Fiber-to-the-room (FTTR) standard progress in CCSA TC6

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CAICT

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☐ **Development of FTTR in China**

☐ Standard progress of FTTR in CCSA

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The rapid development of fiber broadband has created a good user base for FTTR in China

Fixed access in China has entered the all-optical era, and optical fiber services can be further extended

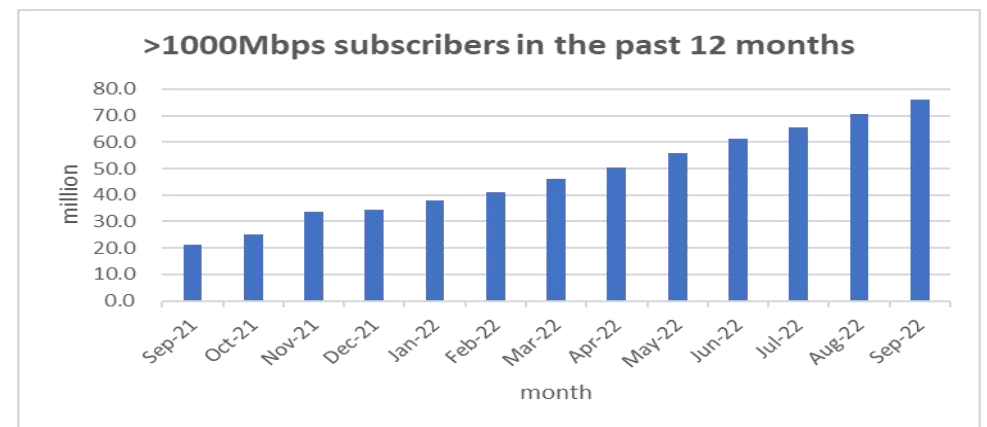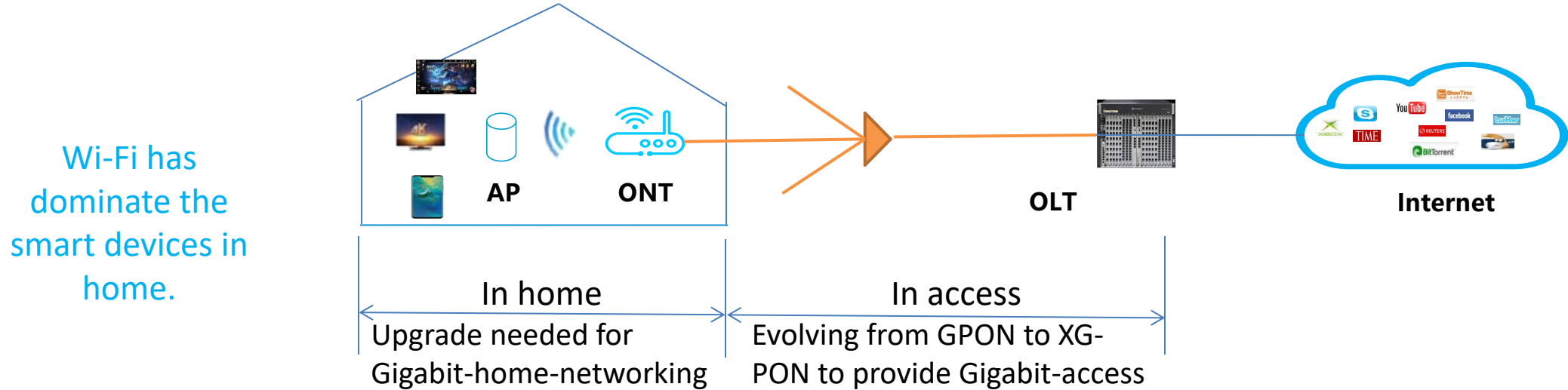| 548 million	95%	94%	>76 million	>99%
FTTH/O Subscribers	Fiber access percentage	>100Mbps Subscribers	>1000Mbps Subscribers	Fiber coverage of village

Source: MIIT, update to Q3-2022

- **Fiber-to-the-home penetration rate tends to be saturated:** fiber users account for 95%
- **Optical access network capabilities upgrade accelerated :** The number of gigabit and above users increased rapidly, with an annual growth rate more than 250%

Indicators of broadband network in China （2022Q3）

Index	Unit	Value	Year-over-year growth(%)
Broadband internet subscribers	Million	57836	9.9
- with FTTH/O	Million	54810	10.4
- access rate >100Mbps	Million	54229	11.9
- access rate >1000Mbps	Million	7603	256.3

>1000Mbps subscribers in the past 12 months

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Home network has become a significant bottleneck for E2E broadband service

Wi-Fi has dominate the smart devices in home.

AP   ONT

OLT

Internet

In home
Upgrade needed for Gigabit-home-networking

In access
Evolving from GPON to XG-PON to provide Gigabit-access

- Because of working in 5GHz band, WiFi6 signal has weaker ability to penetrate (concrete) walls than 2.4GHz, and **installation of multiple APs is more and more popular** in home.

- Because of non-professional installation and setup, **quality issues of home Wi-Fi** (e.g. signal strength, interference, seamless roaming) are usual

- More than half of **complains feedback to operators** are related to home networking problem.

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Fiber is competitive for home Wi-Fi backhauling

	Fiber	Ethernet (UTP)	Wireless
Transmission Stability	High	High	Low
Bandwidth	2.5G or 10G	100M / 1000M (Speed upgrade limited by UTP cable)	Medium (depends on channel)
Range	< 1000m	< 100m	Uncertain (depends on channel)
Remote Management	(To be defined)	No	No

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In-home fiber networking is beginning to be deployed

Telecom operators have accelerated the development of higher speed networks and launched FTTR service brands

CTC

CMCC

CUC

Whole house Giga

Optical Wi-Fi

Whole house optical
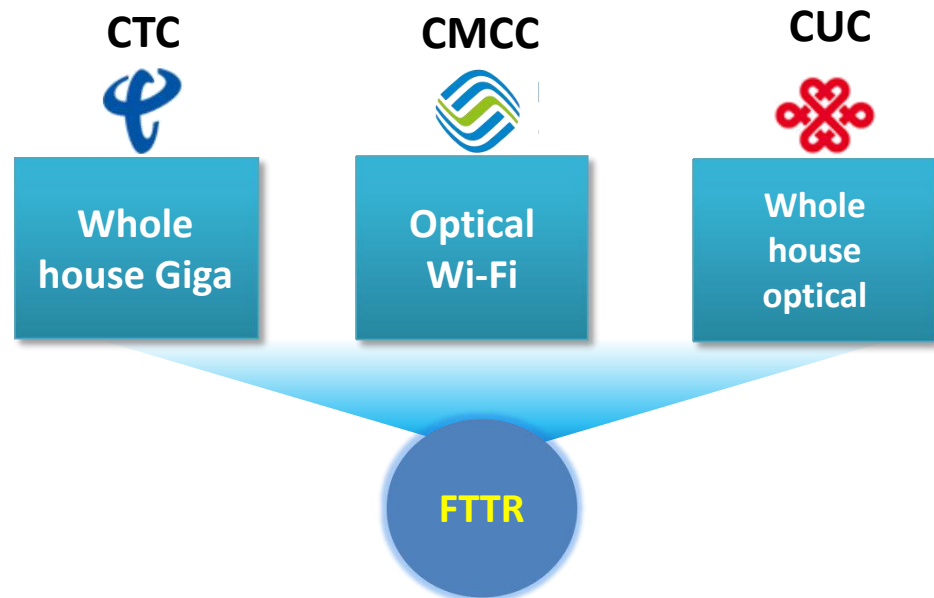
FTTR

✓ full-service operations
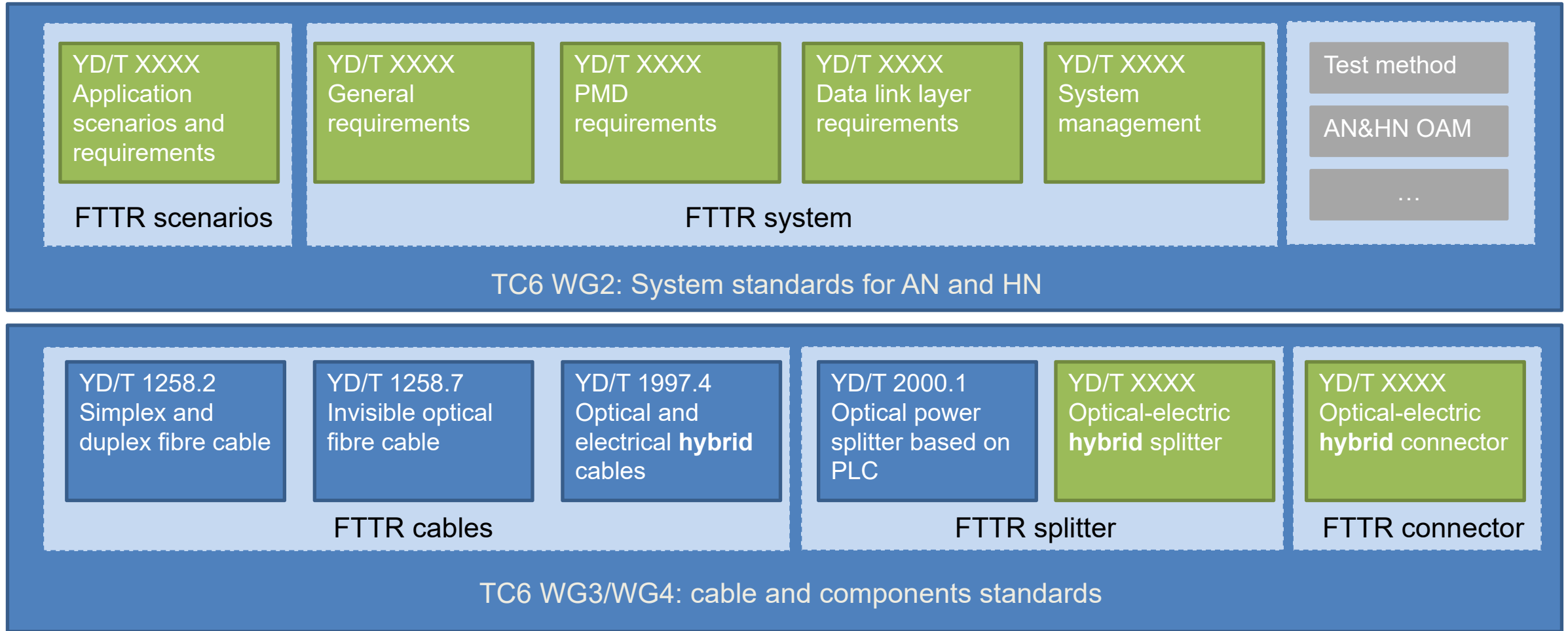✓ Acquire high-value users
✓ Enhance market competitiveness

- The number of FTTR users in Hebei province, Shandong province and other places has exceeded 100,000

- It is expected that about 15~20% of families of 460 million households will be upgraded to FTTR during next 5 years

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Content

- ☐ Development of FTTR in China
- ☐ **Standard progress of FTTR in CCSA**

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Standards family of FTTR in TC6

TC6 WG2: System standards for AN and HN

FTTR scenarios

YD/T XXXX Application scenarios and requirements

FTTR system

YD/T XXXX General requirements	YD/T XXXX PMD requirements	YD/T XXXX Data link layer requirements	YD/T XXXX System management

Test method

AN&HN OAM

…

TC6 WG3/WG4: cable and components standards

FTTR cables

YD/T 1258.2 Simplex and duplex fibre cable	YD/T 1258.7 Invisible optical fibre cable	YD/T 1997.4 Optical and electrical **hybrid** cables

FTTR splitter

YD/T 2000.1 Optical power splitter based on PLC	YD/T XXXX Optical-electric **hybrid** splitter

FTTR connector

| YD/T XXXX
Optical-electric **hybrid** connector |
| --- |

■ Published   ■ Under study   ■ Future

FTTR general requirements – optical network features

The FTTR ODN architecture is different from the traditional access network's uniform optical division, non-uniform optical splitting and optical fiber direct connection are the scenarios that must be considered

FTTR
Multi-level cascade
OLT
Main-unit
Sub-unit
Sub-unit

FTTR
Direct connection
OLT
Main-unit
Sub-unit
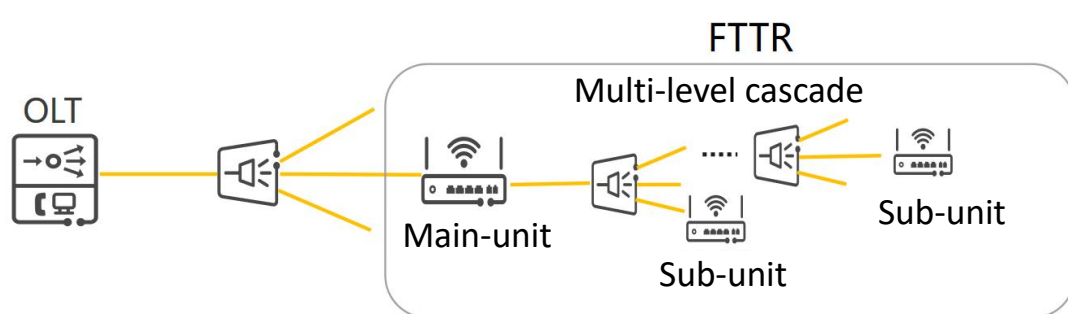
Multi-level non-uniform：The end-to-end maximum optical link loss needs to be recalculated
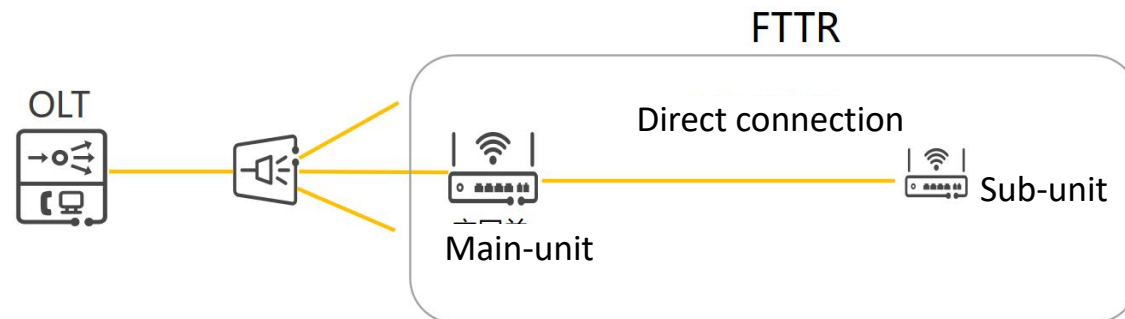
Direct connection：The receiver dynamic range specification needs to be improved

New ODN optical class will be defined for FTTR

class	Ra	Rb
OPL min (dB)	0	13
OPL max (dB)	22.5~23.5 (TBD)	28

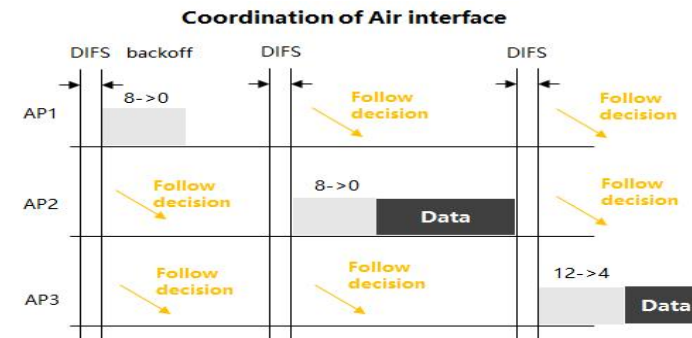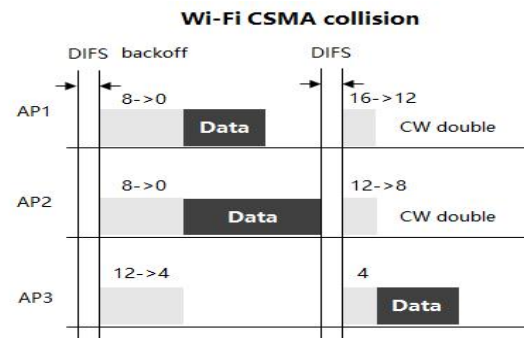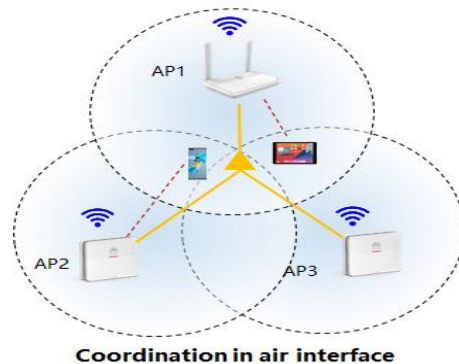**Selection of FTTR wavelength mainly considers the reuse of existing industry chains**

- considering 1310nm for US, 1490nm or 1550nm for DS(TBD)
- Reuse the optical access device industry chain to reduce costs

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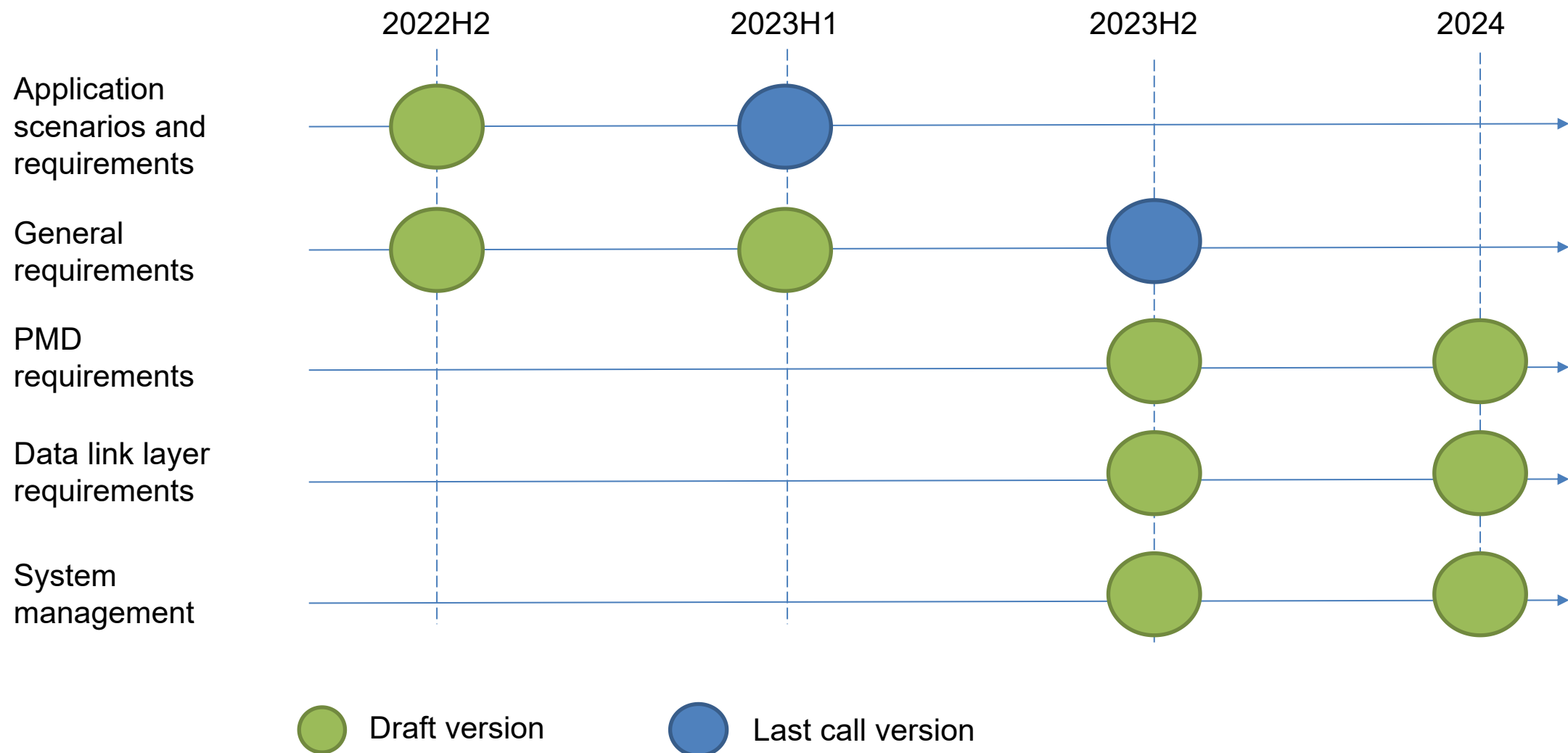# FTTR general requirements – Optical / Wi-Fi cooperation

The converged architecture and technology of optical & Wi-Fi are the key technologies of FTTR. FTTR should provide advanced multi-AP management capability

- **Level 1**：Manage key parameters of different APs through a unified configuration interface, such as SSID, password, etc. - (normally provided by home used APs)
- **Level 2**：Optimize channel frequency, transmit power, and roaming assistance at different nodes by controller - (available on high-end commercial APs)
- **Level 3**：Coordinate the transmission mechanism of different APs at the air interface, make full use of channel resources, and avoid signal competition (**expected for FTTR**)

The air interface transmission mechanism (competition, roaming) is the key for experience assurance, and it is also the problem that FTTR currently focuses on

Coordination in air interface

Wi-Fi CSMA collision

Coordination of Air interface

Planned roadmap of FTTR system standards

	2022H2	2023H1	2023H2	2024
Application scenarios and requirements	Draft	Last call		
General requirements	Draft	Draft	Last call	
PMD requirements			Draft	Draft
Data link layer requirements			Draft	Draft
System management			Draft	Draft

🟢 Draft version 🔵 Last call version

Thanks

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