6022-17, Session 3a
Influence of a control plane on network expenditures
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During the last years the main focus of transport network evolution was on increasing transport capacities and on introducing data networking technologies and interfaces, e.g. Gigabit Ethernet. This evolution is complemented by ongoing initiatives to reduce the operational effort and accordingly the costs of network operations. GMPLS together with standardized interfaces like UNI/NNI automate the operation of telecom networks. They allow to efficiently provide services and to enable less resource consuming resilience schemes. For the service provisioning there is a new paradigm of user initiated service provisioning (also known as switched connections) where the client can setup connections without operator interaction. This does not only speed up the provisioning process, but also reduces effort for the network operator. Currently the approach of using a distributed control plane for network functions like service provisioning, link management or failure recovery is followed by several initiatives and standardization bodies including ITU, OIF and IETF.

In this paper we do not distinguish the details of these approaches but generally assume a control plane supporting automation of network operations. We use the term GMPLS to refer to any kind of control plane according to one or several of these standards.

In the past, several studies have been published indicating the impact of resilience strategies on the network equipment cost (CAPEX). The impact on the operational expenditures, however, was neglected in most cases.

And if GMPLS is often claimed to allow the reduction of OPEX, detailed analysis and quantitative evaluation is rare. This paper provides a detailed analysis and modelling of the Operational Expenditures (OPEX) for a network provider, and studies the impact of GMPLS together with resource efficient resilience schemes on both the capital (CAPEX) and the operational expenditures. CAPEX can be calculated from the network dimensioning. In order to determine the expected OPEX, we use a process-based approach. The operational processes are elaborated and the expected changes when using GMPLS are described. We evaluate how GMPLS technologies impact network operators' processes and costs. When compared to traditional approaches. After briefly describing the process-based approach for calculating OPEX, we elaborate on the used input data and assumptions.

This includes network equipment characteristics, failure statistics, and load duration and estimated duration of some activities in network operation, needed in order to calculate labour costs. A case study is performed, considering a reference German 17 node network, using WDM, Ethernet, and MPLS traffic. Realistic figures are given for the case study and some more general trends are derived.

In case of a traditional network, we show an important impact of the resilience scheme on the expenses directly related to continuous costs of infrastructure (floor space, energy,...) and on the planning and repair costs. Concerning the service provisioning costs, we show that GMPLS introduction leads to a reduction in the order of 30% of the OPEX cost compared to the traditional case. We also assess the impact on the CAPEX/OPEX ratio.

6022-19, Session 3a
Network planning from telecom provider perspective
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Network planners of the incumbent telecom service provider face a series of challenges following technology developments, raising demand changes and utilizing existing resources. It is believed that the telecom planning that was started from the early time for PSTN deployment contributed to the foundation for the telecom planning but does not provide enough methodologies to help today's planning activities. The planning work for the provider must be innovated for adapting to the dynamic environment and support business development. In this talk, the planning history, purposes and current issues are first reviewed, then restructuring for the planning organization to meet present scenarios is discussed.

The presentation includes objectives and processes of planning, hierarchy and interaction of planning, and organization and effects of planning.

6022-25, Session 4a
Optical networking (Tutorial)
A. Gladisch, M. K. Jaeger, T-Systems International GmbH (Germany)

No abstract available.

6022-26, Session 4a
Next generation multi-service optical networks
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Current optical transport networks are based on non-transparent SONET/SDH technology. Wavelength multiplexed systems (WDM) modulate optical signals with SONET/SDH digital formats at 2.5 and 10Gb/s rates. Transparent Optical Networks have been actively researched as a way to make optical transport independent from the electronic signals transmitted. In this talk, we review recent developments in optical components that facilitate a flexible spectrum usage of DWDM systems. We further intro-