INVENTION DISCLOSURE

1. **Invention Title.**

Determination of Bandwidth Requirements for Aggregation Device Using Bandwidth Reports from End Units

2. **Invention Summary.**

In EPON networks, ONUs send REPORT messages to the OLT to report the "fullness" of their queues. The OLT, in turn, uses the REPORT messages to allocate upstream bandwidth to the ONU.

In the present invention, the OLT dynamically determines the upstream bandwidth requirements of an intermediate Aggregation Device by algorithmically combining the individual REPORT messages from the individual ONUs which are downstream from the Aggregation Device.

3. **Invention Description**.

a. Describe the invention in detail.

Ordinarily, a device that is part of a point-to-multipoint (P2MP) network is required to send upstream messages to report the fullness of its queue or the amount of upstream bandwidth it requires. In EPON, these messages are called REPORT messages. REPORT messages are sent from the Optical Network Unit (ONU) to the Optical Line Terminal (OLT). The OLT is a centrally-located device that arbitrates upstream scheduling and allocates upstream bandwidth to the ONUs by sending GATE messages to the ONUs.

In the present invention, consider a cascade of P2MP networks, P2MP Network #1 and P2MP Network #2, with an Aggregation Device separating the two networks, as shown in the figure below.

If the underlying network technology was based on EPON, the Aggregation Device would ordinarily need to send REPORT messages to the OLT describing the fullness of its queues. The fullness of the queues in the Aggregation Device would necessarily be related to the fullness of the individual REPORT messages from ONUs downstream from the Aggregation Device.

Since in the present invention the OLT receives the REPORT messages from ONUs, and the OLT is aware of the set of ONUs downstream from an Aggregation Device, the OLT can dynamically compute the fullness of the Aggregation Device queues by algorithmically combining the REPORT messages from downstream ONUs. This alleviates the need for Aggregation Devices to report queue fullness to the OLT. This leads to a simplified and less expensive Aggregation Device and improved network efficiency.

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In one embodiment of the invention, the algorithmic combining of REPORT messages from ONUs could simply be the summation of individual ONU queue fullness to provide an overall traffic picture of the P2MP network downstream from the aggregation device.

b. Why was the invention developed? What problem(s) does the invention solve? How is it better?

The invention was conceived as a method to improve efficiency of a network comprised of one or more P2MP networks, and to simplify and reduce costs associated with the aggregation device. Specifically, the invention was conceived during discussions related to network and device architecture for networks that use the EPON Protocol over Coax (EPoC) technology.

c. Briefly outline the potential commercial value and customers of the invention.

Customers of the invention would be those companies which development networking equipment based on EPoC technology.

4. **HOW is your invention different from existing products, processes, systems?**

Networks which use EPoC technology are just beginning. Thus, there are no known devices or networks which are similar.