Testing OAM over SPF–to–SFP Media Convertors

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1 Abstract

The IEEE 802.3ah standard defines OAM protocol for monitoring and maintenance of remote Ethernet devices. This protocol works over pure Ethernet without demand for IP addresses. It is very suitable for some lines used in CESNET production networks. This report informs about in lab tests of this protocol before putting it on production network.

2 Motivation

Main networking equipment vendors usually limit spectrum of gigabit Ethernet pluggable transceivers (GBICs or SFPs) usable in their routers and adhere to a relatively small number of approved types. Usually there are a lot of SFP modules which have better optical power budget or other special properties suitable for utilisation in CESNET backbone network. For utilisation of new models of SFPs which have not been yet tested by our networking equipment manufacturer we propose to use small external equipment serving as a "transponder". The idea is easy to understand from picture **??**.

This picture exactly corresponds to the schema of our tests.

3 Tested Equipment

There are some basic requirements for "transponder" equipment:

- item redundancy of power supply and central processor unit is necessary
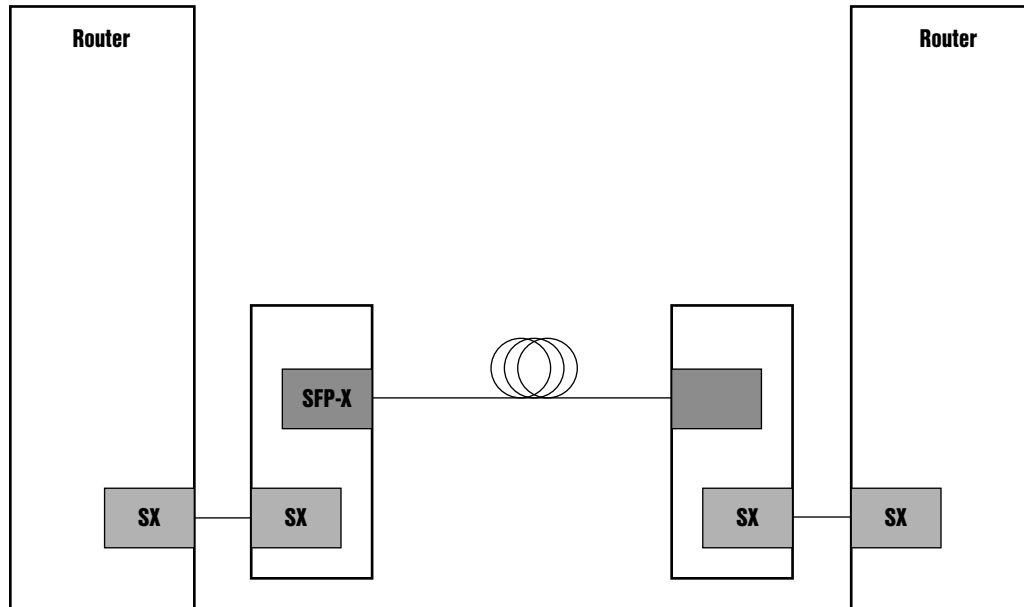
- reasonable level of modularity

Figure 1: Usage of external "transponder" for utilisation of special SFP modules

- manageability via SNMP

We can utilise Ethernet OAM as specified by IEEE 802.3ah for many possible applications in CESNET network. For this reason we have concentrated on testing equipment supporting this protocol only.

The test was performed with the following equipment: SFP-to-SFP media convertor MRV model EM316-GRMAHSH. One convertor was used in a single slot chassis (suitable for remote sites with no other media conversion needs) and the second one was used in a 16-slot chassis with management module EM316-NM.

As SFP modules two types of SFPs from Optoway Ltd. were used:

- Single fibre modules SPB-7780-1510 resp SPB-7780-1590

- Legacy (2-fibre) modules SPS-73160

The SPB-7780-1510/SPB-7780-1590 modules have declared power budget 24dB. It corresponds to approximately 80km of single-mode fibre. Today better modules SPB-77120-1510, resp. SPB-77120-1590 are on the market. It's power budget is 31 dB which corresponds to approx. 120km reach on standard single-mode fibre.

The SPS-73160 have declared power budget 37dB. This corresponds to approximately 160km of fibre.

The test was performed on few meters of optics line supplemented with optical attenuator. In case of single-fibre SFPs SPB-7780-1510 the 25dB attenuator was used, in case of dual fibre SPS-73160 35dB attenuator was used.

4   Results

Routers were connected on "client sides" of tested transport network and reliability of the connection was tested via continuous ping and with IP performance monitoring tool *iperf*. In both cases (single fibre and dual fibre SFP modules) communication between testing stations was without any erroneous packets.

Ethernet OAM frames worked fine. We were able to monitor remote convertor via management module used in 16-slot chassis. For monitoring and configuring both "local" and "remote" media convertors MRV proprietary application was used. This application is based on standardised SNMP MIBs. The MIB file for these modules is publicly available.

Everything worked as expected. The next step should be application of this technology in a production network. These tests will start during few days.

5   Further Work

The only weakness of this proposed solution is management. We have utilises vendor specific management application for monitoring and configuration of transponders in our tests. This application worked fine but is not easy to integrate it into existing backbone network management system. Further work will be implementation of some kind of Unix scripts suitable for management and configuration of Ethernet OAM capable devices. This work will be documented in a next report.