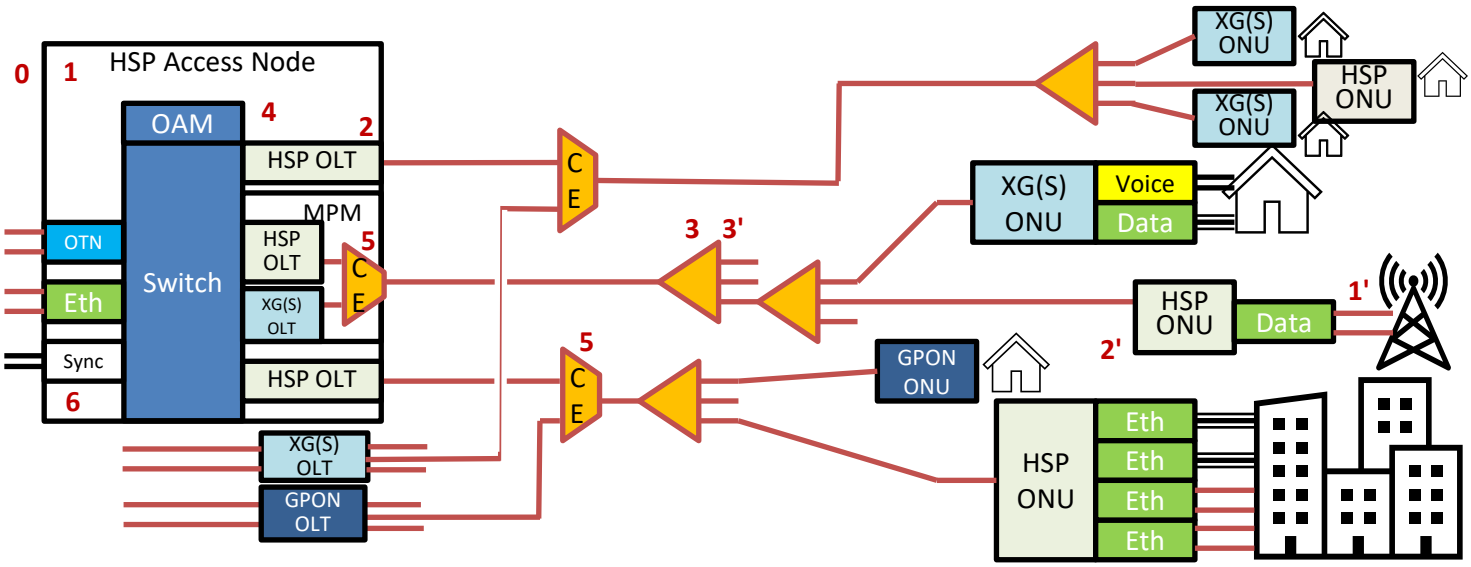
ITU-T Study Group 15

G.9804 HSP: Higher Speed Passive Optical Networks

- Full-service support – including voice, TDM, Ethernet (10/100/1000/10G/25G BASE), xDSL, wireless xhaul
- Basic physical reach is 20 km. Logical reach of up to 60 km. System is wavelength coexistent with G-PON, XG(S)-PON, 10G-EPON
- Support for bit-rate options, 50 Gbit/s downstream and 12.5 or 25 or 50 Gbit/s upstream
- Powerful OAM&P and system protection capabilities
- providing a feature rich and reliable service management system
- Advanced security features including authentication, rogue detection, and information privacy
- Power saving features on top of the already considerable low power nature of fibre access



0. ITU-T G.9804.1, Clauses 3-5 – Definitions, acronyms, conventions
Establish the common terms and acronyms used in the series, as well as delineating the various optical access topologies.

1. ITU-T G.9804.1 – Higher speed passive optical networks – Requirements
Provides examples of services, user network interfaces (UNIs) and service node interfaces (SNIs) that are required by network operators. In addition, it shows the principal deployment configuration. The most important requirement is the backward compatibility with existing optical distribution networks (ODNs) that comply with ITU-T G.984.x, ITU-T G.987.x and ITU-T G.9807.x series of Recommendations.

1'. ONU applications and services
The HSP system is intended to be a full-service access network. A key part of that is the extreme diversity of optical network unit (ONU) types and form factors. In addition to all the applications described for G-PON, XG-PON, and XGS-PON, the higher capacity of HSP opens new possibilities. Examples of these are serving diverse 5G cell sites and various enterprises. Existing G/XG(S)-PON ONUs can remain in service alongside the HSP ONUs, allowing for easier upgrades.

2. ITU-T G.9804.2 – Higher Speed Passive Optical Networks: Common Transmission Convergence Layer Specification
Defines the HSP frame format and media access control method, which are based upon those of XG(S)-PON and NG-PON2. The protocol units and information exchange between the optical line terminals (OLT) and ONUs are generalized to be future proof. It describes the ranging and activation processes, dynamic bandwidth allocation (DBA), physical layer management (PLOAM), security, power saving, system protection, channel management, and rogue behaviour mitigation.

2'. ONU behaviour
The approach taken in ITU-T G.9807.3 is to describe in detail the behaviour of the ONU, leaving the detailed behaviour of the OLT to the implementer. The approach makes it possible to test for ONU conformance to the specifications. This makes the interoperability of different vendor's ONUs on a single PON possible. There are conformance and interoperability testing programs organized by the Broadband Forum (BBF).

3. ITU-T G.9804.3 – 50-Gigabit-capable passive optical networks (50G-PON): Physical media dependent (PMD) layer specification
Defines the optical requirements and specifications for the 50 Gb/s single channel PMD layer. This Recommendation covers systems with nominal line rates of 49.7664 Gbit/s in the downstream, and the upstream line rate options are 49.7664 Gbit/s, 24.8832 Gbit/s, or 12.4416 Gbit/s. The PMD is designed to operate bidirectionally over a single strand of single mode optical fibre (G.652). The wavelength plan specifies downstream wavelength band as 1340 to 1344 nm, and upstream wavelength band as Option 1 (1260 to 1280 nm) and Option 2 (1290 to 1310 nm). Option 1 or option 2 allows wavelength division multiplex (WDM) coexistence with G-PON or XG(S)-PON, respectively.

3'. ITU-T G.9804.4 – Time and Wavelength multiplexed passive optical networks (TWDM-PON): Physical media dependent (PMD) layer specification
Defines the optical requirements and specifications for the higher speed variant of the TWDM-PON system. This Recommendation covers systems with nominal channel line rates of 49.7664 Gbit/s in the downstream, and the upstream line rate options are 49.7664 Gbit/s, 24.8832 Gbit/s, or 12.4416 Gbit/s. The PMD is designed to operate bidirectionally over a single strand of single mode optical fibre (ITU-T G.652).

4. ITU-T G.988 – ONU management and control interface (OMCI) specification
Defines the managed entities of a protocol-independent management information base (MIB) that models the exchange of information between the OLT and ONU, for all PON systems specified in ITU-T. The MIB describes the wide range of services and UNI types that an ONU may support.

5. ITU-T G.984.5 – Gigabit-capable passive optical networks (G-PON): Enhancement band
Defines wavelength ranges reserved for additional service signals to be overlaid via wavelength-division multiplexing (WDM) in future passive optical networks (PON) for maximizing the value of ODNs. The details of both the coexistence element (CE) and the blocking filter at the ONU are described. As new PON systems are standardized, this standard is updated to account for them.

6. Synchronization and timing are supported as part of the HSP system. ITU-T G.9804.3 specifies methods for transferring precision timing information over the PON system, avoiding the inherent TDMA timing asymmetry. This is increasingly important for various wireless applications especially services with low latency requirements.

For more information, please visit the ITU-T Study Group 15 website at: www.itu.int/go/tsg15