

Tough to beat: perspectives on the next generation of broadband access

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It has been widely asserted that TDM PON technology will not be able to effectively cope with future increases in subscriber bandwidth demand, and that next generation PON architectures must succeed it. This contribution will provide an update of different next generation optical access technologies and contrast them with alternatives. We will recap how the aggregate bandwidth of a PON can be further increased beyond the current standard 10Gbit/s capability by means of TDM-PON, hybrid TWDM-PON, WDM-PON, and OFDM-PON. Comparing the historical trend of TDM PON bandwidth supply and the growth of residential bandwidth demands to the end of this decade, and concluding that bandwidth supply is growing much faster than the demand, we will argue against the need for WDM PON [1]. To close we will compare how new concepts and technology research at Bell Labs have made progress towards an easier deployment, lower cost, and lower energy consumption[2].

A note on bandwidth to wet your appetite

TDM PON has been benefiting from about 15 years of volume deployments. During this time the bandwidth supply of TDM PON has been doubling every two years, much faster than demand, and with 10G PON now far surpasses the sustained bandwidth demand associated with streaming video. As a result, average-bandwidth-per-subscriber, a useful figure of merit for systems constrained by sustained bandwidth traffic, is largely irrelevant. Instead, bandwidth headroom is the correct metric, because what differentiates FTTH architectures is the ability to deliver very high burst bandwidth where it is needed, on-demand. That's what the higher-speed shared bandwidth architecture of TDM PON excels at, and where the lower-speed dedicated bandwidth architecture of WDM PON is deficient.

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References

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