ESG-NetCOP

Network Configuration, Optimisation and Planning Tool

SS7 Network Planning

The ESG-NetCOP signalling (SS7) planner supports the user in designing the signalling part of a GSM and UMTS core network. It provides a highly detailed view of the signalling traffic flow, with accurate figures for signalling load. This feature allows the load of the control processor (CP) that handles SS7 messages to be assessed.

SS7 Network Planning

ESG-NetCOP supports MAP, ISUP and INAP/CAMEL protocol layers. Signalling traffic is triggered by signalling events. In ESG-NetCOP, about 100 different signalling events are modelled, such as events caused by:

- Payload traffic exchanged within the circuit-switched/packet-switched core network (e.g. mobile terminated voice calls, web browsing, video conferencing)
- Subscriber mobility (handover, location update, routing area update, detach, paging)
- SMS, call forwarding to VMS, CCBS, NICA and authentication

Each signalling event consists of a sequence of transactions. For each of these transactions, the user may define the number of message signalling units (MSUs) and its average size in order to adapt the tool to the specific situation found in the operator's network.

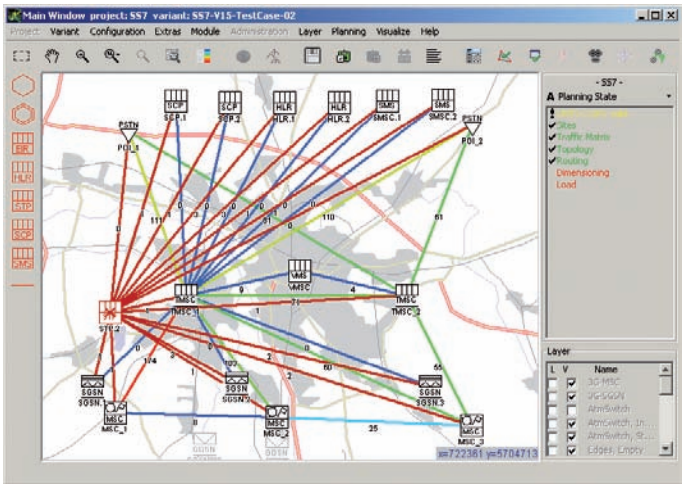
A highly detailed SS7 traffic model is used to characterise the behaviour of subscribers in the network in terms of triggering SS7 traffic. Regional specifics can be taken into account by defining a local traffic model for every switch. The signalling traffic to be exchanged between the signalling end-points is calculated in the form of an end-to-end signalling traffic matrix.

The starting point of SS7 network design are the end-to-end traffic demands, as calculated in the traffic matrix. Connections between the SS7 nodes are defined. In addition, the planner may introduce stand-alone STPs to forward signalling traffic without imposing extra load on signalling control processors.

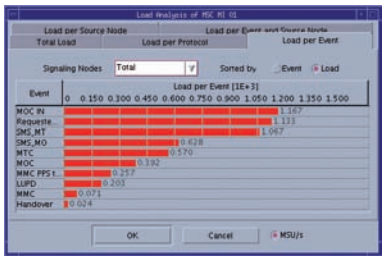
ESG-NetCOP computes SS7 routing tables to determine paths between the signalling end-nodes with regard to the selected strategy: associated or quasi-associated routing. SS7 traffic flows through the network are computed and the number of SS7 links (NBSL and HSL) in a trunk group are dimensioned.

HIGHLIGHTS

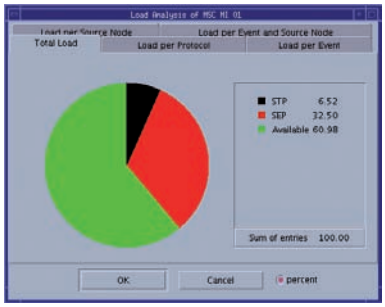
- Determination of the source/sink traffic relations between all signalling end-points of the network
- Design of an optimum SS7 network topology
- Computation of optimum SS7 routing tables
- Calculation of the SS7 traffic flow through the network
- Support of the user in assessing the signalling control processor load for all SS7 nodes
- Load analysis of existing network
- Single node/edge failure simulation
- Extensive possibilities for visualisation of network properties and results



This figure shows the influence of a failed STP for connectivity, the dimensioning, and the SS7 traffic of a SS7 network



Traffic analysis of the events of the used nodes



Traffic analysis of SS7 application parts of the used nodes

SS7 Network Analysis and Optimisation

To keep a SS7 network operational, it is essential that signalling control processors (CP) are not overloaded. ESG-NetCOP can be used to undertake a highly precise analysis of the SS7 load occurring anywhere in the network.

The performance of a signalling CP can be defined in terms of a maximum number of MSUs that it is able to process per second. Based on the calculated SS7 traffic flow in the network, it is known for each signalling node how many MSUs and of what size it has to process per second. Using this target load, ESG-NetCOP indicates CP loading due to the MSUs processed as signalling end-node (SEP) and the load due to MSUs simply being forwarded by the signalling node (acting as a STP).

Going into more detail, ESG-NetCOP can display CP loading as a function of the protocol that carries the respective MSUs. In this way it is easy to detect whether the load comes from e.g. the ISUP or MAP protocol.

The next highest level of detail indicates CP loading per SS7 event. It is therefore possible to detect, for example, that most of the load is caused by processing MSUs of SMS events, forwarding these MSUs to a SMSC. It is even possible to subdivide the load of a certain event with respect to the source node of this event.

With this detailed information, specific actions can be taken to remove any high load conditions within the signalling network in order to optimise signalling transfer routes e.g. route MSUs via a stand-alone STP instead of a switch.

The robustness of a SS7 network in terms of failures is of particular interest when characterising the quality of its design. ESG-NetCOP contains an algorithm that automatically performs a study of network sensitivity to single trunk group failures. The most sensitive trunk groups in the SS7 network can thus be found and alternative paths can be dimensioned in such a way that they survive such failures.

Benefits

- Optimisation of SS7 network topologies with regard to costs and link load
- Studying upgrade planning for different scenarios
- Detection of overload situations on signalling links
- Detection of overload situations on signalling control processor
- Forecast equipment and configuration requirements on your SS7 network due to changed subscriber behaviour