Fibre In-premises Network in ITU-T SG15 Q3

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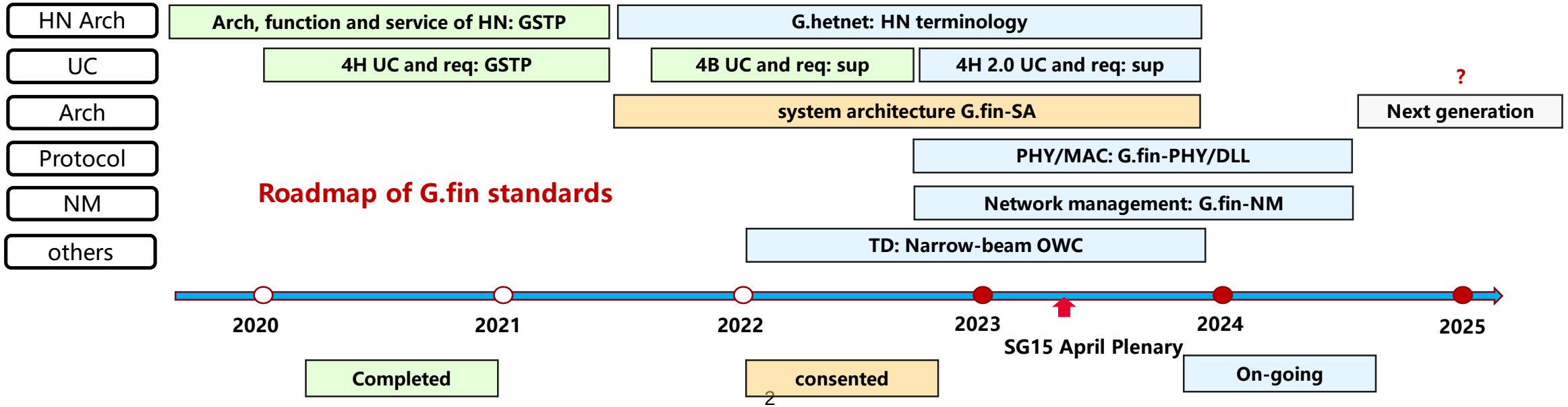
Fibre In-premises networking standards in ITU-T SG15 Q3

- The fibre in-premises network based on glass optical fibre begins from 2019
- 30+ participants in 2023 April plenary (>70% contributions are G.fin related)
- G.fin recommendations (High speed fibre-based in-premises transceivers)
  1. **Use case & requirement:** TP of 4H (published), supplement of 4B (published), supplement of 4H 2.0 (on-going)
  2. **System Architecture (G.fin-SA, G.9940 consented):** priority of P2MP, centralized fibre & wireless coordination
  3. **Physical layer (G.fin-PHY, G.9941) and data link layer (G.fin-DLL , G.9942):** common agreement in frame design
  4. **Network management (G.fin-NM , G.9943):** on-going
  5. **Extended application:** narrow-beam optical wireless communication (NB-OWC), fibre sensing (for further study)

- G.p2pf recommendation (Point to point fibre based on optical Ethernet), begins from April 2023



G.fin application in SME

① Live applications

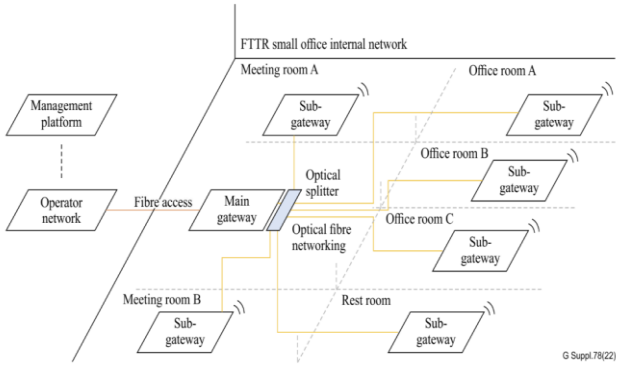
Live selling **Live broadcasting**

Game studio

Service:
- 4K/8K video stream for UL/DL
- Real-time control message

Requirement:
- Guaranteed UL throughput
- E2E Low latency
- Stable connection

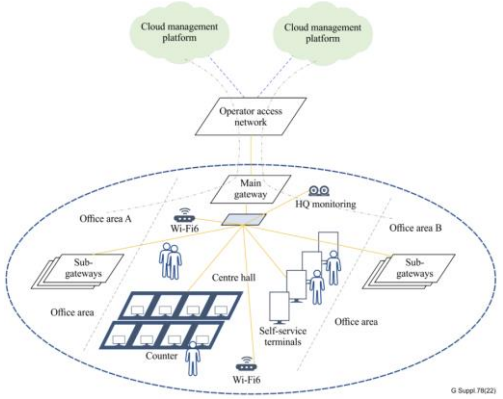
② Smart office



Service:
- Combination of network service
- Diversified connection

Requirement:
- 32-128 links @1km
- O/E cable, East to west, O&M
- Controllable network jitter

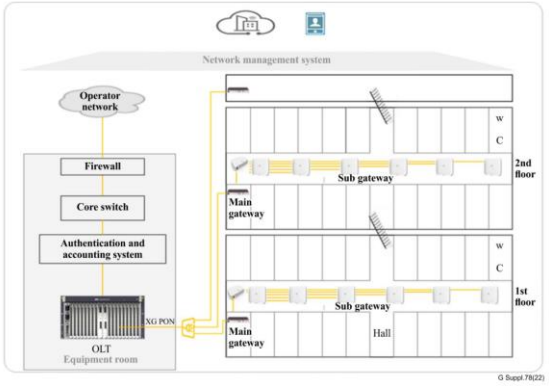
③ Smart service hall



Service:
- Customer designed service flow
- Combination of network service

Requirement:
- Isolated network
- O/E cable, East to west, O&M
- Guaranteed QoS

④ School



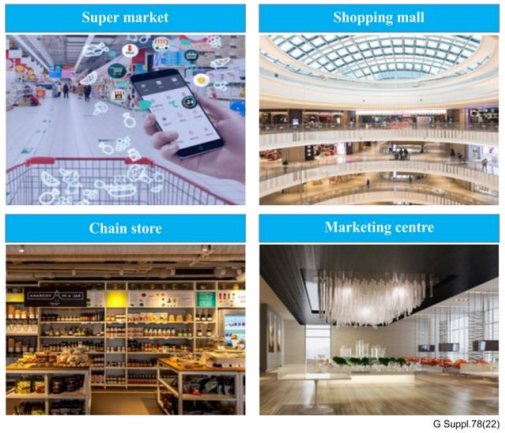
Service:
- Wi-Fi full coverage
- Dense connection

Requirement:
- Different modes of authentication
- Multicast, isolated network,
- O&M, network control

Source: ITU-T SG15 Q3, G.suppl.78, Use case and requirements of fibre-to-the-room for small business applications, published in 2022

G.fin application in SME

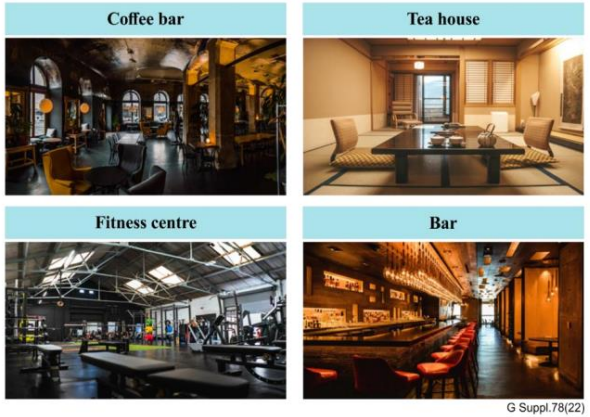
⑤ Business Building



Service:
- QoE for consumer
- Dense connection

Requirement:
- Guaranteed QoS, isolated network
- Automatic coordination
- Seamless roaming

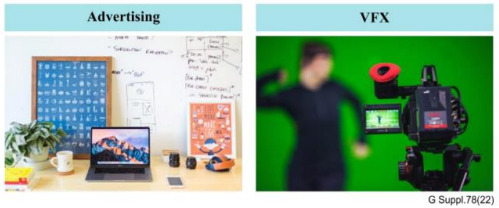
⑥ Indoor leisure & entertainment

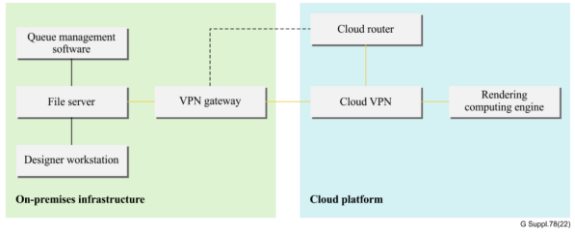


Service:
- QoE for consumer
- Dense connection

Requirement:
- Full Wi-Fi coverage
- Service QoS

⑦ Advertising design and virtual effect processing

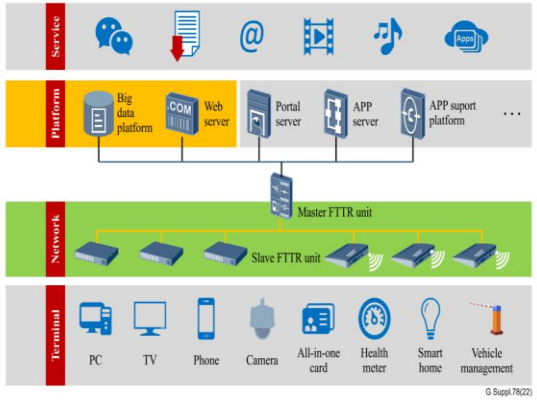




Service:
- Quick upload of large file
- Cloud based service

Requirement:
- 1-10 Gbps uplink connection
- Multiple robust uplink connections with stable high throughput

⑧ Smart community

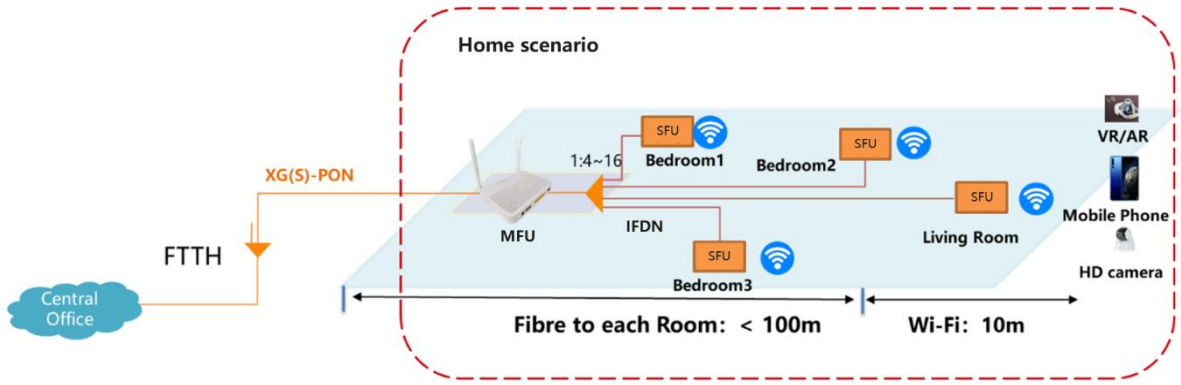


Service:
- Diversified link (e.g. IoT)
- Network coordination

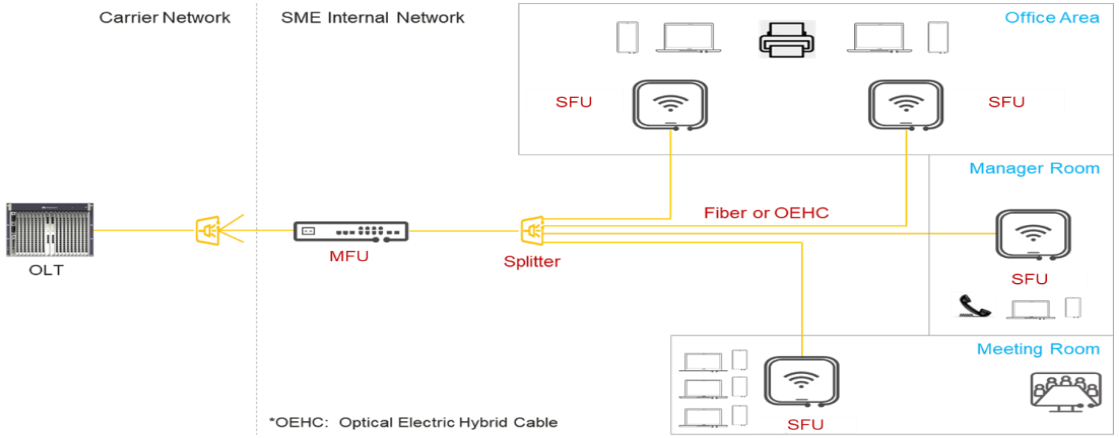
Requirement:
- Wired and wireless connection
- Robust high-speed link
- Stable connection for IoT
- Network coordination

Source: ITU-T SG15 Q3, G.suppl.78, Use case and requirements of fibre-to-the-room for small business applications, published in 2022

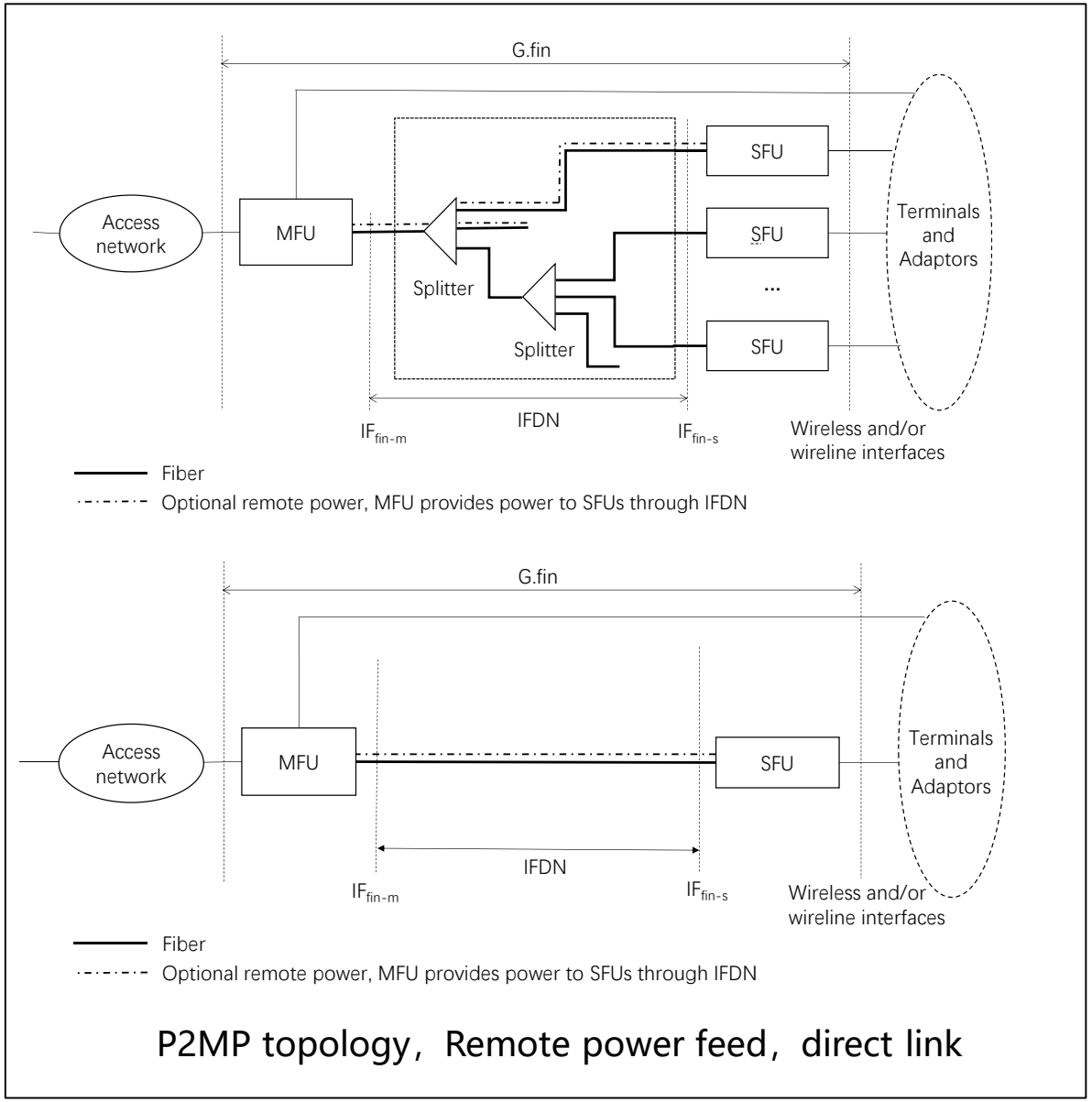
G.fin-SA: system architecture (G.9940)



- Home scenario



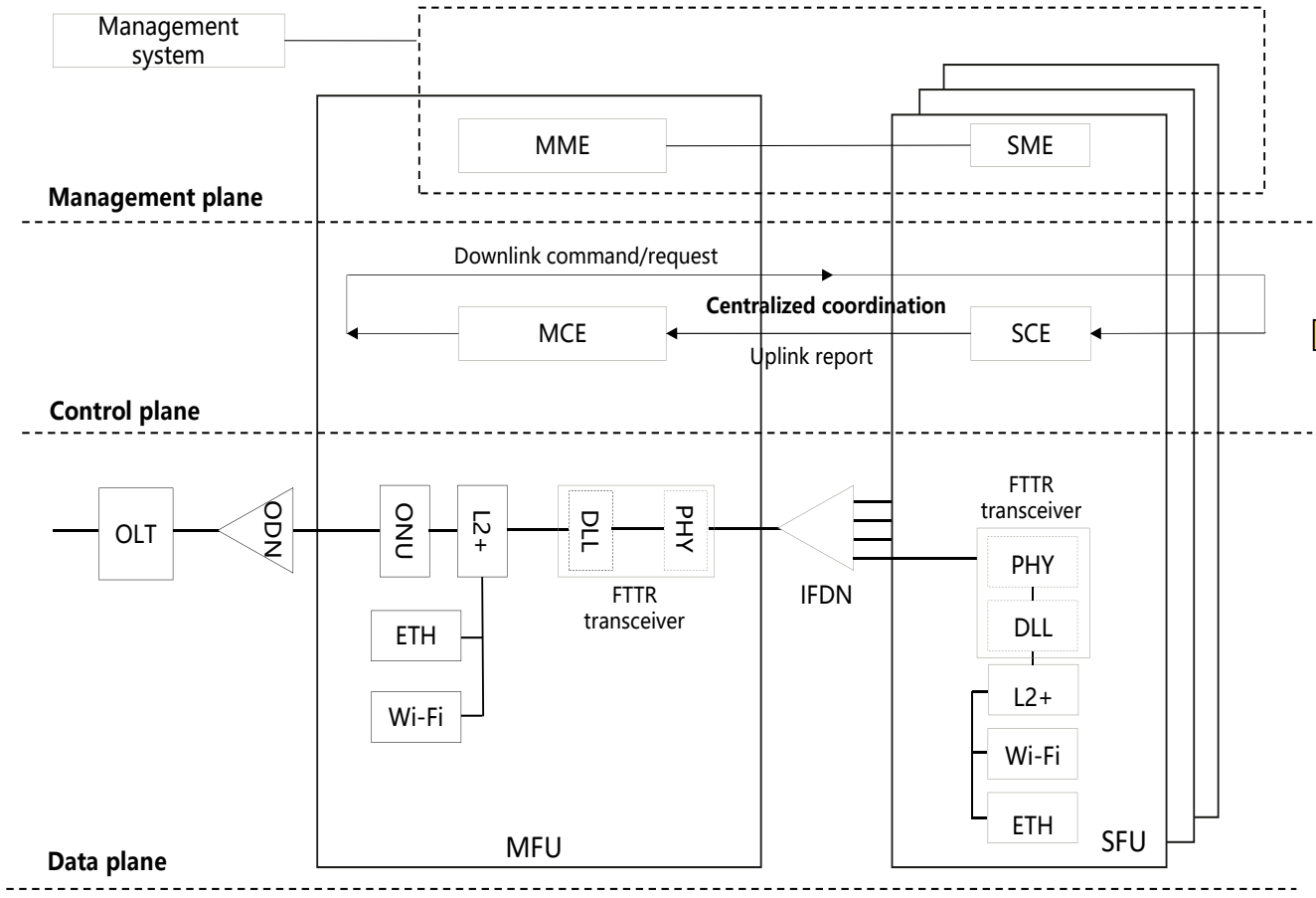
- Business scenario



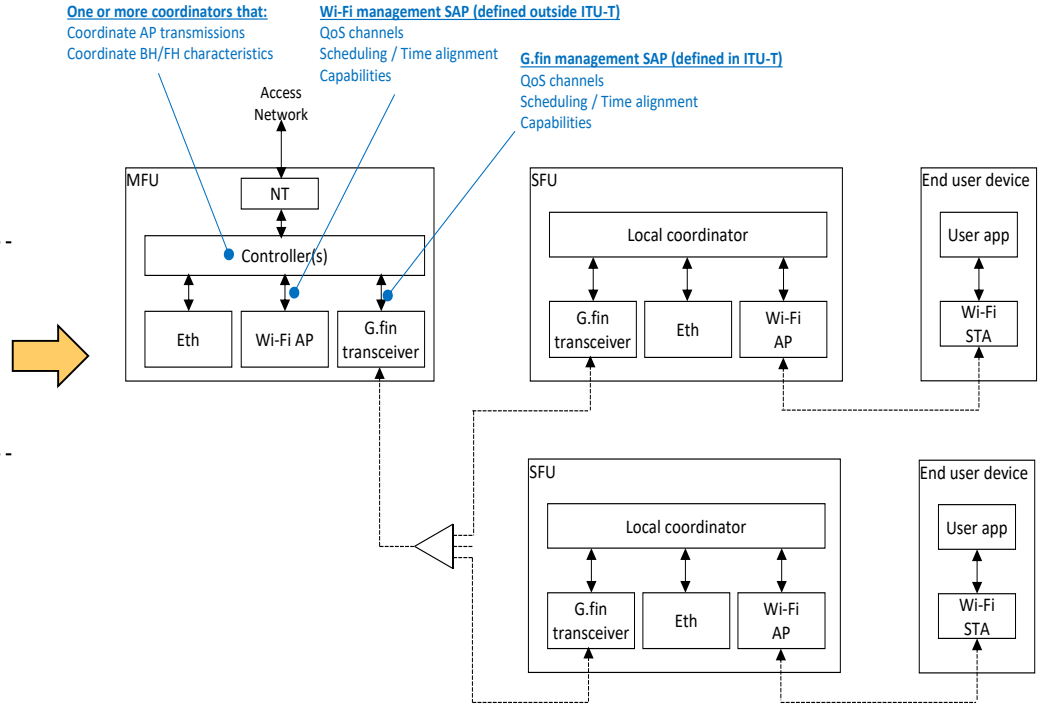
P2MP topology，Remote power feed，direct link

Source: ITU-T SG15 Q3, G.9940, consented in April plenary of 2023，under review-LCC

G.fin-SA: system architecture (G.9940)



Functional framework of G.fin system



- **Mechanism:**

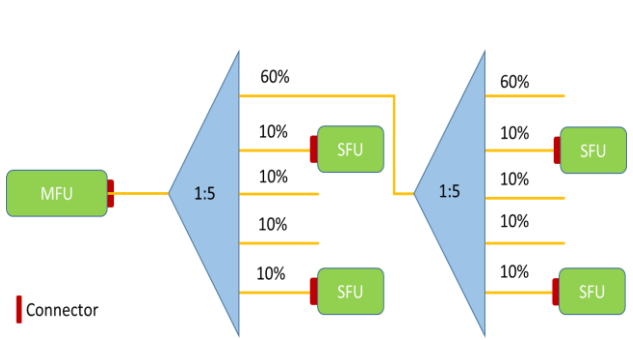
1. Identify service flow and differentiate the service QoS
2. MFU dynamically collects the Wi-Fi and network relevant information such as data buffer, link status, etc.
3. The MFU controller does analysis and makes decision
4. The decision is sent to each SFU through the fibre network

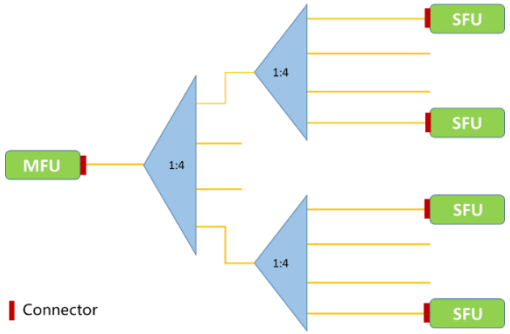
Source: ITU-T SG15 Q3, G.9940, consented in April plenary of 2023, under review-LCC

G.fin-SA: system architecture (G.9940)

Optical link budget and wavelength set

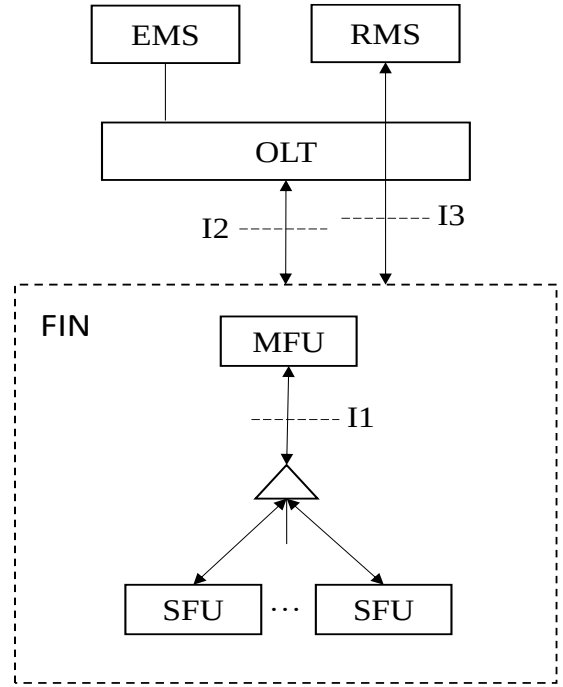
Optical link budget	Typical splitting ratio	Upstream/downstream wavelength set	
		2.5/2.5 Gbit/s	10/10 Gbit/s
0-18 dB (home)	1:8	Up: 1300-1320 nm Down: 1480-1500 nm	Left for further study
13-28 dB (SME)	1:32	Up: 1300-1320 nm Down: 1480-1500 nm	Option 1: Up: 1300-1320 nm Down: 1480-1500 nm Option 2: Up: 1260-1280 nm Down: 1567-1587 nm





Source: ITU-T SG15 Q3, G.9940, consented in April plenary of 2023, under review-LCC

Ways for managing G.fin devices



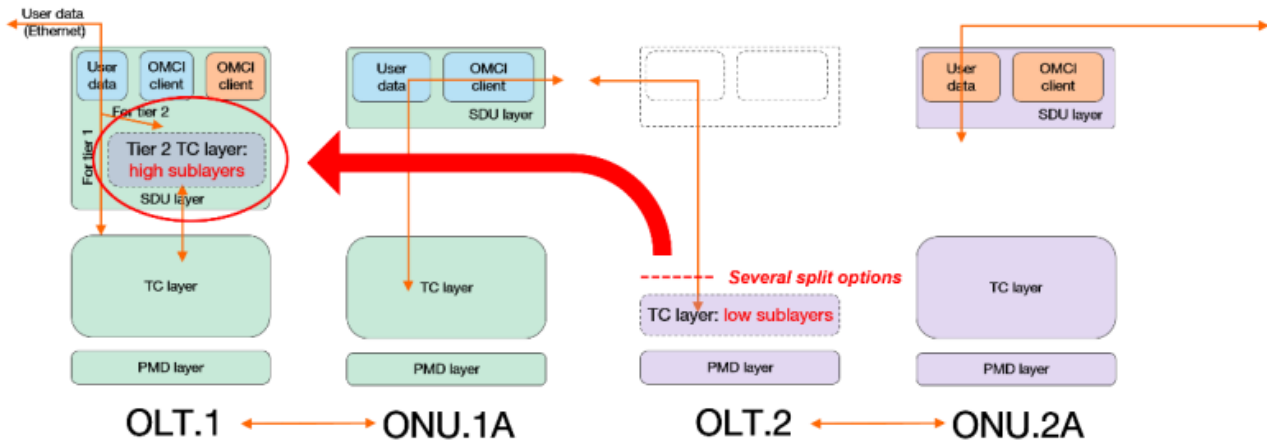
- **Management methodologies:**

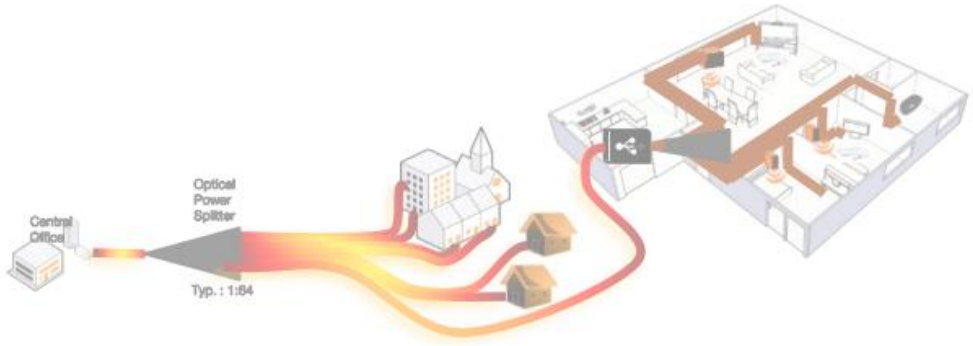
1. RMS directed: TR-069、TR-369 for MFU and SFU
2. EMS directed:

-> MFU/SFU are directly touched by central office (e.g. OLT)

3. MFU as an agent to do O&M for G.fin system

Innovative ways in the future

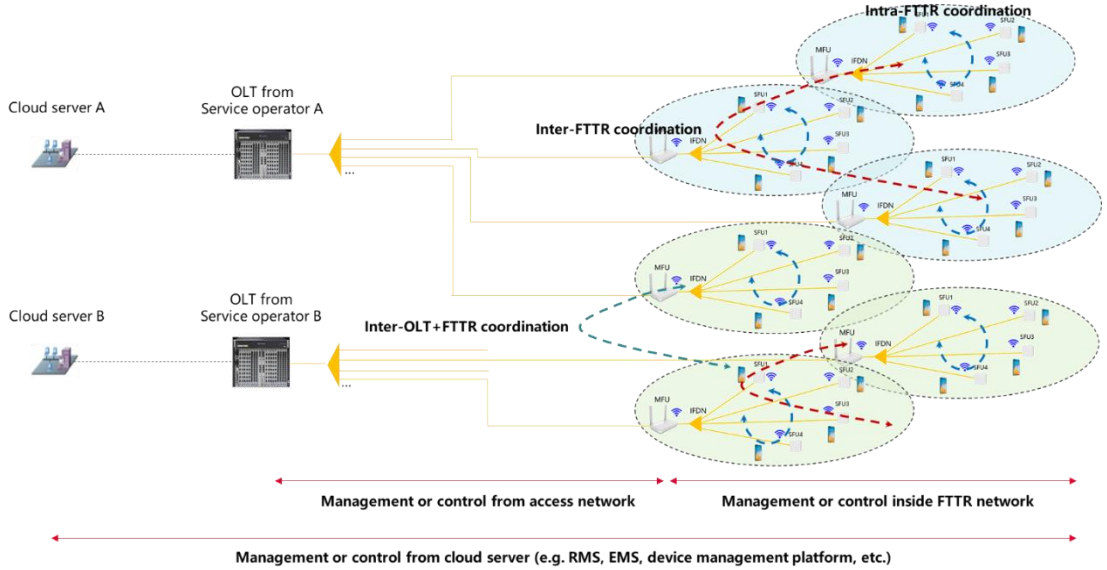




C-FAN Centralised-FAN (Fixed Access Network)

-> Simplified G.fin devices
-> Centralized control in central office

Source: 2nd FTTR joint workshop, 2022, Orange

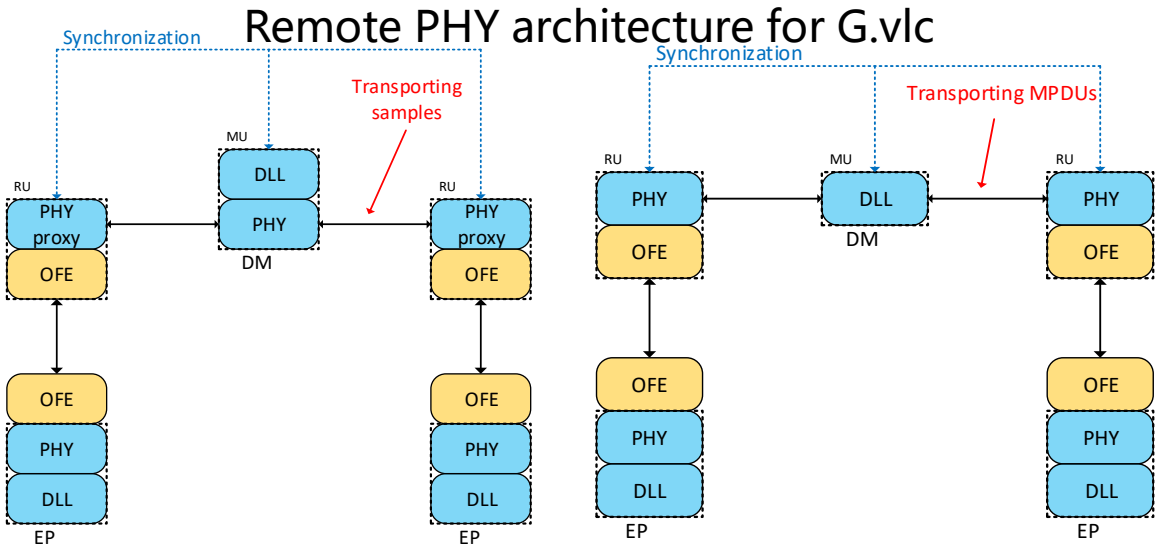


- Enable Wi-Fi coordination between neighbors

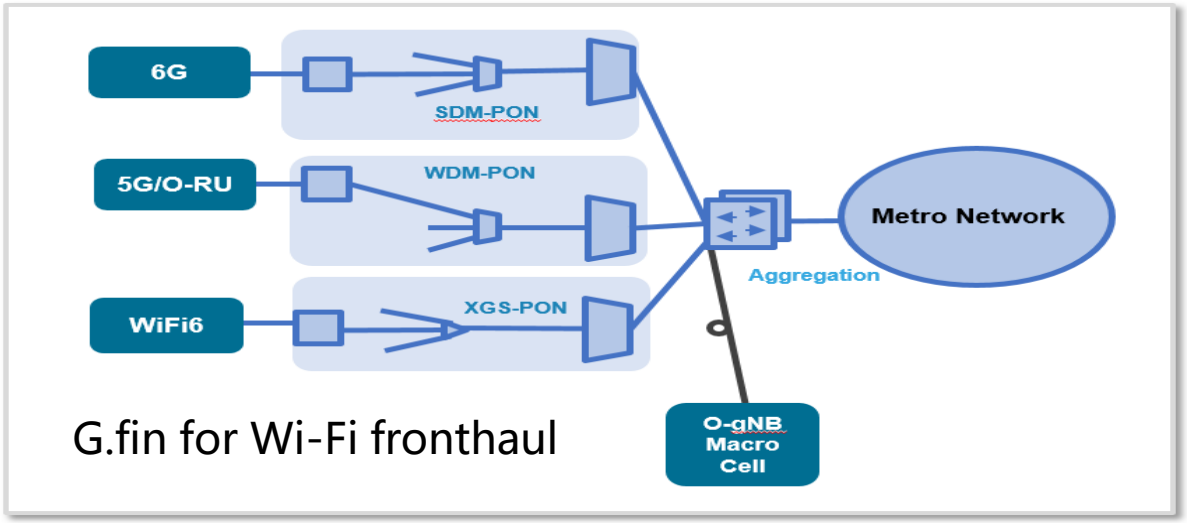
-> Additional controller in central office
-> Real-time coordination message exchanging:
① under the same PON port
② between different PON port of same OLT
③ between different PON port of different OLT

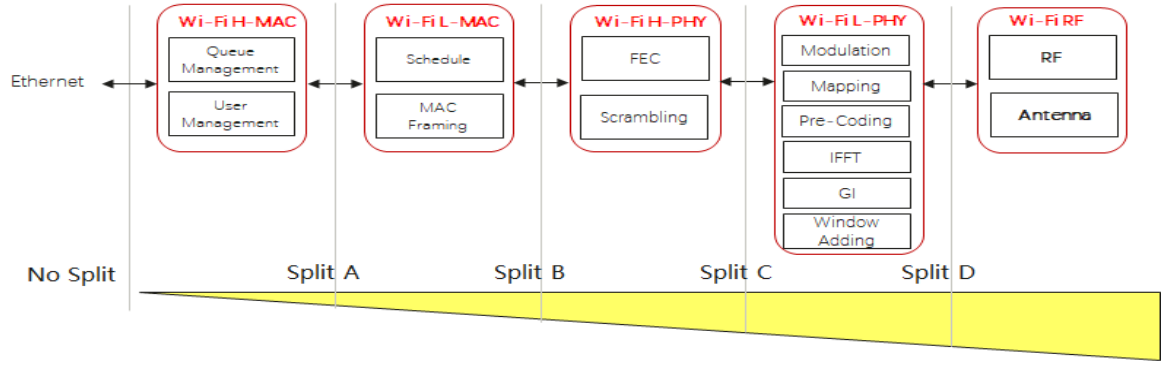
Source: ITU-T SG15 Q3, T22-SG15-C-0568!!MSW-E, Huawei, 2023

Innovative ways in the future

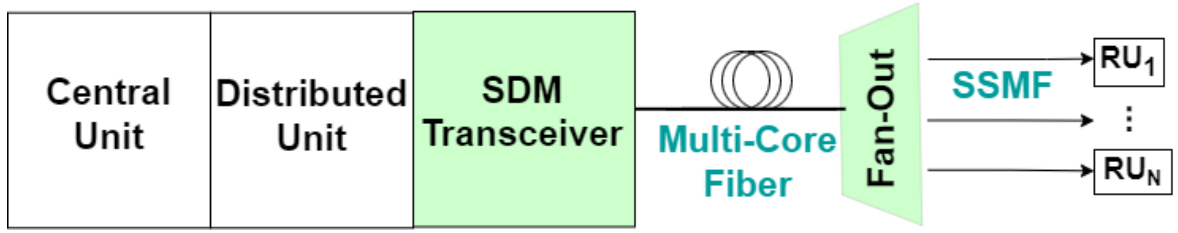


Source: ITU-T SG15 Q3, T22-SG15RGM-Q3-230131-C-0019, Maxlinear, 2023





Source: ITU-T SG15 Q3, T17-SG15-C-2773!!MSW-E, Huawei, 2021



Source: ITU-T SG15 Q3, T22-SG15-C-0592!!MSW-E, HHI, 2023

In summary

- **Focal point of ITU-T SG15 Q3 in next step :**
  1. Continuously update use case & requirements of fibre in-premises
  2. Complete G.fin series recommendations
  3. Complete G.p2pf recommendation
  4. Explore new applications based on fibre in-premises technologies
- **Welcomed all the ITU-T member to contribute fibre in-premises network specification**

Thank You