

# Protection Switching and Restoration Scheme at the Drop Region for FTTH-PON

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**Abstract** - Restoration and protection are two terms commonly used in the context of network survivability. Passive optical networks (PONs) are based on an emerging technology that provides a low-cost method of deploying optical access lines between a carrier's central office and a customer's site. The paper discusses network architectures and technologies that make a fiber-to-the-home (FTTH) network feasible. A challenging task for network planners is to reduce network protection costs while maintaining an acceptable level of survivability. This paper provides solutions that help service providers plan affordable networks for service continuity. In this paper, we propose a cost effective protection scheme for a novel tree-based EPON architecture. The protection scheme is capable of fault detection within 2 ms, assuring zero packet. In this paper we use only 2x2 and 2x1 optical switches combination to divert the traffic to the alternative path. Five faulty conditions are considered in this article and OptiSystem, Inc. software is used to prove the solution feasibility.

**Keywords:** PON, EPON, FTTH, protection, restoration scheme, optical switching.

## 1 Introduction

FTTH is also widely recognized as the optimal solution for providing broadband to new and existing communities alike. In fact, several thousand FTTH communities are flourishing because FTTH offers more bandwidth and more flexibility than alternatives, at a similar price. FTTH is the only technology that will deliver enough bandwidth, reliably and at a low enough cost, to meet the consumer demands of the next decade. FTTH is affordable now, which is why hundreds of companies using hundreds of different business cases worldwide are racing to install it in thousands of locations. FTTH will enable products that we have yet to conceive of, but that we are certain will become necessities for living well and working well in the decades ahead.[1] Fiber offers other advantages in the here and now: New broadband applications are coming onto the market every day, and many of them present opportunities for use or resale by fiber providers. Most of these applications can operate on lower-bandwidth

networks, but not with the same degree of performance, security and reliability as they do on fiber. The transmission in a PON is performed between an optical line terminal (OLT) installed in a CO (or remote terminal) and an optical network terminal (ONT) placed at the customer residence or in a building. The OLT is active equipment. It corresponds to the demarcation point between the access network and the metro backhaul network [2].

Amongst various protection scheme architecture that was been developed in a decade, [3] was proposed a reliable protection services by adding the optical switch to the trunk part of the protection path and another trunk for the recovery path to the protection route. This architecture will protect the ONU from the failure of PON line termination, trunk and branch. Other than that the switched FTTH access network is proposed in [4] FTTH switch is placed in the central office and if the fiber failure occurs the FTTH switch will be activated according to algorithm supported by the network. If the OLT failures occur then FTTH switch will notify the faulty of OLTs and uniformly distribute the network load to the other working OLT. In previously proposed an optimal protection architecture when the fixed transceivers, the EDFA in OLT and the trunk between OLT and RN are protected [5]. They note that only one failed transceiver can recover from the failure when multiple transceivers fail at the same time. While in [6] was proposed for hybrid protection architecture, which can ensure survivability against multi point failure when both working fiber and protection fiber are used to transmit traffic under normal state. If failure is detected at some module, the extra traffic is pre-empted for protection in normal traffic condition. Automatic protection switching mechanism used independently in ONU using LAN data was proposed in [7]. The fiber cable break is assumed when the transmitted LAN data will not be received in ONU.

### 1.1 Survivable Protection Scheme

Survivability in network system will provide the protection and restoration architectures and it continued services in the presence of failures. Protection switching