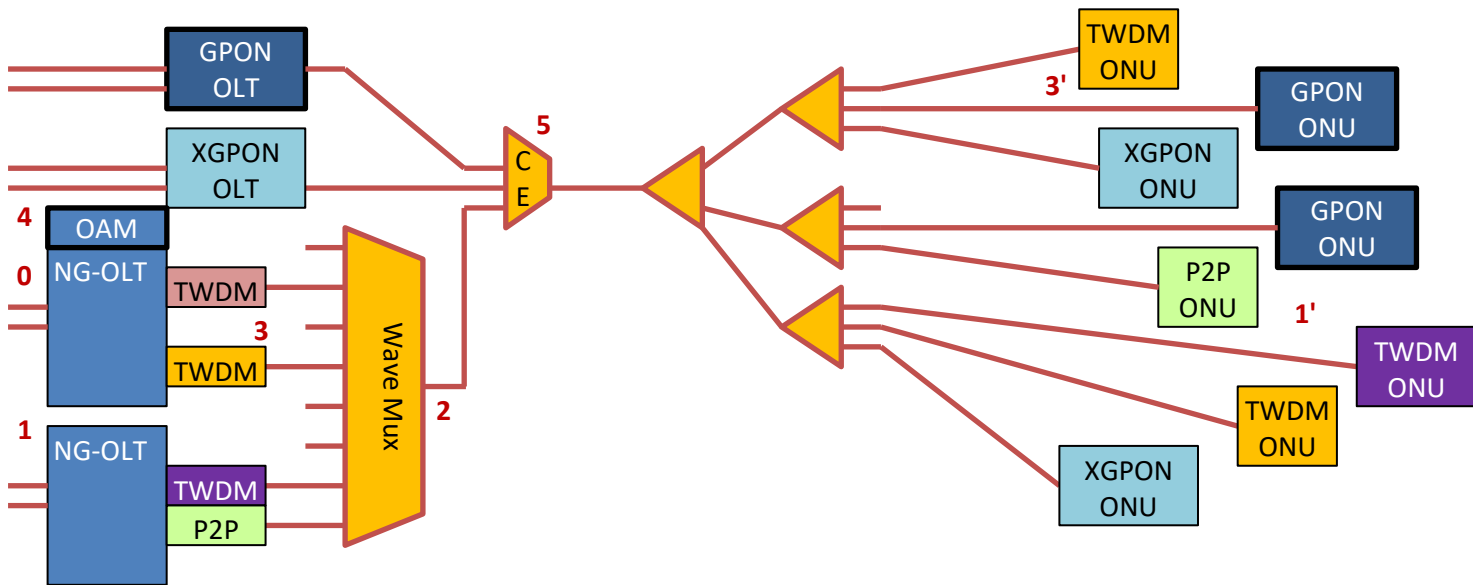


G.989 NG-PON2 Passive Optical Networks

- Full-service support – including voice, TDM, Ethernet (10/100/1000 BaseT), xDSL, leased lines, wireless extension and more
- Logical reach of up to 60 km. Basic physical reach is 20 km. System is wavelength coexistent with G-PON and XG-PON
- Support for bit-rate options, 10 Gbit/s downstream and 2.5 or 10 Gbit/s upstream
- Strong operation, administration, maintenance and provisioning (OAM&P) capabilities for end-to-end service management
- Security at the protocol level for downstream traffic due to the broadcast nature of PON



0. ITU-T G.989 – 40-Gigabit-capable passive optical networks (NG-PON2): Definitions and abbreviations

Establishes the common terms and acronyms used in the series, as well as delineating the various optical access topologies.

1. ITU-T G.989.1 – 40-Gigabit-capable passive optical networks (NG-PON2): General requirements

Provides examples of services, user network interfaces (UNI) and service node interfaces (SNI) that are required by network operators. In addition, it shows the principal deployment configuration. Wherever possible, this Recommendation maintains characteristics from the ITU-T G.987.x series Recommendations. The NG-PON2 system contains both a time and wavelength division multiplexed (TWDM) capability as well as a point to point (P2P) capability. Several OLT styles are supported (single chassis, multi-chassis, integrated multi-channel line cards, and pay-as-you-grow pluggable line cards).

1'. ONU applications and services

The NG-PON2 system is intended to be a full-service access network. A key part of that is the extreme diversity of ONUs coexisting on a common PON. G-PON and XG-PON legacy ONUs are supported, as well as TWDM ONUs (with tunable burst mode optics) and P2P ONUs (with tunable continuous mode optics). Each of those ONU types can then support many different UNIs, making NG-PON2 the "Swiss army knife" of PON Recommendations.

2. ITU-T G.989.2 – 40-Gigabit-capable passive optical networks 2 (NG-PON2): Physical media dependent (PMD) layer specification

Provides the physical layer requirements and specifications for the PMD layer. This Recommendation covers systems with nominal line rates of 9953.28 Mbit/s in the downstream direction and either 9953.28 Mbit/s or 2488.32 Mbit/s in the upstream direction, as well as other rates. The PMD is designed to operate bidirectionally over a single strand of single mode optical fibre (ITU-T G.652). The downstream wavelengths are in the L-band and the upstream wavelengths are in the C-band. A channel grid is defined in these bands, which is physically realized in the wavelength multiplexer (WM) device. The ODN is composed of fibres and passive optical splitters and connectors.

3. ITU-T G.989.3 – 40-Gigabit-capable passive optical networks (NG-PON2): Transmission convergence layer specification

Defines the frame format and media access control method, and all the usual functions that have been described in previous PON generations. New additions here are the many new PLOAM messages to handle the set-up and operation (e.g., tuning) of the multi-channel system. Support for multiple TWDM-PON OLTs sharing the same ODN is described, as well as new forms of wavelength protection.

3'. ONU behaviour

The approach taken in ITU-T G.989.3 is to

describe in detail the behaviour of the optical network unit (ONU), leaving the detailed behaviour of the optical line terminal (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).

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 the ONU, not only for G-PON, but all PON systems standardized after G-PON. The MIB implicitly describes in detail the wide range of UNIs that an ONU may support. It covers the ONT management and control channel, protocol and messages.

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 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.