

1 **NG EPON rate and capacity considerations**

2 **Eugene Dai**

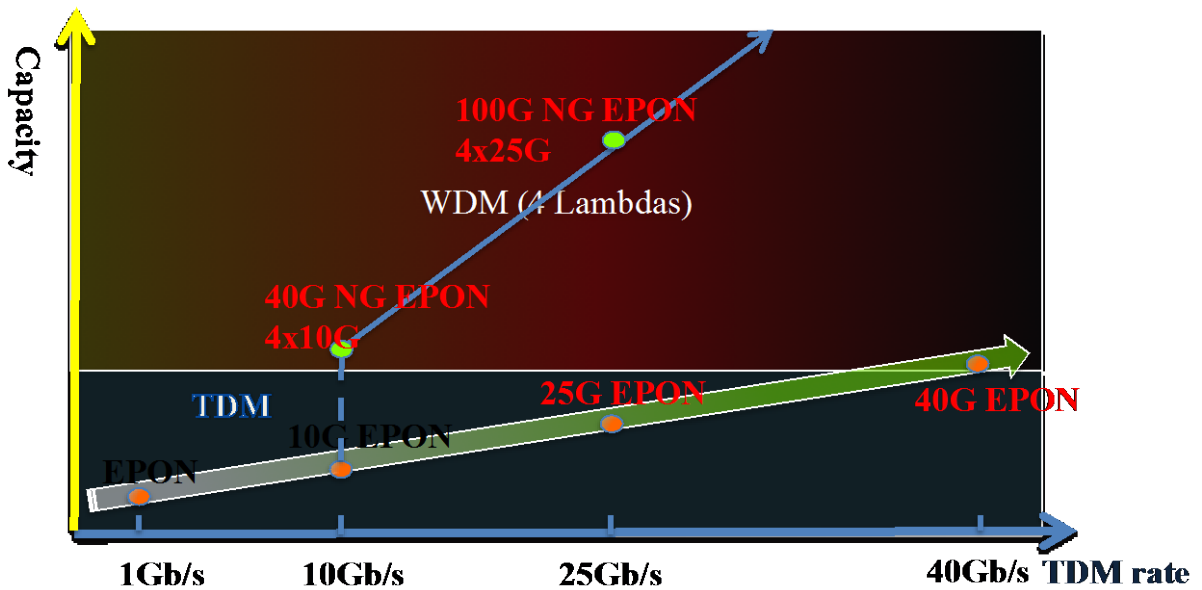
3 **Cox Communications**

4 **IEEE plenary meeting**

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7 **NG EPON rate and capacity**

8 There are many ways to achieve higher capacities for NG EPON. As shown in Fig. 1
9 there are several architectural choices for NG EPON. For example, WDM can be used at
10 10G EPON to achieve 40G aggregated capacities with 4 lambdas like that in NG-PON2.
11 Or, we can go to a higher TDM rate first. For example, we can go to a serial rate of
12 25Gbps EPON with advanced modulation, and then employ WDM to have 100G system
13 capacities with 4 lambdas.



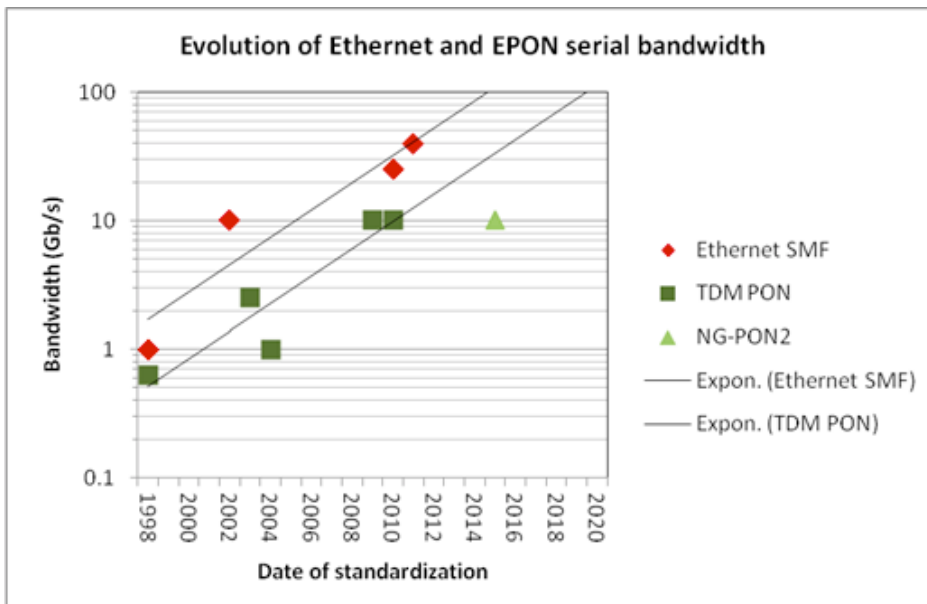
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15 Fig1. Ways to achieve higher capacity for NG EPON

1 There are several considerations regarding whether NG EPON should go to a higher serial rate
2 first, or to employ a hybrid WDM solution at 10Gbit/s rate which is supported by 10G EPON
3 today.

4 The first consideration is from the service offering point of view. The highest upstream burst
5 rate is determined by the serial rate of NG EPON. This is apparent for single wavelength
6 architecture. In hybrid a WDM –TDM solution, the highest burst rate an end-user can experience
7 is also determined by the serial rate in the wavelength channel the end-user is assigned to, not
8 the aggregated capacity of the hybrid WDM –TDM PON. The benefit of the aggregated capacity
9 is mainly on the service provider side – it provides better network scalability and saves CAPEX by
10 sharing a trunk fiber with multiple TDM PONs.

11 The second consideration is from a technical-economic point of view. History of optical
12 networking, regardless of long-haul, metro, or access, has been proven repeatedly that it is most
13 economically favorable to go to the highest TDM rate before considering a WDM solution.
14 History also shows that the evolution of Ethernet rate is always ahead of that of EPON serial
15 bandwidth, as shown in Fig. 2. Currently IEEE is developing a single lane 25Gbit/s Ethernet
16 standard. It is feasible that NG EPON serial rate will follow the evolution of single lane Ethernet
17 rate. The NG EPON system capacity is a 2D problem, the serial TDM rate and WDM capacity
18 need to be considered with many factors, and among these are service offering and technical-
19 economic feasibility.

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Figure 2: Evolution of Ethernet and EPON serial rate

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