ESG-NetCOP

Network Configuration, Optimisation and Planning Tool

PS Core Network Planning

ESG-NetCOP supports the logical design of a modern packet-switched core network. The overall goal is to produce a network that ensures operation of packet-switched applications with a certain Quality of Service (QoS) and an optimal cost.

Network Modelling

The modelling of a PS core network involves a detailed modelling of network elements (SGSN, GGSN, BG etc.) and of logical interfaces between them. Following the general concept in ESG-NetCOP, the network elements part of the network model use predefined releases which define their main functionality and limits. Access Point Names (APN) are modelled as virtual elements connected to GGSN, which take part in the traffic distribution matrix.

Subscribers' Traffic Modelling

Prerequisites for planning the PS core network are applications and their usage by subscribers (traffic model), used to calculate the logical traffic flow between different network nodes (traffic matrix). NetCOP allows the definition of any number of applications with a granularity varying from high level applications such as HTTP, e-mail, video streaming etc. down to the radio bearer level when necessary.

Each application is characterised by a set of key parameters that are used by the dimensioning algorithms. Based on these key parameters, the planning process ensures that the defined application can be supported by the network with a certain QoS.

The traffic model is derived from traffic measurements or from experience and estimates, and contains the following data, on a per application basis:

- PS data rate: average traffic amount per subscriber
- PS traffic split: traffic separation based on destination (APN, GRX)
- PS usage intensity: busy hour call attempts, session duration etc.

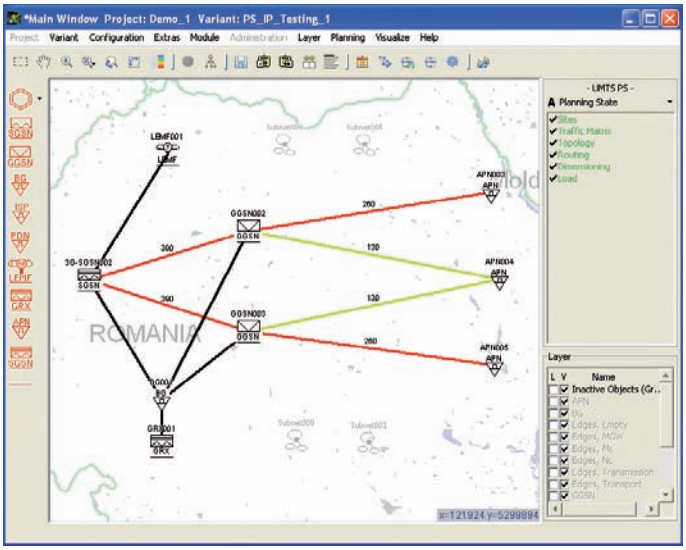
Regional specifics can be taken into account by defining local traffic models for each SGSN region.

Traffic Matrix

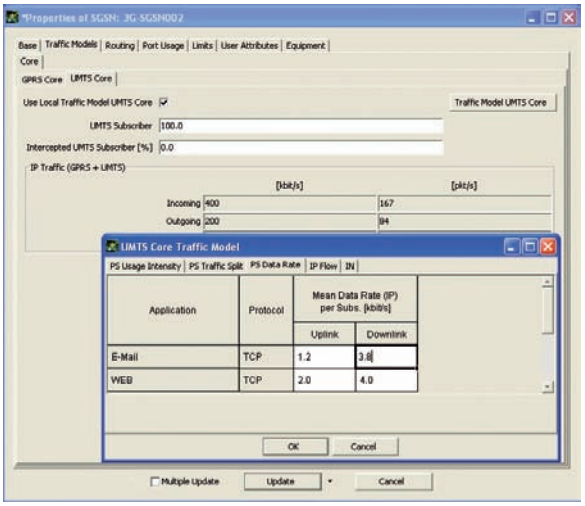
The basic information required for network planning is the amount of traffic that needs to be exchanged between network nodes. This information is given in compact form through the end-to-end traffic matrix, separate for GPRS and UMTS applications, describing the amount of traffic to be exchanged between nodes that support subscribers (e.g. SGSN and GGSN).

HIGHLIGHTS

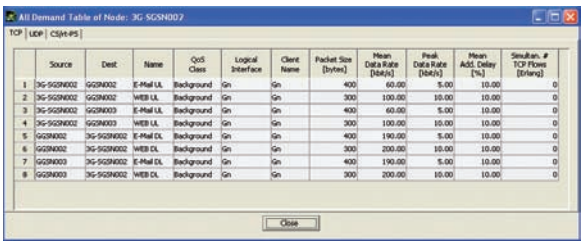
- Detailed modelling of the traffic relationship between all network nodes
- Determination of logical routing tables for up to eight alternative routes
- Permanent observation of defined network limits
- Load analysis of existing network
- Extensive possibilities for visualisation of network properties and results



PS core network topology



Local SGSN traffic model



SGSN TCP traffic demands

Dimensioning of Interfaces

Dimensioning of the network applies the latest results of the queuing theory. The traffic of PS applications sometimes suffers a significant increase due to various protocol stacks involved throughout the network (such as TCP over IP over ATM/AAL5). Therefore, ESG-NetCOP supports a detailed protocol stack definition, on a per logical interface basis (e.g. Gn, Gp, Gi), in order to simulate the total overhead which needs to be taken into account while calculating the required bandwidth. The impact of different protocol stacks on the total capacity required can be easily simulated.

The result of the PS planning process is the bandwidth requirement, which is forwarded to the IP transport layer (covered by the ESG-NetCOP IP/MPLS module) in the form of traffic demands.

Evaluation of Various Network Topologies and Routing Schemes

Multiple network topologies with regard to the number of SGSN, GGSN, Border Gateways (BG) etc. and connectivity between them can be created and analysed in terms of cost and performance. Different configurations of GGSN nodes in terms of Access Point Names (APN) can be evaluated. The planner can also modify the logical routing tables of the PS core elements (e.g. to control the load split between GGSNs) and observe how traffic is re-distributed through the network and how the loading of different interfaces changes. Routing tables are automatically analysed for routing loops, and any routing problem is immediately brought to the planner's attention.

Network Load Monitoring

A set of pre-defined limits of core equipment, like maximum number of simultaneously PDP contexts, PDP context activation rate etc. are permanently supervised by NetCOP during the planning process. Overload conditions are immediately reported, both graphically and via detailed log messages. In addition, a large number of network resources and parameters can be optionally monitored and visualised.

Scenario Analysis

The number of subscribers and the way they use the applications in a network are continuously changing. Using ESG-NetCOP traffic simulation capabilities (e.g. modify the traffic model on one SGSN or alter the traffic distribution matrix), the planners can examine the impact of additional load on existing interfaces and all installed equipment.

Benefits

- Optimisation of network topologies with regard to cost and performance
- Easy upgrade planning for different scenarios
- Network analysis of current and future networks
- Estimate the impact of changes of application usage/network structure on network performance