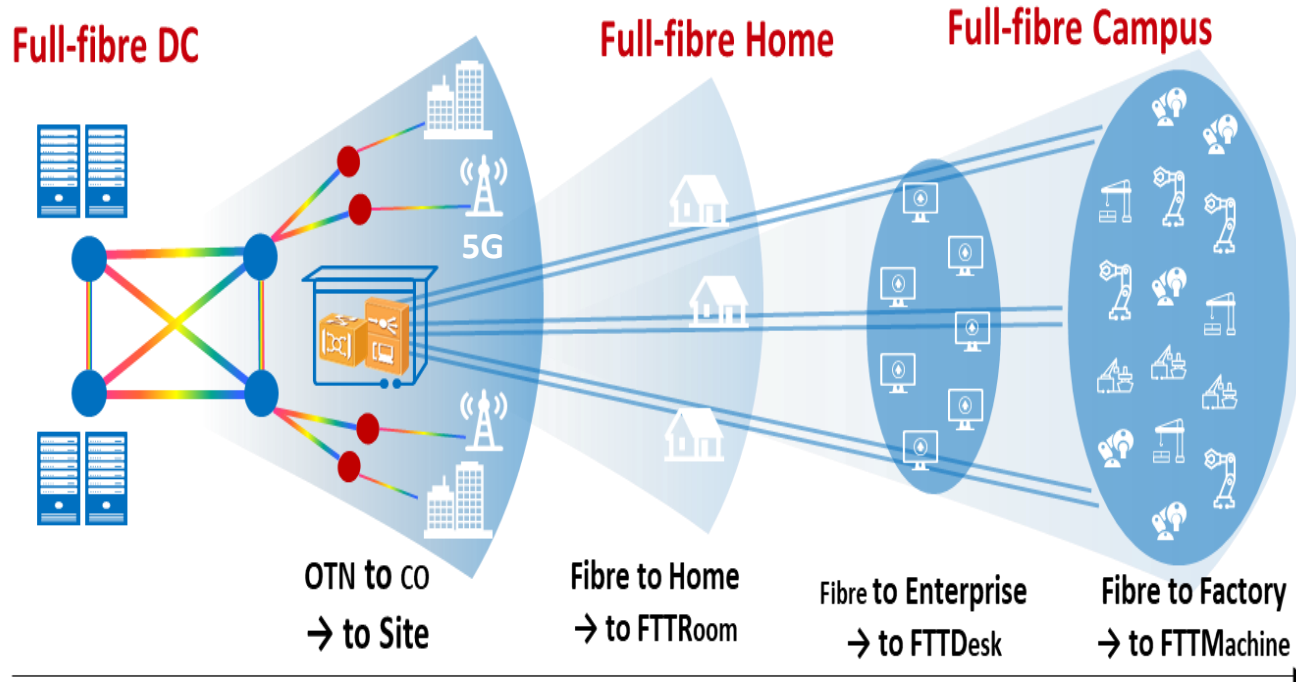
- **Green and Digital Transformation Enabled by F5G**, Luca Pesando, ETSI ISG-F5G
- **F5G PoC Demonstrations on Low-Latency Industrial Applications**, Behnam Shariati, HHI, Germany
- **Fiber-to-the-Room (FTTR) Advances**, Frank Effenberger, Futurewei, USA
- **Fixed-Mobile Convergence in F5G-Advanced**, Gaël Simon, Orange, France
- **Opportunities and Challenges for Optical Sensing in F5G**, Neil Parkin, British Telecom, UK
- **Advances in B400G Optical Transport Network Technologies and Standards**, Tom Huber, Nokia, USA
- **Optimal Support of IP, Optical, and Computing Functionalities**, Loudon Blair, Ciena, UK
- **Autonomous E2E-Optimized Network Management Technologies**, Johan Baeck, Infinera, USA

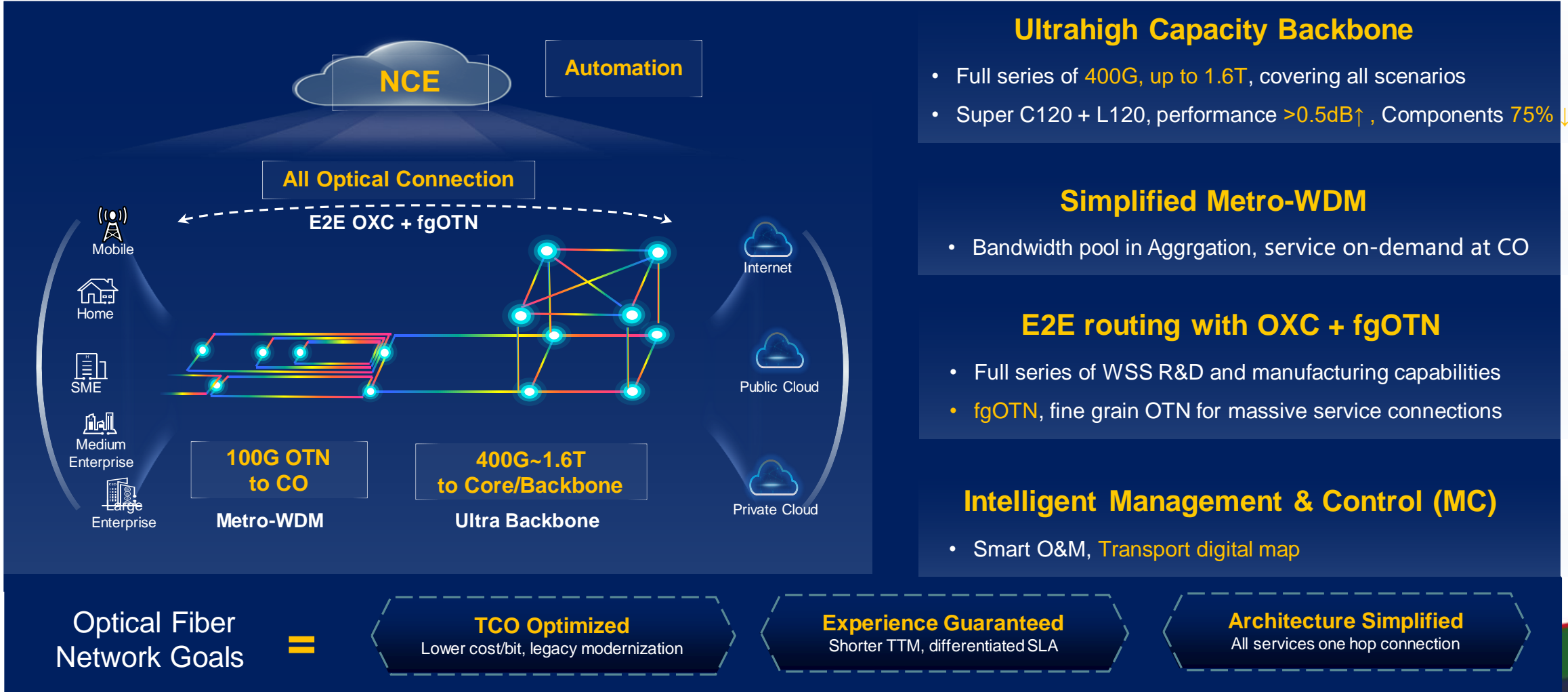
Panel Discussion (16:10~16:30)

F5G Vision: Fiber to Everywhere & Everything

Fiber connectivity is becoming ubiquitous, extending from last “mile” to last “meter”

F5G enables many new use cases, expanding the application space of 5G





Ultrahigh Capacity Backbone

- Full series of 400G, up to 1.6T, covering all scenarios
- Super C120 + L120, performance $>0.5\text{dB}\uparrow$, Components 75% \downarrow

Simplified Metro-WDM

- Bandwidth pool in Aggrgation, service on-demand at CO

E2E routing with OXC + fgOTN

- Full series of WSS R&D and manufacturing capabilities
- fgOTN, fine grain OTN for massive service connections

Intelligent Management & Control (MC)

- Smart O&M, Transport digital map

E2E Network Slicing in F5G-Advanced

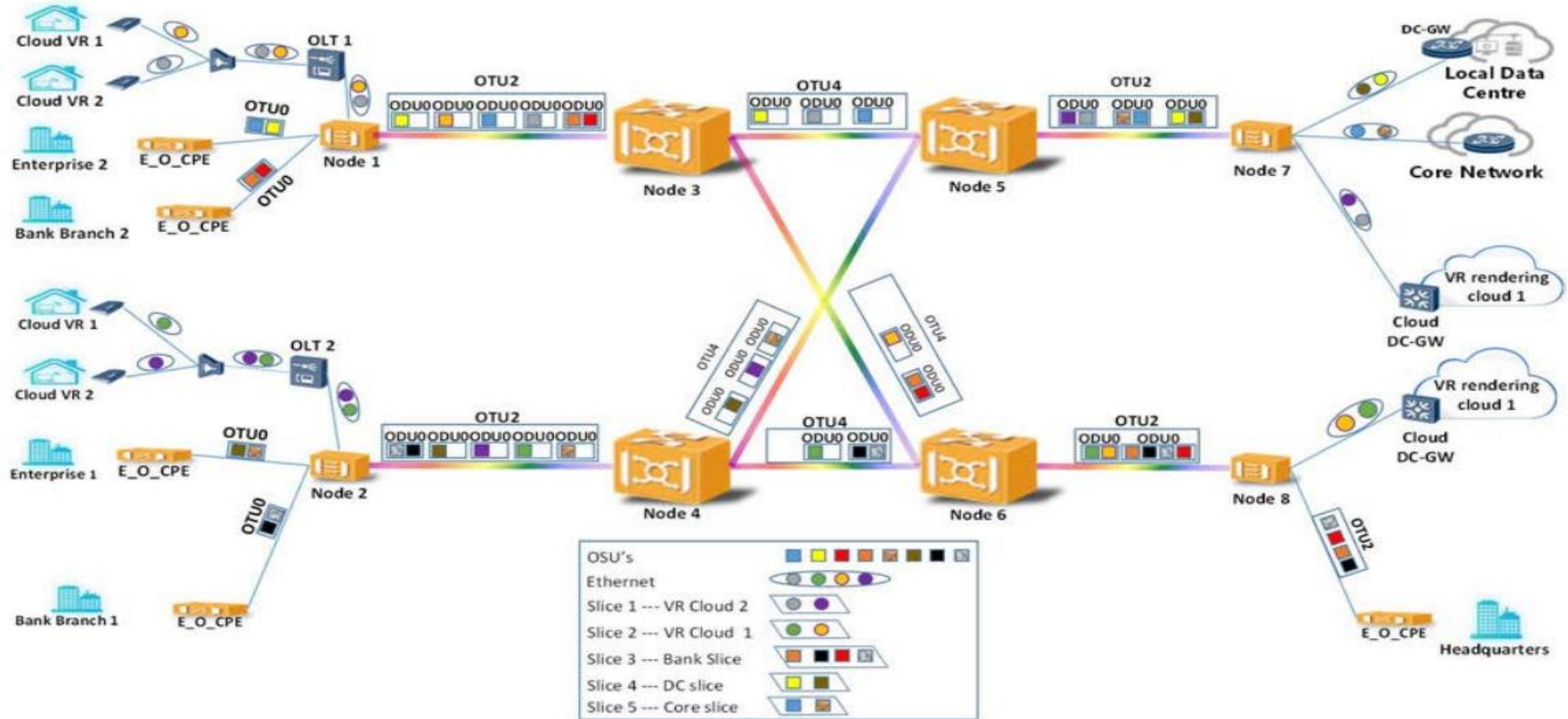
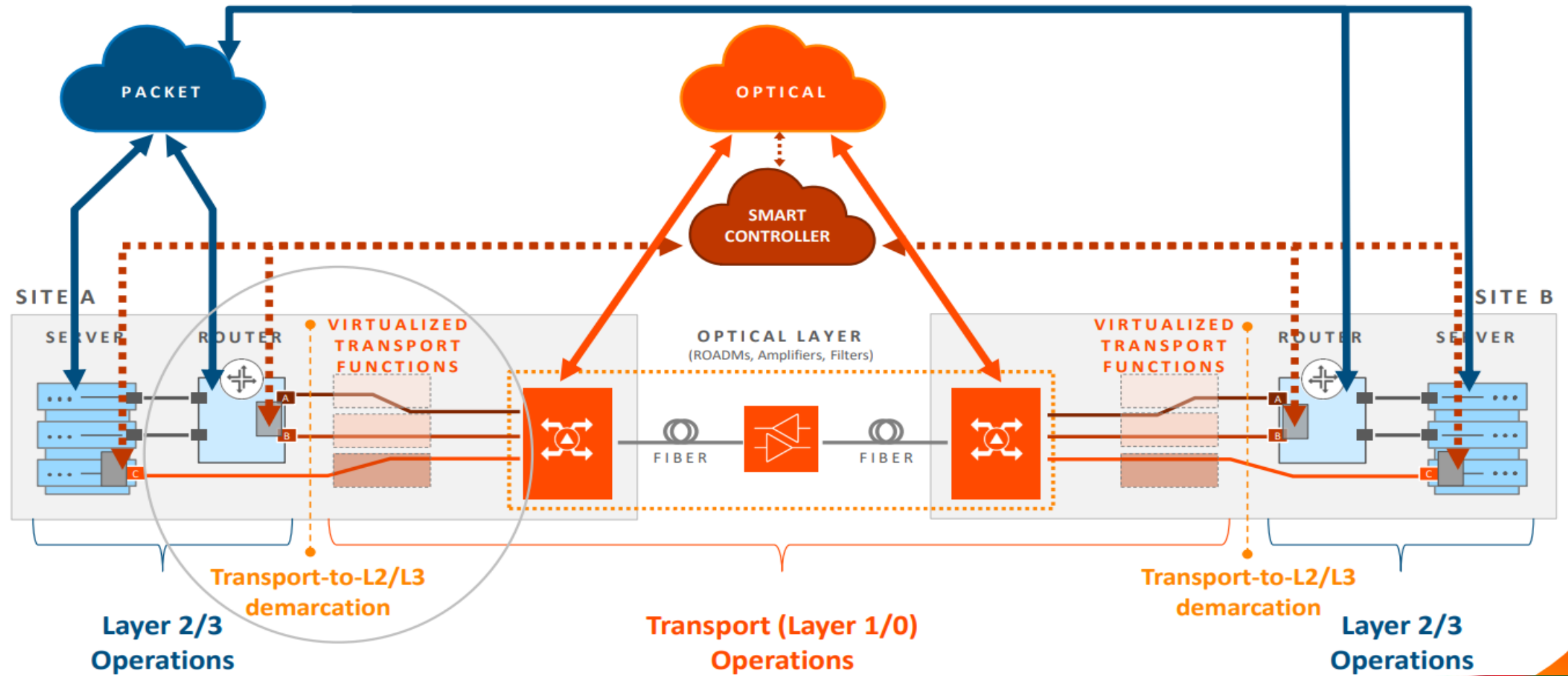


Figure 18: An example illustrating different OTN slices

Reference: F5G Network Architecture Release 2 (May 2023),

https://www.etsi.org/deliver/etsi_gs/F5G/001_099/014/01.01.01_60/gs_F5G014v010101p.pdf

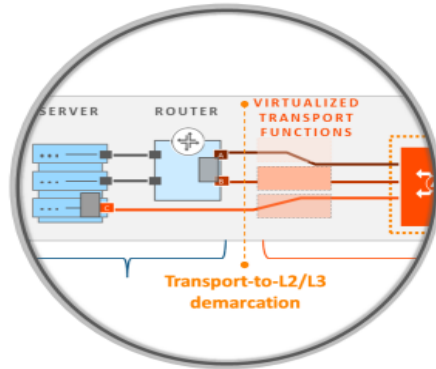
Trend of “Intelligent Optical Networking”



Reference: David Welch's presentation at the OFC 2023 workshop on F5G Update.

Intelligent Optical Networking

A Host Independent Architecture for IPoDWDM Management



VIRTUALIZED TRANSPORT DEMARCATION ENABLED BY SMART CONTROLLER INTERFACING TO SMART PLUGGABLES

VIRTUALIZED TRANSPORT FUNCTIONS



DIFFERENT MANAGEMENT PATHS FOR DIFFERENT USE-CASES:
ALIGNS RESPONSIBILITIES WITH ORGANIZATIONAL EXPERTISE AND TOOLS



ALIGN IP AND OPTICAL OPERATIONS WITH ORGANIZATIONAL STRUCTURE:
A CHOICE TO MERGE OR KEEP DOMAINS SEPARATE

HOST INDEPENDENT MANAGEMENT



DEPLOY AND BENEFIT FROM NEW SMART COHERENT OPTICS AND APPLICATIONS WITHOUT WAITING FOR INTERFACE STANDARDIZATION



DECOUPLE DEVELOPMENT TIMELINES FOR PLUGGABLES AND HOSTS:
ACCELERATE TIMELINES IN A DIVERSE HOST TYPE REALITY



ENSURE OPERATIONAL AND MANAGEMENT CONSISTENCY
ACROSS ALL HOST PLATFORMS

- **ETSI ISG F5G**

- Contributions referencing Open XR in use cases and technology landscape documents

- **CableLabs – 100G CPON – Coherent PON project**

- 100 Gbit/s coherent PON
- Ongoing project

- **IOWN**

- Discussion on Next Generation Networks

- **ITU/FSAN/IEEE**

- Multiple Contributions to ITU-T in September 2022

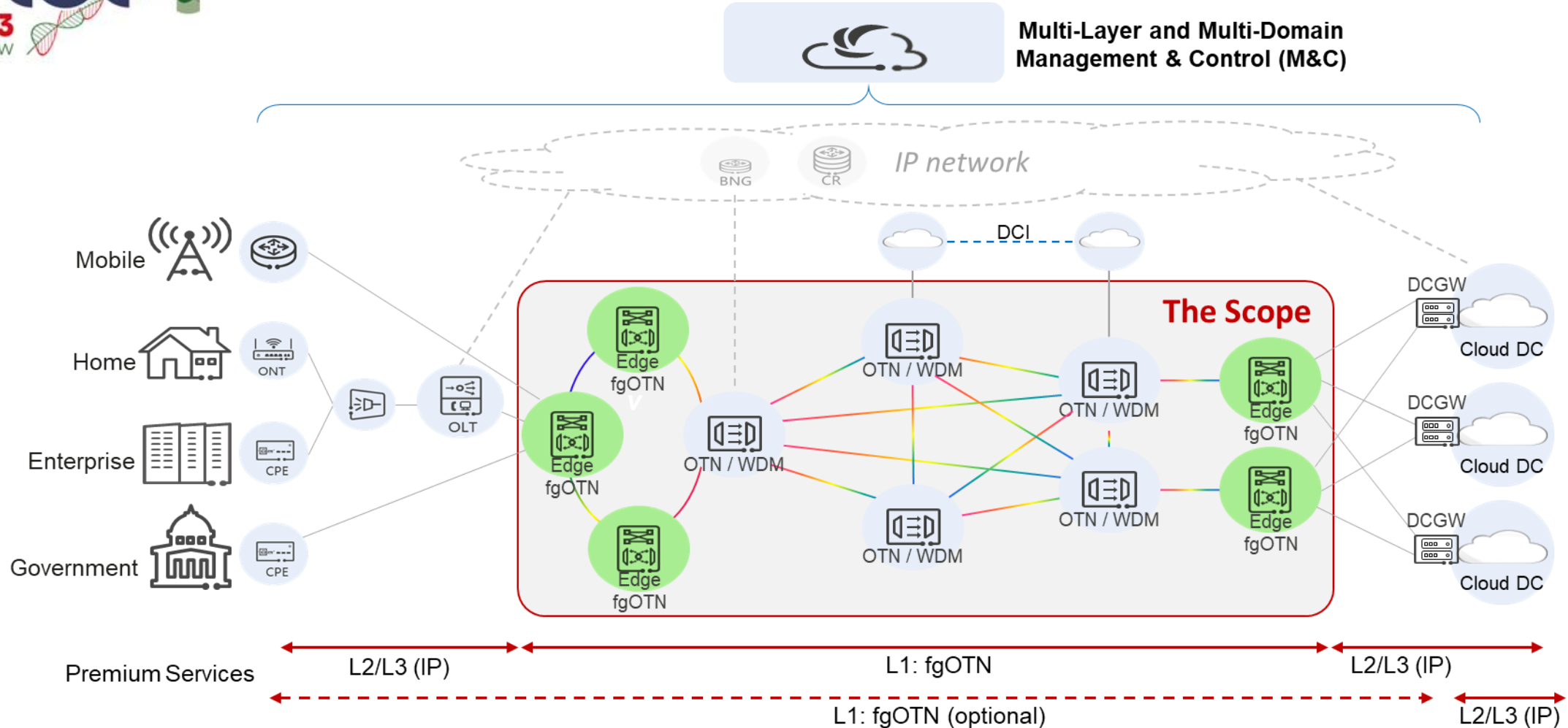
- **OIF**

- Contribution to add P2MP Cross-Connect Table for CMIS 5.3

Reference: [David Welch's presentation at the OFC 2023 workshop on F5G Update.](#)



Service-Oriented Optical Network (SOON) [1,2]



ITU-T layered network architecture has been well designed to be future-proof, which can readily support the M&C of SOON.

Advantages in Agility, Capacity, Coverage, Energy Efficiency, Flexibility, Latency, Reliability, Synchronization, and TCO.

[1]: The "SOON" concept was also discussed at the ITU-T Q11/15 Interim Meeting in Zurich, 29 June 2023.

[2]: wd1214-52, "Considerations on the management and control of cloud-service-oriented optical networks", ITU-T SG15 Q12&Q14, Hong Kong, 18-22 Sep., 2023



Panel Discussion and Q&A

Join at
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OPTICA Foundation Challenge Program:

“Use photonics. Find a solution. Change the world.”

Foundation
**20th Anniversary
Challenge**

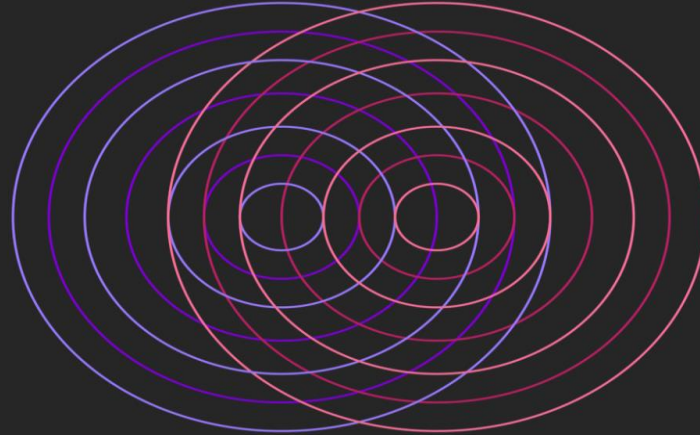
Use photonics. Find a solution. Change the world.

Application Dates

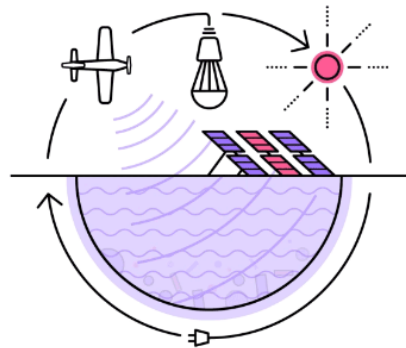
07 Jul 2022 - 15 Sep 2022

Program Prize

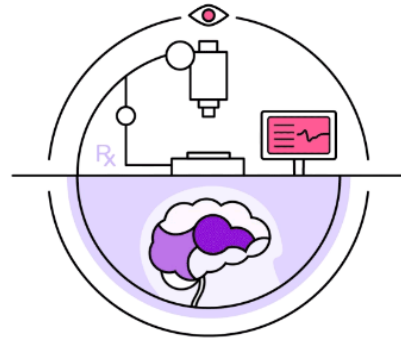
US\$100,000 x 10



Categories



ENVIRONMENT



HEALTH



INFORMATION

Information Category

Modern humanity and the global economy rely on optical infrastructures and technologies to drive our digital society. We will continue to see exponential data traffic. The cost of this growth in communications draws a significant fraction of the energy society uses. New, more energy-efficient approaches and technologies must be developed and adapted to permit continued information growth. **Our information and communications lifeline demand innovation and game-changing discoveries to keep up.**

Addressing Key F5G Challenges toward 2030

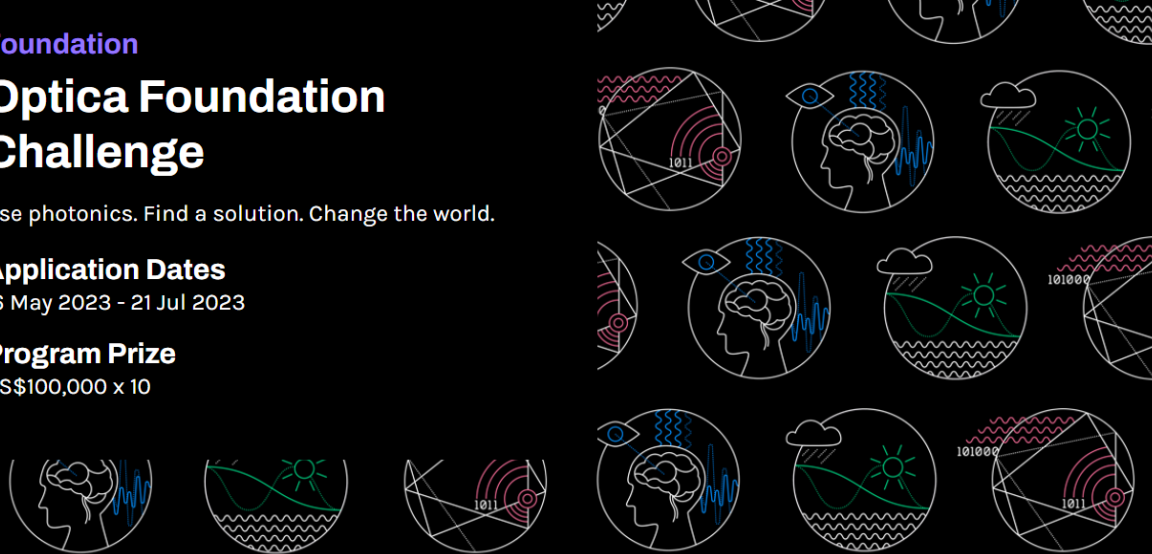
https://www.optica.org/foundation/opportunities/competitions_prizes/challenge/

Foundation
Optica Foundation Challenge

Use photonics. Find a solution. Change the world.

Application Dates
16 May 2023 - 21 Jul 2023

Program Prize
US\$100,000 x 10



INFORMATION



- Developing optical technologies and novel innovations that **improve communication bandwidth, integrity and access at scalable levels**.
- Enhancing connectivity by finding **more efficient, speedy and reliable connectivity between devices, communications infrastructure and the cloud**.
- Managing the data traffic and coordination required by **the smart cities of the future**.
- Balancing the need for resilience and performance with **cost and energy efficiency** in communication infrastructure.
- Exploring new **optical sensing technologies** to improve various parameter monitoring capabilities.
- Other proposals exploring innovative, groundbreaking research or technology developments are welcome and encouraged...

The global optical community is working together for modern humanity toward 2030 and beyond.

Concluding Remarks

- Facing the fundamental challenges imposed by **the Shannon Limit** and the slowing down of **the Moore's Law**, **optical & photonic innovations** are required.
- Continued **global collaboration in international standards & open research** will be essential to the realization of the full value of **F5G optical fiber networks towards 2030 and beyond**, for the common benefit of our global society.



Thank you all!



Panel Discussion and Q&A

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Poll #1 Result

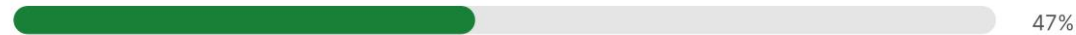
☰ Which of the following F5G-Advanced features are of interest to you? (You may choose all the ones you like)

Multiple Choice Poll 15 votes 15 participants

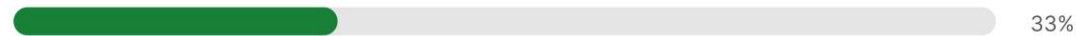
eFBB (enhanced Fixed BroadBand) - 4 votes



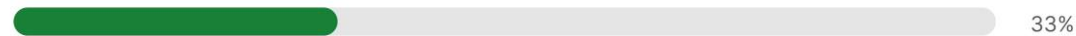
GRE (Guaranteed Reliable Experience) - 7 votes



FFC (Full-Fiber Connection) - 5 votes



GAO (Green Agile Optical network) - 5 votes



RRL (Realtime Resilient Link) - 3 votes



OSV (Optical Sensing & Visualization) - 9 votes

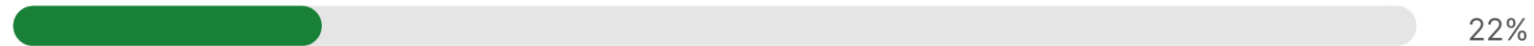


Poll #2 Result

 What is the next generation PON after 50G-PON?

Multiple Choice Poll  23 votes  23 participants

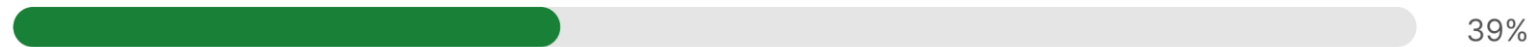
100G-PON - 5 votes



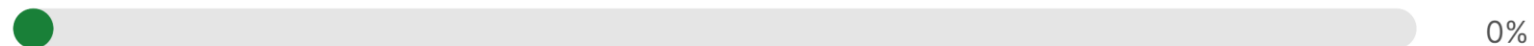
200G-PON - 9 votes



Flex-PON up to 200G - 9 votes



Others - 0 votes



Poll #3 Result

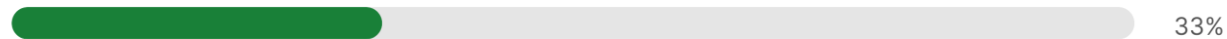
☰ Which of the following F5G technology directions would be of interest to you? (You may choose all the ones you like)

Multiple Choice Poll 24 votes 24 participants

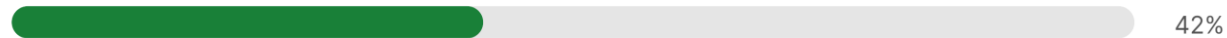
FTTR with WiFi coordination - 13 votes



Beyond 50G-PON with slicing capability - 8 votes



Flexible and resource-efficient metro network with ROADMs & OXCs - 10 votes



Service-oriented optical network (SOON) supporting a massive amount of services with guaranteed QoS - 5 votes



Intelligent cross-layer/domain network management & control with AI assistance - 8 votes

