

Towards Automated Interactions between the Internet and the Carrier-Grade Management Ecosystem (ONE Project)

Keywords; Multi-Layer Networks, Computer Network Management, Coordination, Techo-Economics.

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1. Research Background and goal

The automated interaction between the Internet and carrier-grade transport systems has been at the heart of carriers' efforts to lower capital and operational expenses, as well as to allow new services to be run over the networks. However, in practice, even the simplest processes such as the IP/MPLS service provisioning are not automated as there is a lack of coordination of network management tasks. The cause is that, on the one hand, the transport network management system is designed to deliver a small number of services with a fairly static demand of network operations with simple management procedures. On the other hand, the IP network is expected to support a large number of services and quickly adopt upcoming network services to reduce time to market. As a result, telecom carriers have been forced to find a reasonable balance between the complexity and the associated cost of the operations required at the IP layer as well as between the simplicity and cost of operation of the equipment at the transport layer. Both optimizations are independent of each other.

To address the above-mentioned issue, an integration of network management systems between IP layer and the transport layer have been proposed and standardized by the IETF and ITU-T. While the ASON/GMPLS control plane framework has been designed to allow integrated IP and the transport network control, a coordination of network management functions between the two layers remains unresolved. In the light of this, the ONE project envisions a different type of network management in the

future, where telecom carriers can use a combination of manual programmability, smart analytics, and autonomic network management. To this end, to enhance cross-layer dynamic provisioning, configuration, fault detection and response in complex multi-service networks, workflow programmability is most critical. ONE suggests using a set of functionalities for defining manually or semi-automatically autonomic workflows by introducing a mediator model between the IP layer NMS and the transport layer NMS.

2. Research Outcome

In the first year of the project, the ONE consortium concentrated their focus around the work packages 2 and 3, i.e., requirements, architectural specifications, and the functional design. In the second year of the project, partners were mainly focused on the implementation of functional modules and their interfaces.

The ONE consortium preliminary achievements had been demonstrated by Telefonica and ADVA. Namely, Multilayer restoration and service provisioning demonstrated in the IST ONE trial, which is available at: <http://www.lightwaveonline.com/articles/2012/07/multi-layer-restoration-and-service-provisioning-demonstrated-in-ist-one-trial.html?cmpid=EnlNetworkingJuly112012>.

Apart from the extended architecture design, the SNU group, contributed to the implementation of the ONE adapter sub-modules such as the workflow triggering module, the authentication, authorization and accounting module, and the logging and monitoring module. In addition to this, the SNU research group has implemented all required interfaces, which are Web-service and Axis2 JAX-WS based.

The project's second year achievements have been reported to the Korean National Research Foundation and the European commission in three deliverables, namely D3.2.1, D3.2, and D2.2. The SNU group together with the partner Telefonica also published a techno-economic evaluation of network management frameworks at the IEEE CTTE conference and presented the paper on June 6th at Athens University in Greece.