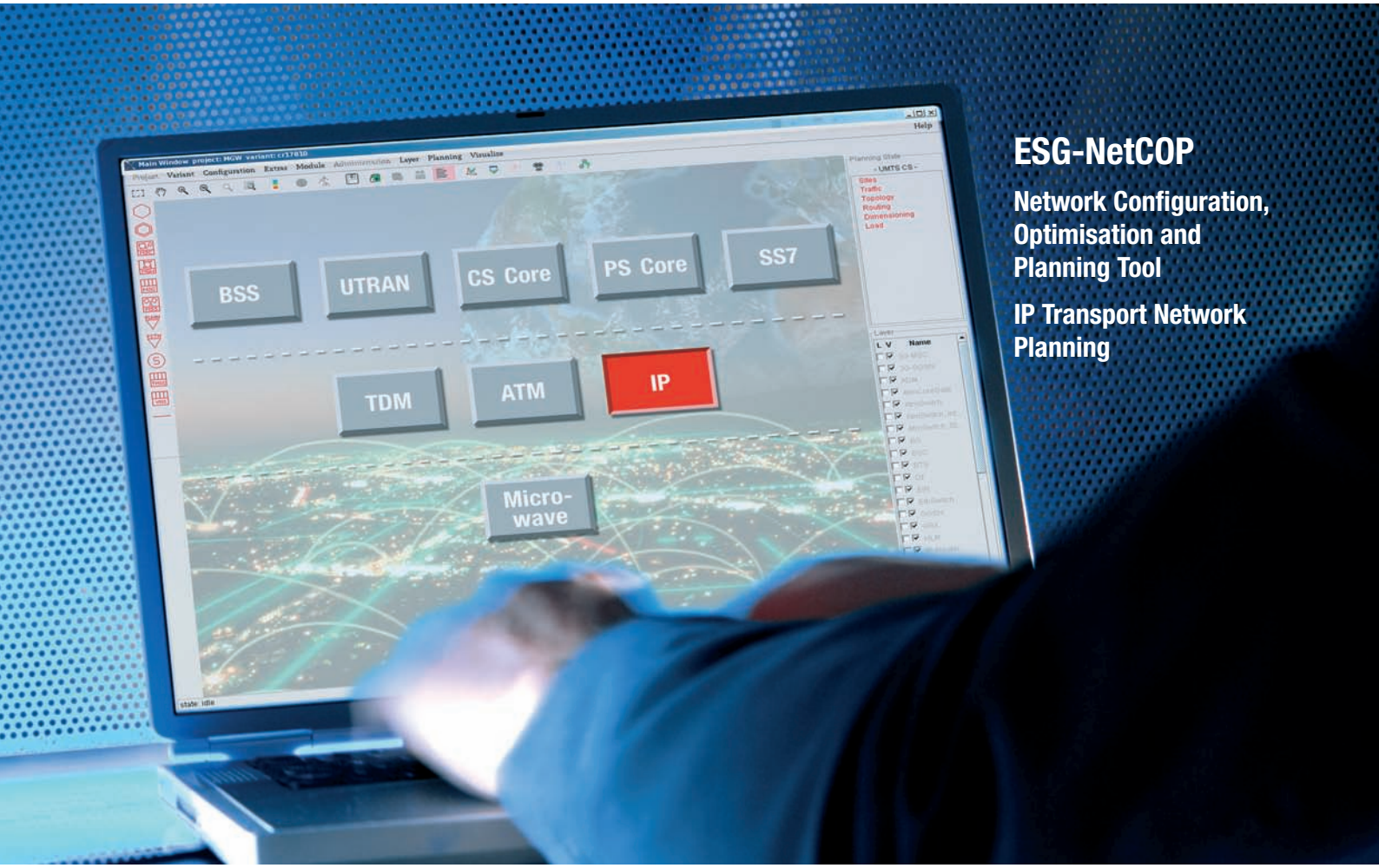


ESG-NetCOP

Network Configuration, Optimisation and Planning Tool

IP Transport Network Planning

Overview

The NetCOP IP module assists with the planning and optimisation of multi-service and multi-vendor IP transport networks independently from the applications generating traffic demands, mobile GPRS/UMTS or fixed network services.

Functionality and Main Features

The IP module handles traffic demands generated by GPRS / UMTS core modules, and traffic demands imported from external databases. The demands are routed over the IP transport network. If Ethernet is the underlying technology, the IP module also performs the link dimensioning, taking into consideration the configured protocol stacks and the desired network GOS (Grade of Service). In the case of ATM, the IP module generates new traffic demands transferred to the NetCOP ATM module for further routing, link dimensioning and device configuration. Each action of the IP module is supported by a set of powerful, user-configurable simulation algorithms.

Network Topology Modelling

Using standalone IP routers and integrated IP routers with the logical GPRS/UMTS network, elements as SGSN are connected via IP links. The IP routers are derived from pre-defined node releases containing basic configuration parameters and limits. The limits are automatically monitored during the planning cycle. The IP routers may contain integrated Ethernet or ATM switches for modelling the underlying network topology.

IP Addressing and Routing

Featuring IP interfaces with full support of IP addressing and static or dynamic routing, the IP routers compute and maintain the routing and forwarding tables based on the routing protocols configured in the network as RIP, OSPF, BGP or ISIS. The real time, TCP and UDP traffic demands are then routed between source and destination accordingly.

Modelling of Virtual Private Networks (VPN)

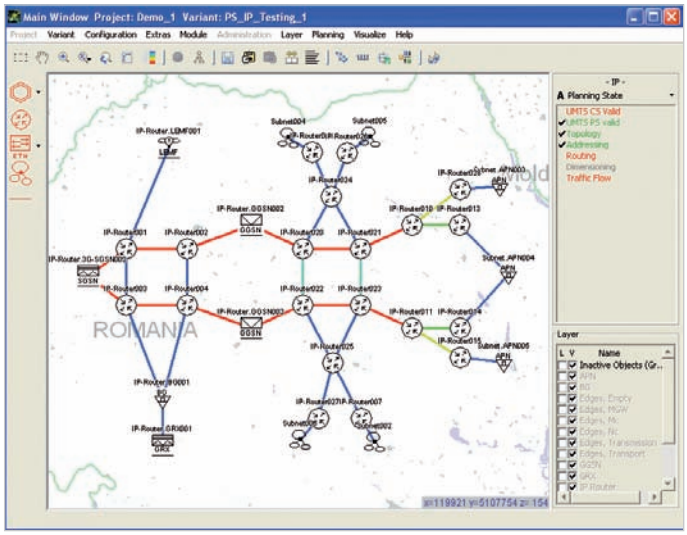
As VPNs are widely used for both internal purposes and services offered to your customers, the IP module of ESG NetCOP supports the modelling of various technologies and concepts that VPNs are based on, such as: BGP MPLS (known as RFC 2547bis), IPSec, GRE, L2TP, IP Virtual Routers

Link Dimensioning and Traffic Analysis

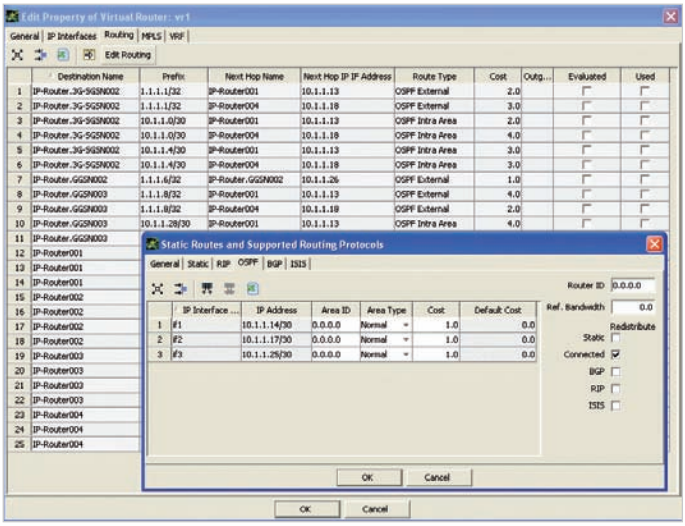
Dimensioning calculates the bandwidth necessary to carry the aggregated demands on a connection so that QoS targets are met. FFM simulates the behaviour of TCP flows at individual router queues (e.g. packet drop probability), and end-to-end (e.g. delay). The use of FFM simulations allows QoS concepts to be evaluated, and the parameterisation of router queues to be tuned.

HIGHLIGHTS

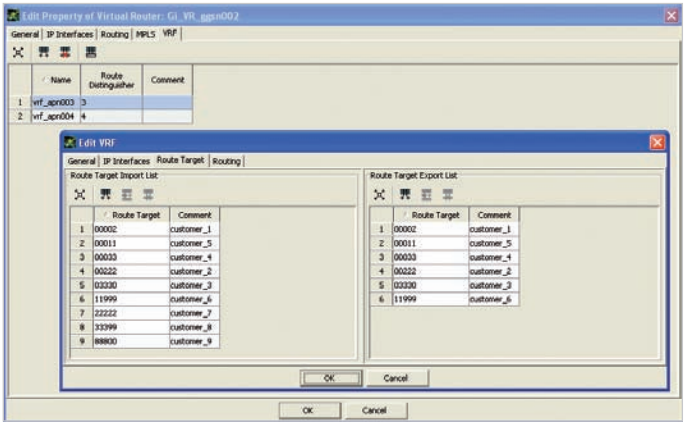
- Support of IP interfaces, addressing/subnetting
- Automatic creation of IP routing tables based upon static routes and dynamic routing protocols as RIP, OSPF, BGP and ISIS
- Modelling of Virtual Private Networks (VPN) based on tunnelling technologies like IPSec, GRE, L2TP
- MPLS-based VPN
- Use of advanced queuing models for link dimensioning
- Use of Fluid Flow Model (FFM) for traffic analysis



IP core network topology



IP routing table



VRF route target list

Planning Scenarios

Evaluation of Various Network Topologies and Technologies

Multiple network topologies with regard to the number of IP routers, connectivity between them or underlying technology (Ethernet or ATM) can be created and then analysed in terms of both cost and performance.

Evaluation of Various IP Routing Schemes

As usually not all IP routers in a network equally support all existing routing protocols, specific combinations of static routes and dynamic routing protocols must be analysed to achieve the best performance. A particular example is the planning and analysis of commonly used IP load balancing and redundancy mechanisms such as ECMP and VRRP.

Focused Planning on One IP Routing Path or VPN

Finding the network elements and links involved with one particular IP routing path or virtual private network becomes a challenge when the network grows. To master this, the IP module allows a focus on the involved planning objects only, isolating them from the environment. This helps to increase planning efficiency and accuracy.

Network Load Monitoring

A set of pre-defined limits of IP routers, like maximum throughput and number of parallel TCP or UDP flows, are permanently supervised by NetCOP during the planning process. Overload conditions are immediately reported. Furthermore, a large number of network resources and node parameters can be optionally monitored and visualised. This gives planners an instant view of occupied or available resources like links, ports, bandwidth etc.

Failover Scenario Analysis

In the live networks it is crucial to know how failures of the installed network elements affect the offered services. To support this task, NetCOP IP module performs a complete analysis in the case of node or link failures, reporting all affected services. Alternative paths are offered based upon the recalculated routing tables. Furthermore, identification of single points of failure in the network assists to plan a stable, reliable, redundant transport network.

Benefits

- Layered approach of network planning, perfectly suited for UMTS / IP
- Optimisation of network cost across layers
- Full integration with NetCOP ATM module for ATM dimensioning and provisioning
- Evaluation of complex planning concepts
- Simulation of traffic flow under various routing and QoS schemes
- Analysis of failover scenarios, including identification of single points of failure