

# ONE

## *Towards Automated Interactions between the Internet and the Carrier-Grade Management Ecosystems*

### At A Glance:

#### ONE

*Towards Automated Interactions  
between the Internet and the Carrier-  
Grade Management Ecosystems*



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### Main Objectives

There is a wide consensus among telecom vendors and operators that the next decade will see a mélange of evolving Internet architectures embedded into high-bandwidth technologies and carrier-grade systems for control and management. The combined Internet Protocol (IP) and Ethernet-based optical transport solutions are expected to drastically lower capital and operational expenses and improve overall network performance.

Central to this premise is the concept of autonomic network management, offering a radical improvement in the way Internet can interact with the transport layers, making automated use of available capacity and physical interconnectivity.

Unfortunately, practice lags far behind this promise. The segmentation of IP and carrier-grade technologies has not only produced the carrier's organizational separation, but also a fragmentation of the technical competence through separate Network Management Systems (NMSs). In the isolated Internet and carrier-grade management ecosystems, even simple operations, such as IP link upgrades, require multiple human-assisted configurations, and are far from automation. As a result, carriers are seeking ways to alleviate the dependency on manual processes that do not only create management expenditures, but also lead to a heavy overprovision of the IP network.

In the project ONE, the objective is to alleviate the current isolation between the IP and carrier-grade management ecosystems. As first step towards a commercially-viable autonomic management solution, we plan to design and prototype an ontology-based communication adapter between the two NMS systems, enabling: i) automated provisioning of IP topologies and services; ii) policy-based setup/release of resources; and iii) coordinated self-healing. We emphasize that the solution does not aim to integrate the NMSs, but should enable communication between them and thus effectively exploit a set of common objectives as they evolve in future systems.

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## Technical Approach

ONE will first focus on the design of the architectural functional model required for communication and policy-based management of the Internet and transport layers. Later, it will prototype and validate the concept within Telefonica's premises. This prototype will enable three automated operations involving interaction between the Internet and carrier-grade management ecosystems, including: i) automated provisioning of new IP links, with a significantly faster response time; ii) policy-based allocation of resources in both networks with policy rules communicated between two networks in an automated fashion; iii) self-healing action, where the IP network manager can dynamically request the restoration through the transport NMS.

## Key Issues

We'll design and implement a *communication adapter* between IP and carrier-grade management planes. This adapter will enable the IP layer to trigger automatic management functions in the transport layer management plane. Examples of the functions of the proposed adapter are illustrated in Figure 1. In its basic configurations, the ONE box implements a simple communication channel between the two ecosystems. In its evolutionary setting and enriched functionality, we foresee that ONE will not only enable a coordinated interaction between IP and transport layer management systems, but also with externally operated management sub-systems, such as PCE and AAA. The main design

goals for the ONE management adapter can be summarized as:

- Automated configuration of IP topologies and services through the management planes;
- Coordinated self-healing and fault-diagnosis, with the coordinated protection and dynamic self-healing actions of the two management subsystems.
- Automated policy-based setup/release of resources during contextual changes in both networks.
- Extensible ONE design to allow wider deployment of new management sub-systems, as they emerge (e.g., PCE).

## Expected Impact

ONE is a focused effort to design, develop, and prototype a management adapter enabling interactions between IP and carrier-grade network management systems. The project's main result is of enormous interest to the operators due to the large OPEX savings expected through the usage of the ONE adapter. Also the telecom equipment manufacturers are expected to benefit from the ONE solution, which will add a new, and a standardized solution in their network management products; standardization of the proposed solution is one of the primary objectives of the ONE consortium. We expect a significant broader impact of the proposed concept in the global efforts to design the future Internet architectures with advanced features of the configurable transport layer. ONE is the evolutionary first step towards this goal.

