5.3 Bit Rate per Wavelength Channel

NG-EPON ONU and OLT should support at least 10 Gb/s per wavelength channel, providing the minimum capacity of 10 Gb/s (symmetric) per ONU. Any increase in the supported data rate per wavelength channel is expected not to limit the ~~come at the cost of~~ supported power budgets, e.g., support for data rates higher than 10 Gb/s cannot restrict the support for higher power budget classes (PR30 and PR40)~~it is not acceptable to increase the data rate to 25 Gb/s per wavelength channel while requiring a reduction of the available power budget to PR20 compatible class~~.

Commented [MH1]: Wording simplification.

5.4 Split Ratios

NG-EPON is expected to support the split ratio of at least 1:32 per OLT port, and it is highly desirable to support the split ratio of at least 1:64 per OLT port~~, and should support a split ratio of 1:64 or higher per OLT port~~. These target split ratios are applicable for all supported power budgets.

Commented [MH2]: Since we cannot use should / shall language in this report, we have to emphasize that 1:64 is desirable.

5.5 Nominal Reach

The target distance in EPON has always been limited by a combination of three factors: ODN loss, transmission impairments (mainly dispersion in 10G-EPON), and target split ratio. The combination of optical transmitters and receivers operating at the specific data rate can support a specific power budget, which then the operator can trade for distance, split ratio, or a combination of both.

The target distance for optical access largely depends on the architecture of existing aggregation and metro networks, as well as placement of local COs relative to population centers. Some operators prefer to maintain a relatively dense network of smaller COs, allowing them to reach a large share of the local population using short access optical links. Other operators have chosen to actively collapse their local COs and consolidate their access infrastructure into fewer super COs [reference needed], serving larger geographical areas. Obviously, in the second approach, the average distance to a connected subscriber is larger than in the first case, but operators justify the longer distances with OPEX savings gained by CO consolidation.

NG-EPON is expected to support the nominal reach of at least 20 km (between the OLT and the furthest ONU), and differential reach of at least 10 km. The nominal reach is the basis for the definition of a power budget for NG-EPON devices.

NG-EPON is expected to support the nominal reach greater than 20 km, where available power budget is traded for higher transmission penalties. This effectively means that the distance between the OLT and the furthest ONU may be longer than 20 km, in which case the available power budget may be decreased due to increased transmission penalties. Operation at a distance exceeding the nominal reach would not be guaranteed by the standard, but would not be precluded by ~~MPCP~~the management and control plane.

Commented [MH3]: MPCP might be too specific here – we do not k now whether MPCP stays in place in NG-EPON, so it's better to be non-specific.

5.6 Power Budgets

It is expected that NG-EPON can coexist with 1G-EPON and/or 10G-EPON (EPON) on the same ODN. It is therefore necessary for the NG-EPON to support the same power budgets as defined for EPON today, i.e.,:

- Low power budget class, which supports PON ODN with the insertion loss of ≤ 20 dB. The low power budget is typically implemented in the form of PON ODN with the split ratio of at least 1:16 and the reach of at least 10 km.
- Medium power budget class, which supports PON ODN with the insertion loss of ≤ 24 dB. The low power budget is typically implemented in the form of PON ODN with the split ratio of at least 1:32 and the reach of at least 10 km.
- High power budget class, which supports PON ODN with the insertion loss of ≤ 29 dB. The low power budget is typically implemented in the form of PON ODN with the split ratio of at least 1:32 and the reach of at least 20 km.
- Extended power budget class, which supports PON ODN with the insertion loss of ≤ ~~34~~ 33 dB. The low power budget is typically implemented in the form of PON ODN with the split ratio of at least 1:64 and the reach of at least 20 km.

Commented [MH4]: The figure is 33dB (34 total power budget)

The power budget supported by the pair of ONU and OLT PHYs allows an operator to trade distance for split ratio and vice versa, just like EPON today. Operators may therefore implement a PON ODN with the maximum distance between the OLT and the ONU exceeding the nominal reach associated with the given power budget class, while decreasing the implemented split ratio to compensate for increased insertions loss and dispersion penalty.

5.7 Optical Distribution Network

It is expected that NG-EPON can coexist with 1G-EPON and/or 10G-EPON (EPON) on the same ODN. It is necessary for the NG-EPON to operate over the same single mode fiber used by EPON today, i.e.: IEC 60793–2 B1.1 and B1.3 [IEC60793.2], ITU-T G.652 [G652], and/or ITU-T G.657 [G657] in any combination. Moreover, NG-EPON is expected to operate over the same passive splitters/couplers and other passive elements of the ODN, including connectors, splices, etc.

Given the large number of deployed PON ODNs following requirements established for EPON, the wavelength allocation plan selected for NG-EPON ~~should~~ is not expected ~~not~~ to require replacement of existing ODN elements. This is especially critical for operators with already deployed EPON infrastructure, where any changes to the ODN are labor intensive and typically very expensive.

Commented [MH5]: We cannot really use shall / should statements in a non-binding report.

EPON ODN is deployed today in different architectures (see section **Error! Reference source not found.**~~3.3~~ for more details), depending on the redundancy requirements, fiber trunk availability, and operator preferences. It is expected that NG-EPON operates over already deployed EPON ODN architectures and does not put additional requirements for a specific ODN architecture to operate properly.