Network Modelling and PSTN-NGN Migration
Modélisation des réseaux et migration PSTN-NGN

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Summary
In the field of telecommunication networks there have been extensive changes. References for that are for example “Next Generation Networks” (NGN), „Voice/All over IP“, UMTS Release 5 (Universal Mobile Telecommunication System)“and „Fixed/mobile-convergence”.
The migration of the existing networks such as PSTN (Public Switched Telephone Network) to SIP/IP-based (Session Initiation Protocol) NGNs also plays a very important role.

Generally this leads to complex heterogeneous telecommunication networks. While convergence aims based on IP you first get a huge increase of complexity and divergence especially by the variety of protocols and protocol layers.
A structured model could help here. However you will see soon that the OSI Reference model (X.200) with its seven layers comes to insurmountable limits very quickly.
An extension of the model with Strati and Planes in accordance with the ISDN and the general protocol reference model of the ITU-T (I.320; I.322) can only postpone the limits but not overcome them, as the biggest problem, the distribution of central network functions such as “services”, “mobility”, “security”, and “quality of service” over different layers and planes can not be modelled by that.

Helpful in this case is a new network model as in figure 1. Additionally to the strati and planes it introduces function columns as well as the network management and concrete network characteristics (number of participants, traffic dimensions etc.) as a column- spreading extension.

The new network model supplies the basis for the design of new networks as well as for the migration of existing networks, from the requirement analysis on the basis of the columns, i.e. related to “services”, “mobility”, etc., over to the functional modelling until the optimization concerning architecture, traffic, costs etc. The latter becomes possible by an efficient calculation model for variant calculations which completes the graphical model.

This new network model can be used for different networks as PSTN, GSM, UMTS, SIP/ IP, it enables the definition of logical and physical network nodes and supports the design of gateways during an interconnection of different networks.
The model is concretely applied in network migration scenarios, in which, on the basis of an PSTN network the gradual change to a SIP/ IP- network is regarded. Additionally migration scenarios with up to four participated networks (PSTN, SIP/ IP fixed network, GSM, UMTS IMS or UMTS Release 7) are optimized.

Based on these results conclusions are made for the method of the migration from circuit to packet switched networks.

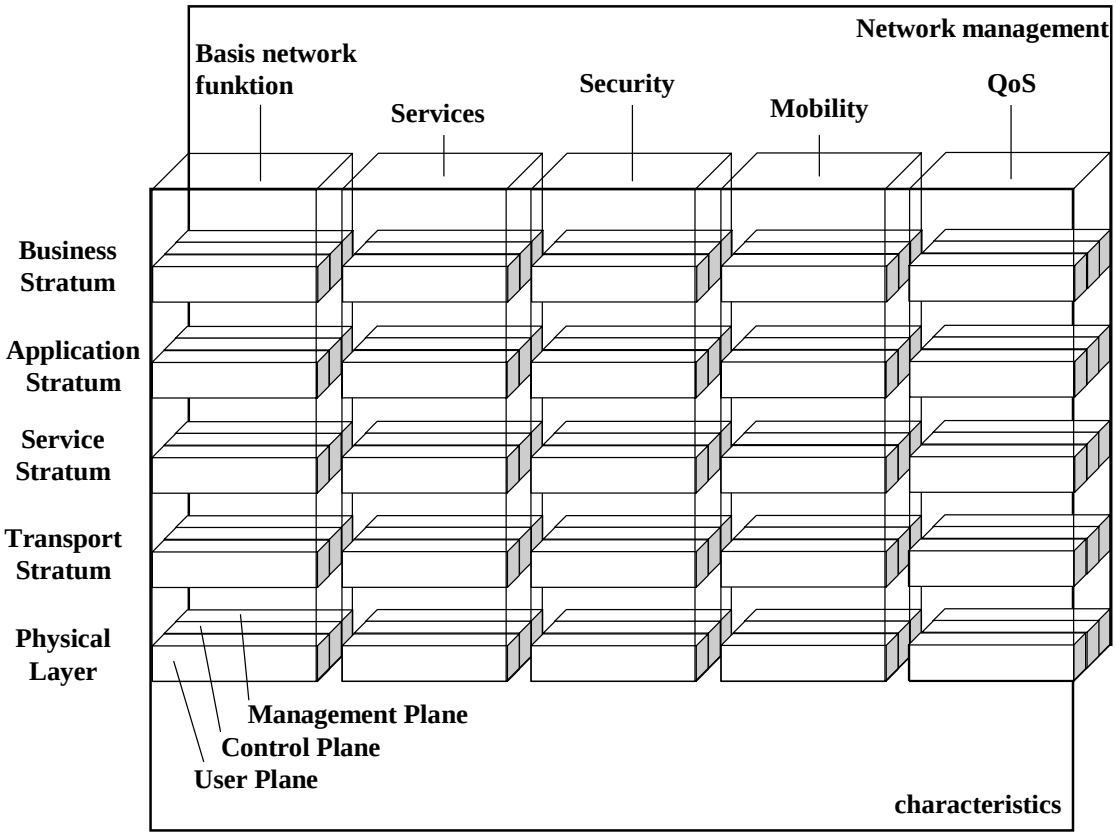

Figure 1: New model for the design, the migration and optimization of telecommunication networks