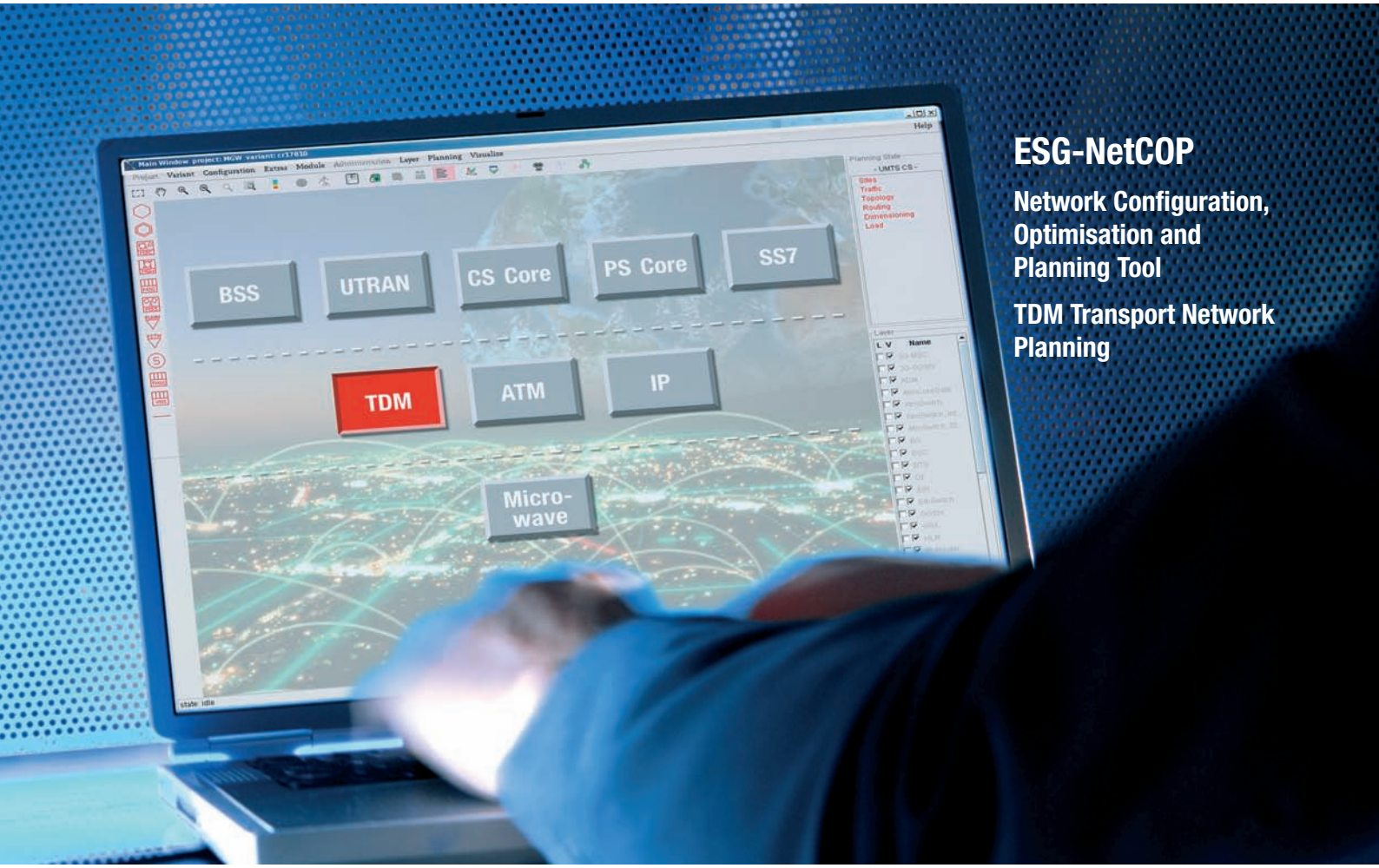



# ESG-NetCOP

## Network Configuration, Optimisation and Planning Tool

## TDM Transport Network Planning

### Layered Approach to Network Planning

The TDM module of ESG-NetCOP introduces the TDM layer as a transport layer of the GSM network. With this module, ESG-NetCOP supports an orthogonal layered approach which allows integrated planning of both the logical layer (client layer) and the data link layer (server layer).

Between the client layer and the server layer, the fundamental information to be exchanged consists of traffic requirements (demands) between pairs of nodes.

Each GSM node (e.g. BTS, BSC, MSC, SGSN, Media Gateway) has an integrated TDM switch. Furthermore, the TDM topology may be based on or extended by stand-alone TDM switches (cross-connects). The traffic requirements are passed to the TDM layer as traffic demands, consisting of channels with a certain granularity and a certain type (TCH, PDCH, Signaling, O&M). It is possible to manually add demands to this demand table and thus to model additional traffic that needs to be carried within the TDM layer.

The TDM layer covers the time division multiplexing of channels (8k, 16k, 32k, 64k) into E1 circuits.

The TDM module further covers the transmission layer by multiplexing E1 circuits into higher-order duct or microwave links (8xE1 MW, channelized STM1, etc.). Modelled nodes on the transmission layer include DFs (MDFs, LDFs, HDFs, DDFs), PDH / SDH ADMs, and MW equipment.

The TDM layer itself can act as the client layer of an ATM layer that offers CES services. This allows integrated 2G / 3G network planning, where transport and transmission resources are used to carry both types of traffic.

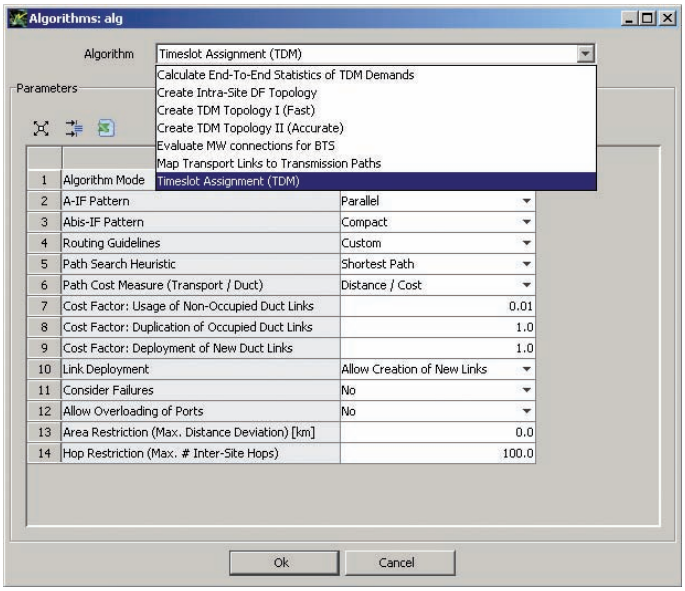
### Planning Objectives

The TDM module:

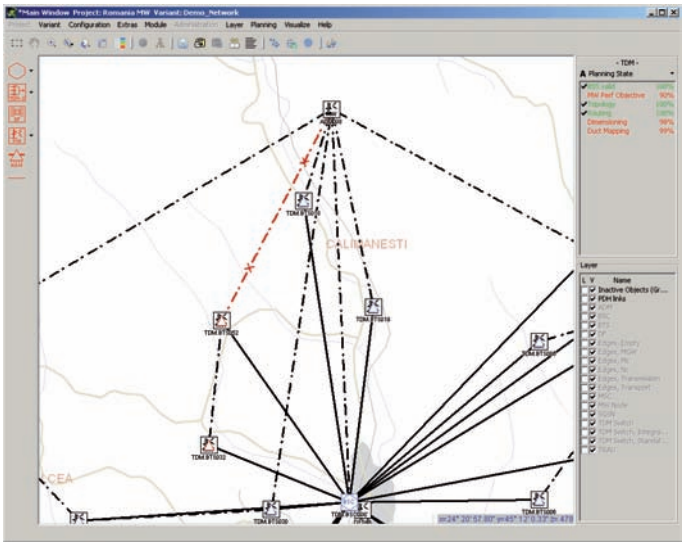
- supports the modelling of arbitrary network topologies below the BSS (drop-insert chains, cross-connects, microwave rings etc.),
- decouples constraints on the transport layer (ports, path length etc.) from constraints on the logical layer (traffic limits, subscriber limits etc.),
- accurately reflects existing capacities,
- supports manual, semi-automatic, and automatic routing of demands,
- allows the effect of failures to be analysed, and demands to be re-routed on alternative paths to circumvent problems caused by such failures,
- focuses on dedicated routing of demands or circuits in a geographical or logical view

### HIGHLIGHTS

- Modelling of network capacity on the transport (E1 circuit) and transmission layer (MW or PDH/SDH links)
- Creation of a cost-efficient network topology
- Manual, semi-automatic, and automatic routing of demands
- Least-cost routing over existing capacity or via proposal of new links
- Timeslot assignment
- Failure case analysis
- Powerful layout algorithms
- End-to-end availability calculation of demands




*Selection of algorithms and influence via parameters*



*Failure case scenario of a failed link (dropped BTS are highlighted)*

## TDM Planning and Configuration

The TDM module can model, plan and configure a TDM network. In particular, the extension of an existing TDM network based on changed demands and/or a modified topology is supported. The tool dimensions all TDM connections (i.e. it creates the needed E1 circuits and a corresponding route over transmission links), and maps the channels of the demands to timeslots within the E1 circuits.

The topology and the routing of demands can be imported or can be determined by the TDM module. The routing of each particular demand can be influenced by defining waypoints i.e. nodes and/or ports over which the demand shall be routed. Between waypoints, the demands are routed least-cost, considering constraints and unused capacity within the transmission layer. The least cost optimisation goal can be influenced by the user via trade-off factors e.g. between existing and new capacity.

## Provisioning

The TDM module provides all information which is necessary to order new leased lines, to upgrade microwave connections or to configure new routes over unused capacity.

In addition, the TDM module produces all information which is relevant for an automatic configuration. This includes the mapping of channels to timeslots (also called timeslot assignment or link pattern), and the mapping between links and ports/slots of transmission equipment.

## Benefits

- Layered approach to network planning, perfectly suited for GSM/TDM
- Optimisation of network cost across layers
- Capacity planning, taking into account shared resources between TDM and ATM
- Effective support of TDM provisioning tasks
- Impact analysis of network failures