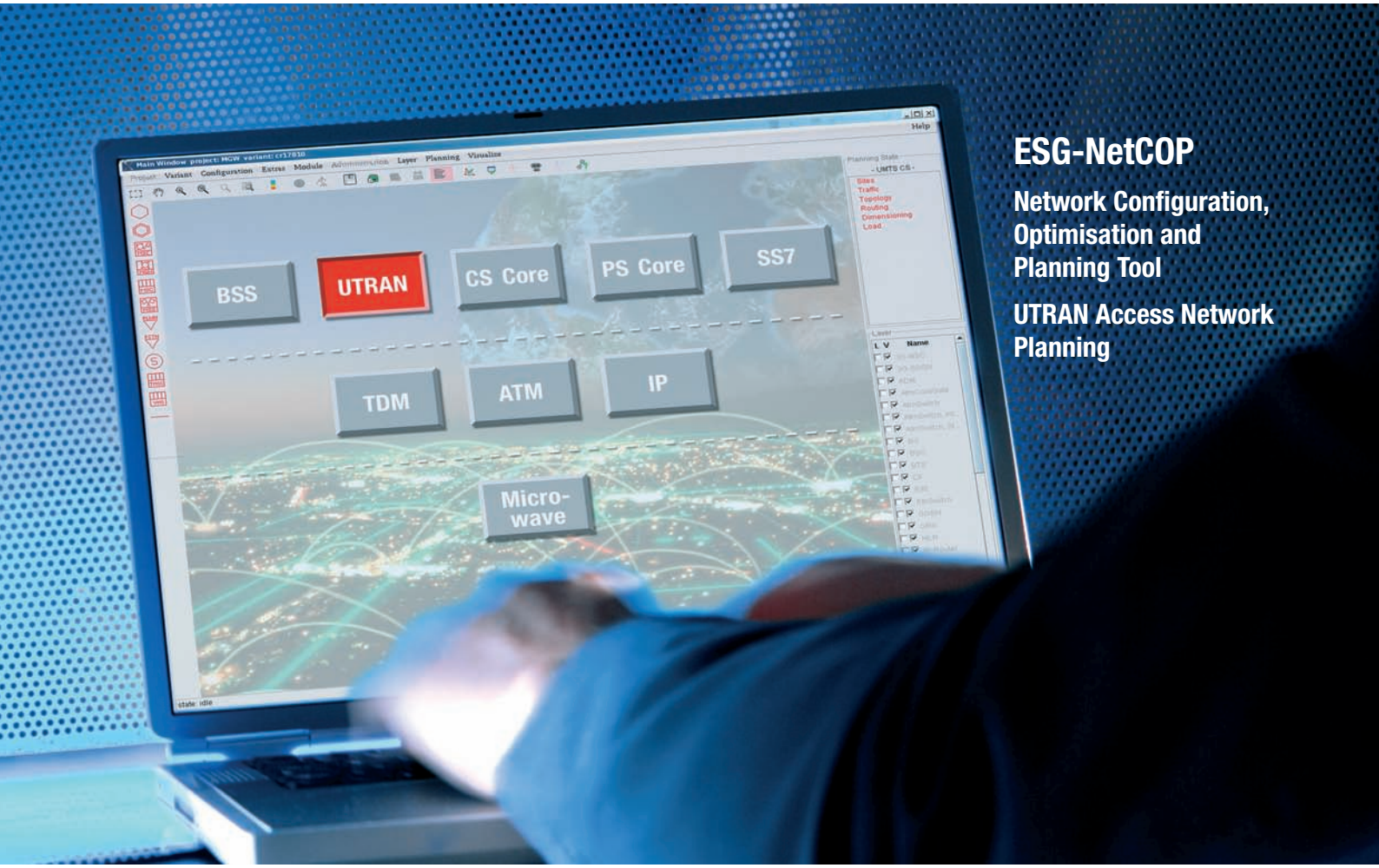


ESG-NetCOP

Network Configuration, Optimisation and Planning Tool

UTRAN Access Network Planning

Planning Basis

UTRAN access network planning usually starts with importing radio network planning data from the current network. This consists of the sites where UTRAN network equipment is located and important information regarding configuration of the NodeBs (e.g. number of sectors, data rate per busy hour).

Alternatively, predefined NodeBs can be distributed automatically in the planning area, e.g. depending on the subscriber density, or can be collocated to existing BTS.

UTRAN Network Planning

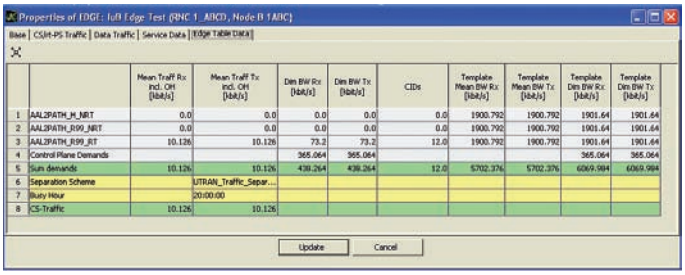
To support UTRAN design at the logical level, ESG-NetCOP optimises the regions for 3G-MSC and 3G-SGSN nodes in the network. NodeBs are assigned to these switching nodes to keep the connection cost low, while taking care of the load at each switching node.

Based on these MSC/SGSN regions, the tool determines the number of RNCs required and their respective locations. Here the algorithm trades off the cost of an RNC against the savings possible by reduced link lengths. The planner may manually rearrange the RNC regions. When re-homing a NodeB to another RNC, all relevant equipment limits of the RNC (e.g. max. number of supported NodeBs) are continuously monitored. Any capacity violation is immediately brought to the planner's attention. Successful region planning assumed, a topology algorithm determines a cost-effective way to connect the NodeBs to the RNC.

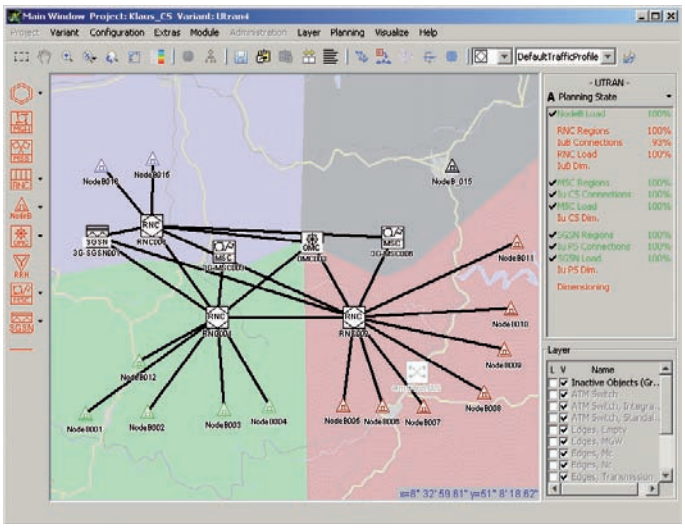
The traffic mix coming from each NodeB is determined by the number of subscribers per NodeB, together with the defined (TCP or UDP) application and the traffic models describing their frequency of use. During this process both soft handover and drift handover traffic is taken into account. On this basis the required link bandwidth (at ATM level, i.e. IP layer) for each connection is computed. The total capacity required for circuit-switched applications is determined by using the multi-dimensional Erlang formula while for packet-switched applications, the queuing theory is applied, together with a generic definition of protocol stack processing.

HIGHLIGHTS

- Modelling of any type of CS and PS application expected to be carried within the network
- Calculation of the required number of RNCs, MSCs and SGSNs
- Placement of RNCs, MSCs and SGSNs in the planning area
- Creation of RNC, MSC, and SGSN regions
- Cost-efficient connection of NodeBs to RNCs to MSCs/SGSNs
- Automatic dimensioning of the access network, deriving the bandwidth required between all nodes
- Extensive possibilities for visualisation of network properties and results



Edge property sheet showing the applications routed inside an edge



This figure shows a UMTS access network (UTRAN). The RNC regions are coloured

As a result, (logical) traffic demands that need to be exchanged between NodeBs, RNCs, 3G-MSCs, and 3G-SGSNs are obtained. As well as this user data traffic, it is possible to define additional demands, e.g. to model the signalling traffic or O&M traffic present in the logical layer. The demands coming from the logical layer are collected in a demand table and forwarded to the ATM layer which serves as the transport layer for the UTRAN module.

The ATM layer is handled in a separate ATM module which receives the demands and routes them over the transport topology.

Access Network Analysis

ESG-NetCOP supports detailed modelling of UTRAN sites. Besides the usual information (e.g. name, location in coordinates, address), the capacity of each site can be stored (e.g. the available floor space). Since information about the floor space required per node can also be modelled, you can immediately decide whether a specific site should be upgraded at all. With this feature ESG-NetCOP enables you to monitor large numbers of UTRAN/ sites, to pinpoint sites that are likely to cause upgrade problems in the near future, and to plan appropriate actions in advance.

The number of subscribers in actual operating networks is continuously increasing. Reliable estimations of the traffic volume and the required bandwidth are therefore very important for such multi-service networks. Using ESG-NetCOP traffic simulation capabilities, you can, for example, examine the required link bandwidth on the basis of the traffic generated by the usage of the CS and PS applications offered in the network. Dimensioning is performed in such a way that the user-defined requirements for QoS (blocking probability for CS applications and delay time for PS applications) are met. So you can receive information on the network performance under the changed conditions within minutes.

Benefits

- Optimisation of access network topologies with regard to costs and link load
- Quick assessment of re-homing activities (both NodeB and RNC) and the consequences for the network
- Rapid re-dimensioning of the UTRAN network in response to changed number of subscribers/ application usage
- Analysis of current and future networks