Considerations for 100G-EPON Standardization

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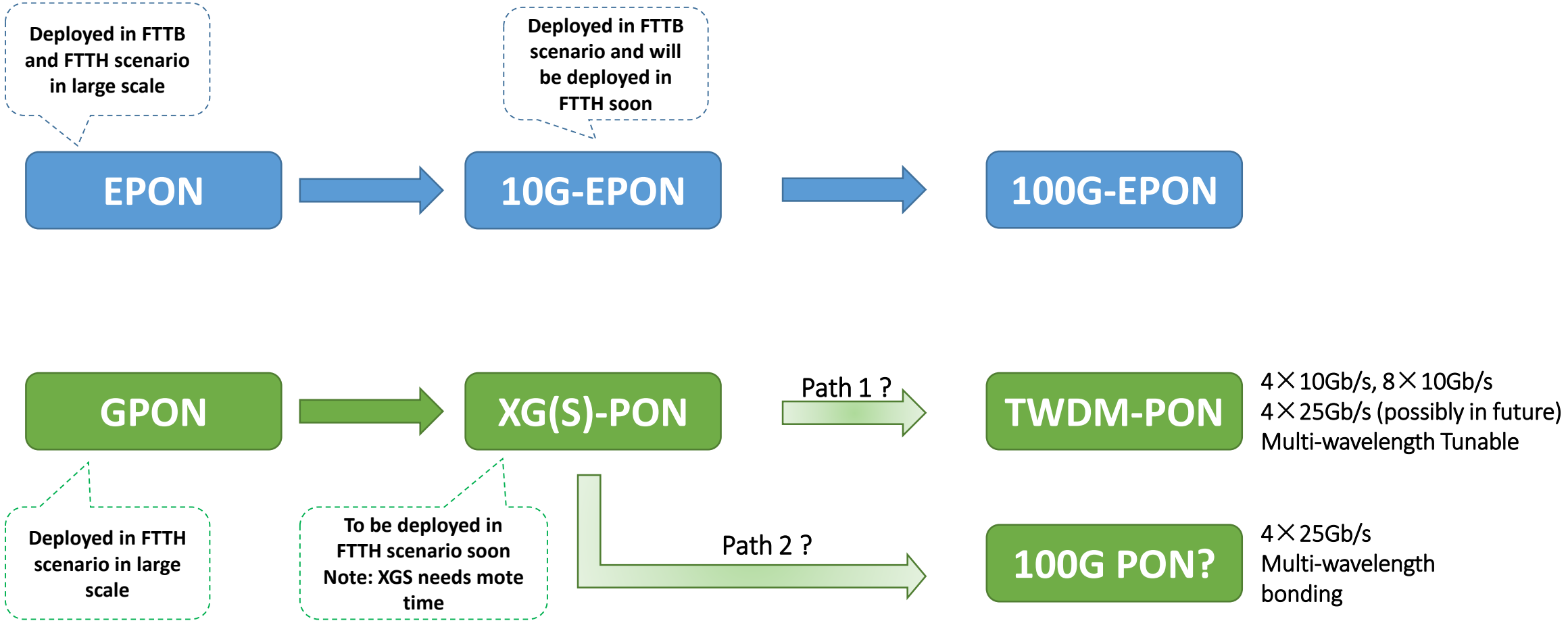
Migration and Evolution – China Telecom

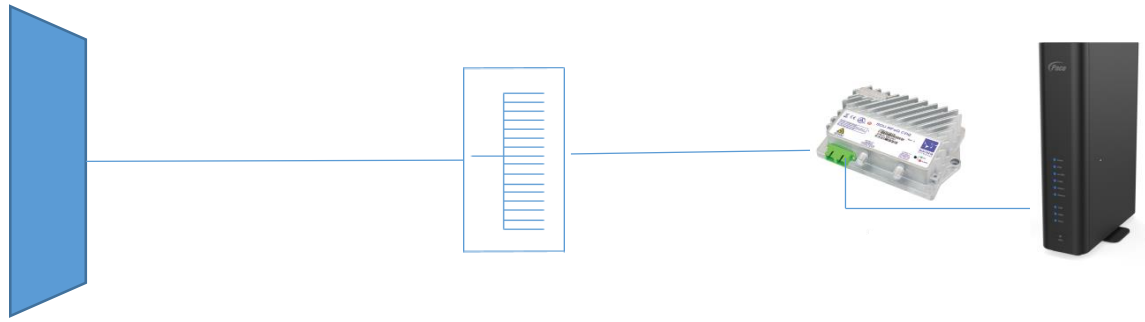


Migration and Evolution – Comcast

RFoG / PON
Overlay
5% to 10% EPON

RF0G (Video)

10G-EPON
(HSD)



2017 migration to all IP

10G-EPON

10G-EPON → 25G-EPON → 50G-EPON → 100G-EPON

Main expectations 100G-EPON standardization By China Telecom

Simultaneous cost optimization of 25G and 100G	**From China Telecom's point of view, most probably to evolve from 10G platform (CO) directly to 100G in the far future when necessary, and without the interim stage of 25G/50G**
Promote IEEE and ITU-T coordination	**The intention is to encourage the key optical component compatibility to some extent, to share the industry chain as much as possible**
	Shared Unified wavelength plan
	Compatible optical parameters of optical component

Main expectations 100G PON standardization by Comcast

- Avoid high cost, low volume technology solutions that create low market acceptance
- Leverage optical device selection with high growth potential or adjacent market usage to lower the forward cost curve
- Allow incremental BW capacity increases (25 / 50 / 100 Gb) that keep pace with market requirements
- Investigate alignment with ITU / FSAN if technology direction and development schedules are compatible
- Drive accelerated standard adoption

Understanding of PON evolution in China Telecom

- 10G PON is understood to be capable to meet mid-term development requirements (at least 5-6 years from now on)
- 100G-EPON is treated as the next step after 10G-EPON deployment
- 100G-EPON is not urgent now for deployment, but in the standardization, key features and functions need to be future proof, especially wavelength plan

- **Propose to comprehensively evaluate the capability/complexity and cost/availability for all candidate wavelength plans before making decision (evaluation model shown later)**

Regarding wavelength plan, 1+3 is preferred

- **1+3 wavelength plan occupies less optical spectrums and provides simplified coexistence**
  - for OLT, 10G-EPON platform → 100G-EPON platform
  - for ONU, 10G-EPON ONU → rates 25/10, 25/25, 100/25, 100/100 per service types
  - If 1+4, then more optical spectrum occupied and more complicated coexistence scenario

- **To balance the cost of future deployment, 1+3 wavelength plan is better than 1+4 wavelength plan**
  - One unified 100G-EPON OLT platform to provide multi types of ONU rates (25/10, 25/25, 100/25, 100/100), while single 25G OLT platform most probably not to be deployed as too short life cycle
  - 1+3 plan leads to a lower total system when connecting both rates 25/25 and 100/25 ONUs in same ODN
    - (approximately) Assuming 25G OLT line card cost = 1X; 100G OLT line card cost cost = 4X
    - System cost calculation method: OLT system cost = 4X by (1+3) plan, while OLT system cost = 1X+4X = 5X by (1+4) plan
    - Gigabit cost calculation method: the costs are about the same, but such method is not rarely used

- **For network deployment planning, it will be much easier to use one unified 100G EPON platform** (instead of two platforms) to serve multi rates requirement, as service requirement trend for optical access is that bandwidth grows rapidly, but customer locations are distributed and mixed

Additional requirements for wavelength plan

- **Upstream wavelength for both 25G and 100G should reside in the O band, to** achieve low cost of both 25G ONU and 100G ONU

- **All 25G ONUs use the fixed wavelength pair, to** relax the complexity of product implementation and field deployment

Evaluation model

- **The intention is to evaluate the capability/complexity and cost/availability of candidate wavelength plans, to serve the final decision making**
- **Should cover both OLT and ONU, both 25G and 100G**
- **Should cover major cost contributors**
  - Laser, PD, TO CAN package, Module PCB, LDD, TIA, LA. Module package, others?
- **Should be a relative cost comparison based on one common ground**
  - PR30 equivalent power budget capable
  - Taking relative cost number based on typical 10G EPON PR30 ONU module
- **Suggest to finalize evaluation model for further input and decision**

Thank you!