

NG-PON2 characteristics

- NGPON2 (TWDM) **expansible** from 40Gbps: 4 wavelengths @ 10Gbps per wavelength today moving to 8x80Gbps in future
- **Bonding capable:** Multiple wavelengths may be channel-bonded to provide > 10Gbps services with standards work in progress
- **Symmetrical and asymmetrical bit rates** to fit any service - Supports 10Gbps down per wavelength and 10Gbps up or 2.5Gbps Up per wavelength
- **Tunable:** ONU's utilize tunable optical to dynamically tune to provisioned wavelength(s)
- **Coexistence:** wavelength mux to combine NG-PON2 wavelengths to single fiber, and co-existence element to combine other technologies to single fiber with NG-PON2
- **Point-to-point WDM** capabilities on the same infrastructure (4-8 wavelengths)

Impact for the industry & users

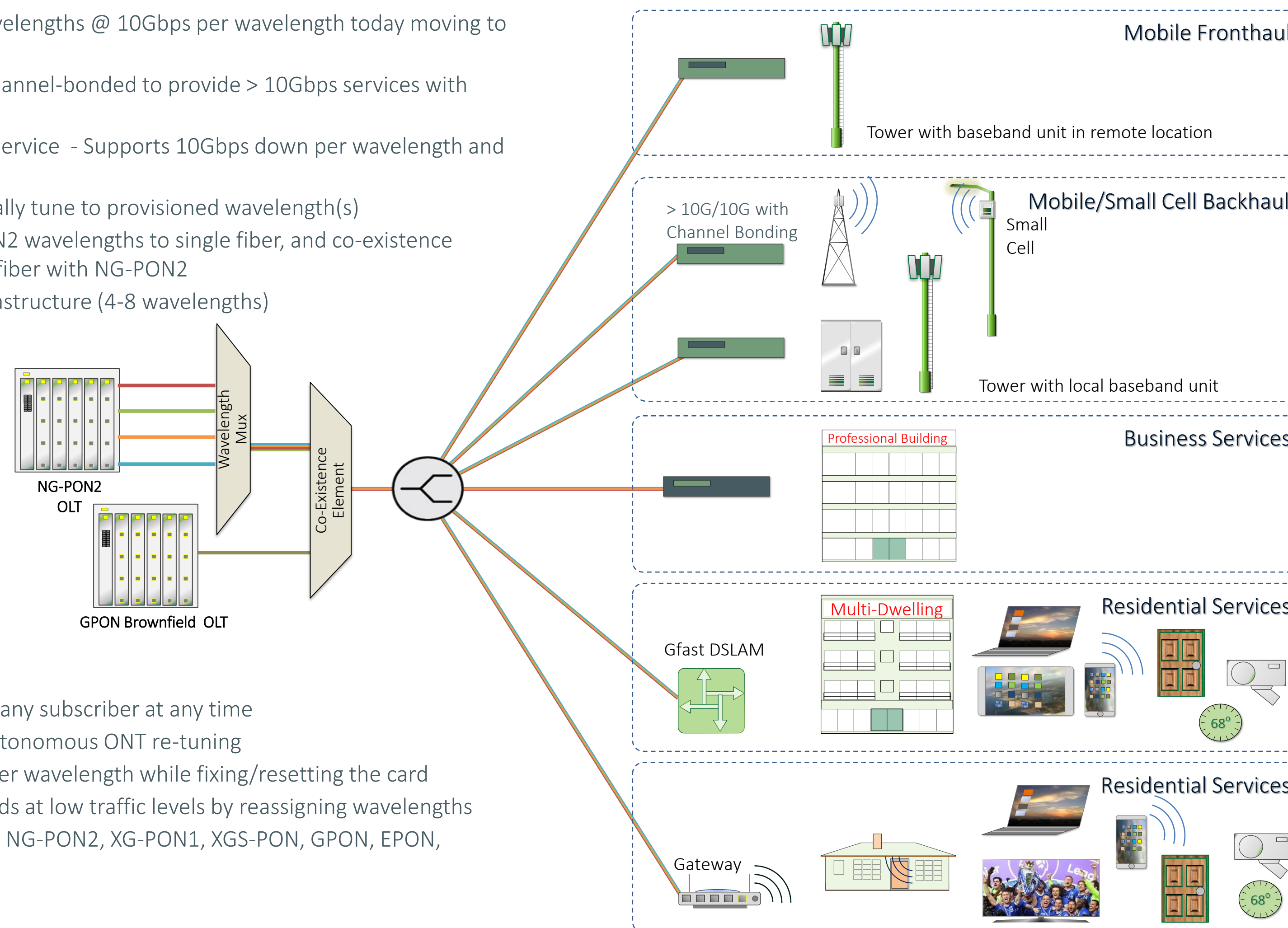
- **Converge all services** for business, consumer, wireless-wireline on a single fiber network
- **Pay as you grow architecture:** add lambdas as required
- **10Gbps + service** capabilities to any subscriber
- **Lower OpEx** with use of tunable optics
- **Lower Latency** than single wavelength systems
- **Bandwidth rebalancing** by reassigning users to different wavelengths
- Allows providers to **deliver dynamic bandwidth** to any subscriber at any time
- **Greater inherent reliability** and availability with autonomous ONT re-tuning
- **Operational protection:** move customers to another wavelength while fixing/resetting the card
- **Green:** ability to turn off unnecessary CO PON cards at low traffic levels by reassigning wavelengths
- **NGPON2 (TWDM)** can co-exist with point-to-point NG-PON2, XG-PON1, XGS-PON, GPON, EPON, 10G EPON, RF Video

NG-PON2 in context

The Broadband Forum is the defining body for today's Broadband Technologies and Software. The many areas spanned include: TR-069 CPE WAN Management Protocol, Broadband User Services, access network technologies, SDN & NFV, CloudCO, wireless-wireline/ 5G.

This chart was produced by the Broadband Forum's **NG-PON2 council** providing education and awareness of the development of NG-PON2. Visit broadband-forum.org for the latest info and to request copies of this chart. The Forum greatly appreciates the sponsoring members listed below for their support for this informational wallchart.

NG-PON2 service implementation choices



NG-PON2 technical information

ONU optics

| ONT Option | Transmit Power Range | Receive Sensitivity |
|-------------------|----------------------|---------------------|
| Type A – 10G/10G | 4dBm to 9dBm | -7dBm to -28dBm |
| Type A – 10G/2.5G | 4dBm to 9dBm | -7dBm to -28dBm |
| Type B – 10G/10G | 2dBm to 7dBm | -7dBm to -28dBm |
| Type B – 10G/2.5G | 0dBm to 5dBm | -7dBm to -28dBm |

ODN classes

| ODN Class | Max Attenuation | Min Attenuation | Differential ODN Loss |
|-----------|-----------------|-----------------|-----------------------|
| N1 | 29dB | 14dB | 15dB |
| N2 | 31dB | 16dB | 15dB |
| E1 | 33dB | 18dB | 15dB |
| E2 | 35dB | 20dB | 15dB |

Wavelengths

| Channel | Wavelength Downstream | Wavelength Upstream |
|---------|-----------------------|---------------------|
| λ1 1 | 1596.34nm | 1532.68nm |
| λ2 2 | 1597.19nm | 1533.47nm |
| λ3 3 | 1598.04nm | 1534.25nm |
| λ4 4 | 1598.89nm | 1535.04nm |

Typical applications

| Class | Optic Tuning Time | Application |
|---------|-------------------|------------------|
| Class 1 | <10us | Not Used |
| Class 2 | 10us to 25ms | Enterprise Svcs |
| Class 3 | 25ms to 1sec | Residential/SoHo |

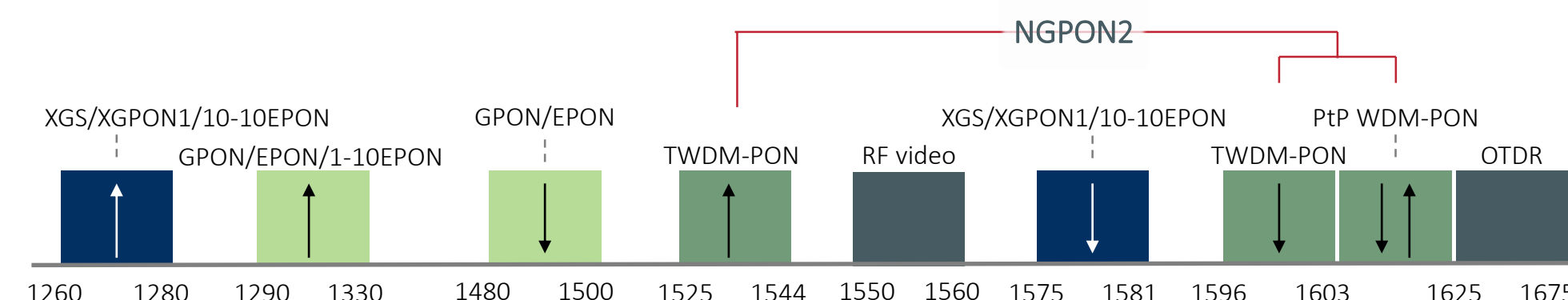
NG-PON2 standards

- ITU-T G.989: 40Gbps Capable Passive Optical Networks: Definitions, abbreviations and Acronyms
- ITU-T G.989.1: 40Gbps Capable Passive Optical Networks: General requirements
- ITU-T G.989.2: 40Gbps Capable Passive Optical Networks: Physical media dependent (PMD) layer specification
- ITU-T G.989.3: 40Gbps Capable Passive Optical Networks: Transmission convergence layer specification
- ITU-T G.988 ONU management and control interface (OMCI) specification

BBF projects related to NG-PON2

- BBF-247 PON Conformance Certification (BBF member program)
- TR-352 Multi-wavelength PON Inter-Channel-Termination Protocol (ICTP) Specification (published) with amendments for NG-PON2
- WT-331 Architecture & Technical Requirements for PON-based Mobile Backhaul networks (WT are member-only documents in progress)
- WT-385 YANG data models for ITU-T Passive Optical Networks
- WT-414 Interoperability Test Plan for NETCONF/YANG OLT management
- WT-402 PON Abstraction Interface for Time-critical Applications

Standards & wavelengths



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