Design of 10 Gb/s Burst Mode Limiting Amplifier

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I. Introduction

As recent bandwidth-hungry network applications, such as HDTV, teleconferencing and file sharing, are quickly gaining public attention , the demand for broadband access grows rapidly. Currently, access speed is mainly limited by the old copper access networks. The first generation Passive Optical Networks (PON), which can handle data rates of 2.5 Gb/s downstream and 1.25 Gb/s upstream at low cost, receive a lot of interest. Nowadays, INTEC_design conducts research on next generation PON's with symmetric 10 Gb/s data rate [1]. The author designed 10 Gb/s Burst Mode Limiting Amplifier (BM-LA) cells for such a network.

A. Network Architecture

Figure 1 depicts a typical PON network. INTEC_design designed the OLT's receiver for which the incoming burst mode signal is illustrated in Figure 1.

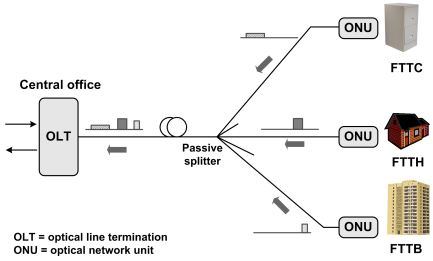

Figure 1. Upstream communication in a PON

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B. Receiver Architecture

Figure 2 shows the different blocks of the OLT's 3R Burst Mode Receiver (BM-Rx), namely the APD, TIA, LA and CDR and their function. This BM-Rx has a sensitivity of -28 dBm with a BER $< 10^{-3}$ at 10 Gb/s.

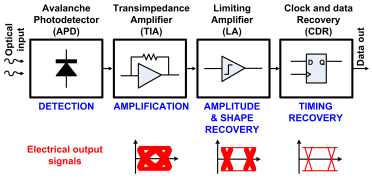

Figure 2. OLT's 3R (Recovery) BM-Rx

II. 10 Gb/s BM-LA design challenges

As illustrated in Figure 1 the OLT receives bursts –separated by a guard time– with different amplitude levels and phases. The BM-LA will amplify this varying signal to logic levels. Therefore the BM-LA needs to determine an accurate decision level burst by burst. The time needed to detect the end-of-burst, to reset the BM-LA and to set the threshold level for the next burst has to be minimized to secure a high network transmission efficiency. A new method to detect the end-of-burst and to set the decision level –both accurately and fast– has been proposed in the author's design.

III. Conclusions

A 10 Gb/s burst mode LA with short overhead for the next generation PON has been developed.

References

[1] X.Z. Qiu, et al, *Evolution of Burst Mode Receivers*, ECOC 2009, Vienna, Austria.