BDT workshop on Network Planning

Module 1: Introduction and Experiences in the Region
Module 2: Role of Network Planning in the current Telecom scenario
Module 3: Integrated Planning Process
Module 4: Specific Network Planning per Layer
Module 5: Supporting Network Planning Tools
Content Chapter  5.3
Network Planning Tools

- Objectives and classification for the different tool types
  - Overall techno-economical evaluation
  - Network design and optimization
  - Network evaluation and simulation
  - Tool mapping per class

Network Planning Tools:
Tool examples per category

- Overall techno-economical evaluation:
  - STEM, Excel applications

- Design and Optimization:
  - Planitu, NetWORKS (Trans, Switch, IP, etc.), VPI-Maker, CHIRplus

- Detailed design and Configuration:
  - VPI-Configurator, NetWORKS - Pro, CIRCEE

- Analysis and Simulation:
  - OPNET, COMNET, SPECTRA
Network Planning Tools: **NetWORKS**

**Objective:** NetWORKS by Detecom (Germany) is a Telecom network planning tool to design, optimize, dimension and document several network layers and technologies as: Switching, Transmission, Cable, Mobile, IP, Signalling, etc.

networks.info@detecon.com
Network Planning Tools: NetWORKS
Network Planning Tools: NetWORKS

The network model used in NetWORKS-Switch comprises three layers: the upper layer covers the technical resources of the network, the middle layer shows the configuration of the network, and the lower layer indicates the assignment of the network.

- Traffic Analysis
- Network Planning
- Signaling Network
- Non-terminal Network
- Terminal Network
- Transport Network
- Telecommunication Theory
- Network Operation

The network planning process for hierarchical and non-hierarchical switching networks is also supported. This process includes:

- Evaluation of traffic scenarios
- Building of network switches for hierarchical networks
- Calculation of loads and capacities, including dimensioning with correlation of network planning and network assignment
- Optimization of user access points
- Dimensioning of network gateways
- Estimation of costs
- Generation of routing tables for switches and reports for dimensioning the trunk
- Finding the demand for transmission channels for the underlying transmission network.
Network Planning Tools: NetWORKS

Application Tools
Planning and Optimization of SDH and PDH Transmission Networks

NetWORKS is an application for designing and optimizing transmission networks using advanced techniques. It enables users to perform network planning, optimization, and analysis with ease.

- Design: Considering lines and links, network topology, and transmission parameters.
- Optimization: Minimizing costs while maximizing network performance.
- Analysis: Simulating network behavior under various conditions.

NetWORKS Model
The network model used in NetWORKS is designed to facilitate easy and efficient network planning.

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Network Planning Tools: NetWORKS
Network Planning Tools: NetWORKS

Presentation
- Calculation
- Optimization
- Documentation

NetWORKS supports you in these steps during the planning process for 2G and 3G mobile fixed line networks. This involves:
- Traffic planning for different services
- Cost and capacity-oriented design of the access area (for connections BTS- MSC, MSC-MSC, NODE-B- MSC, SCC- MSC)
- Dimensions and physical structures
- Examinations of loads and capacities including manning.
- Examinations of cost
- Generation of priority levels
- Determination of the demand for transmission channels for the planning network.

In many cases there is a decentralized planning of the access network by the subsystems of a network operator. For doing so, an import file basis are the dumps from a network database. This application Mobile Access shows you the whole planning process in a clear and easy way.

Planning the core network (MSC and gateway), however, has to be done by the network operator himself. Also in this case the access to a network database is useful. By using the application Mobile Core...
Network Planning Tools: NetWORKS

Due to the high complexity of 2G+3G-mobile fixed-line networks, there are more different parts of these models, and the radio sections, traffic analysis, and the like. This slide focuses on the technical overview of the NetWORKS model.

For GSM and GPRS, there are separate structures in the core network. The UMTS model is a hybrid of these two. The network model also provides object groups for a UMTS core network based on packet switching, which enables the integration of appropriate planning templates.
Network Planning Tools: NetWORKS

NetWORKS - ATM

for the Planning of Networks with ATM Technology

- Traffic Planning
- Network Design
- Capacity Planning
- Cost Calculation
- Cost Allocation
- Documentation of Allocation (VC, VP)
- Device Configuration

Network Planning Tools: NetWORKS

Presentation
Edition
Calculation
Optimization
Documentation

Network Model and Planning Ways

The network model defines an ATM layer which can be related to adjacent layers. There are three phases in the planning process with NetWORKS-ATM:

Design
- With taking into account the device locations, the transmission needs,
Network Planning Tools: NetWORKS

Algorithms and other Application Functions

- Man application functions of NetWORKS are algorithms which you can adapt to and use on your (individual) PC. This enables you to follow your individual planning line according to your personal interests and needs.
- NetWORKS-ATM also extends the graphical and tabular functions considerably. Some typical application functions are:
  - Planning of ATM traffic contracts (see dialog example)
  - Definition of the working in specific routing algorithms for ATM network (VPI)
  - Testing the availability of the physical containers and defining bottlenecks
  - Path calculation
  - Section of path and configuration for the route
  - Customized input and export filters for the coupling with databases.
Network Planning Tools: NetWORKS

Flexible Algorithms for Planning and Optimization Various Telecommunications Networks

AlgorithmPro is an application for high-level demand on capacity in planning and optimization of telecommunications networks concerning various technologies such as PSTN, ISDN, X.25, and X.75 and various network architectures such as switched networks, fixed networks, mobile networks, and virtual networks.

Each node in a complex planning system has been considered as an oriented algorithm, do you just to practice, to reach your own planning strategy. The tool data structure you use is in a certain order. The condition each algorithm has access to all data elements defined in the model, the metrics parameters, combined both as input and output, which are the algorithms to solve the example of the missing algorithm.

Methods of operations Research

The following methods of graph theory, spanning tree and reliability theory, as well as integer and non-linear programming are implemented in algorithms of NetWORKS:

- Shortest paths in graphs (Diagonal, Floyd, A* with hop number relaxation)
- Shortest paths in graphs (Dijkstra, Bellman, Floyd, Szwarczewski)
Network Planning Tools: NetWORKS

- Presentation
- Edition
- Calculation
- Optimization
- Documentation

NetWORKS supports you in making those steps during the planning and optimization process for different highly flexible telecommunication networks. The tool is

- various algorithms:
  - STP (Shortest Path)
  - Dijkstra's algorithm
  - Bellman-Ford algorithm

- various network architectures:
  - packet switched, broadband networks, variable number of network levels, various network layers
  - various network scenarios:
    - call, voice, data, video, multimedia
  - various dimensioning tables (multiplexing, transmission rates, traffic, error rates, etc.)
  - various routing algorithms:
    - Dijkstra, Bellman-Ford, and others

NetWORKS is characterized by:
- comprehensive modeling, even with physical and logical layers in one picture
- user-friendly planning tasks, which can be arranged in a logical order
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- interactive support for the network planning cycle, allowing for real-time adjustments

NetWORKS provides tools for:
- nodal analysis
- flow diagrams
- network planning
- traffic analysis
- site planning
- capacity planning
- cost analysis
- network management
Network Planning Tools: NetWORKS

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