

Reference Manual Telecom Network Planning for Evolving Network Architectures

Version 01 – 2003 :

- **210 pages**
- **16 references within the text**
- **6 additional reference documents (contributions)**

Version 02 – 2004 :

- **334 pages total**
- **78 references within the text total**
- **2 new additional reference documents**

Who should use the NP Manual

The Reference Manual is intended for use by network planning experts from telecom operators, policy makers and regulators to facilitate the development of their respective strategies for evolution of the present network architectures and transition to the next generation networks - NGN.

The Reference Manual on the Telecom Network Planning for evolving Network Architectures intends to present an objective and technology neutral view of the issues to be addressed in the planning of the transition to NGN.

Content of the NP Manual

This reference Manual comprises 8 chapters and 3 annexes, each of which could be updated periodically, due to the rapid changes in the telecom networks.

Typical reason for revisions in the manual could be:

- **introduction of innovative network technologies and corresponding planning methods**
- **appearance of new or improved planning tools on the market**
- **the need for better explanations in the presented material**

Content of the NP Manual – Chapter 1

Chapter 1 provides the objectives and context of the manual as well as the content of the different chapters and relation to other ITU activities and documents.

Chapter 1 – Introduction :

➤ *ITU Vision on Network Planning*

➤ *WTDC-02 PROGRAMME 2: TECHNOLOGIES AND TELECOMMUNICATION*

NETWORK DEVELOPMENT – Point 1.3

➤ *Who should use this Manual*

➤ *Content of the Manual*

Content of the NP Manual – Chapter 2

Chapter 2 will review the aspects that a planner is confronted with when taking decisions on what to do in the network evolution, when to perform the changes, how to perform the corresponding actions and which processes to follow.

Chapter 2 – Overview of network planning

- **Network planning processes**
- **Overall plans per network layer and technology**
- **Solution mapping per scenario**
- **Relation among technical, business and operational plans**
- **Planning issues and trends when reaching NGN**

Content of the NP Manual – Chapter 3

Chapter 3 addresses the needed modelling and characterization of services that is required for the planning activities.

Chapter 3 – Service definition and forecasting

- **Customer segments**
- **Services definition and characterization. Categories**
- **Services mapping to customer segment**
- **Service forecasting per segment**
- **Service bundling**
- **Service security**

Content of the NP Manual - Chapters

Chapter 4 will give generic traffic characterization. Due to the overall modeling of the network for planning purposes, the needed traffic characterization is less detailed than the one needed for detailed system design.

Chapter 4 – Traffic characterization

- **Traffic units for service characterization**
- **Reference periods for dimensioning**
- **Traffic aggregation process**
- **Traffic matrix**
- **Traffic models**

Content of the NP Manual - Chapters

Chapter 5 gives an overview on the economic modeling for planning and different evaluation procedures.

Chapter 5 – Economical modelling and business plans

- **Business planning**
- **Economic modelling for planning**
- **Economical concepts and terms**

Content of the NP Manual - Chapters

Chapter 6 describes different network architectures and special attention is drawn on the next generation network (NGN) and the migration scenarios from the current TDM networks.

Chapter 6 – Network architectures and technologies

- Network architectures
- New network technologies (MPLS, Ethernet, Wi-Fi, etc.)
- NGN solutions and migration steps

Content of the NP Manual – Chapters(cont.)

Chapter 7 presents an overview on the diverse models and methods used in the telecommunication network planning.

Chapter 7 – Network design, dimensioning and optimization

- Core Network
- Access Network
- Basic optimisation methods
- Specific Issues of Radio Network Planning
- Additional design and dimensional problems

Content of the NP Manual – Chapters(cont.)

Chapter 8 lists the main input data needed for network planning. Network planning, especially performed with NP tools, requires collection of numerous data.

Chapter 8 – Data gathering

- **Geographical information for the studied area**
 - **Vector and Raster data**
 - **Background Maps for Display and Visualization**
- **Demand of services and traffic**
- **Existing network and infrastructure**
- **Telecommunication equipment and costs**

Content of the NP Manual – Annexes

Annex 1 presents a portfolio selection of planning tools to support different planning activities. The selection criteria are: capability to model modern technologies, commercial availability and being well proven in the field.

Annex 1 – Network planning tools

- **Application of EXCEL**
- **PLANITU – ITU**
- **STEM**
- **NetWORKS**
- **VPIsystems**
- **Lstelcom**

Content of the NP Manual – Annexes

Annex 2 provides selection of most frequent case studies (i.e.: Network extension, transmission, signaling, migration to NGN, mobile, etc.) in order to illustrate the application process.

Annex 2 – Case Studies

- **Consolidation of national transit network**
- **Broadband access planning for major cities**
- **Voice over IP over WDM**
- **Mobile network coverage**

NP Manual - Version 03 - 2005

Possible activities for Version 03(not started yet) :

- **Enforcing of Version 02 in some topics**
- **Fixed Mobile Convergence (FMC) issues.**
- **Extension of Mobile networks coverage and access planning.**
- **Special issues for rural networks planning.**
- **Complete network planning case study with data from a developing country.**

Network Planning Tools Specs (NPTS) Content

- **Objectives of the specs**
- **Need for multiple tools and support**
- **Document structure**
- **Type of requirements**
 - Technical requirements per domain
 - Tendering requirements

Network Planning Tools Specs Objectives

- **Context**
 - Today the higher number of options for telecom solutions and services with the complexity of planning increases the needs for a systematic and reliable planning methodology
- **Objective**
 - Following ITU mandate and agreements, the Reference Document, Network Planning Tool Specs (NPTS) is defined to meet countries' requests for assistance in the field of Network Planning for Developing Countries and Countries with economies in transition.
 - Document will provide support in the network planning activities, technical requirements for tools and selection criteria for tools that fulfill the requirements

Network Planning Tools Specs Users

- **Users of the NPTS**

- The Reference Document on NPTS is intended for use by network planning experts and managers from telecom operators, policy makers and regulators

- **Reference document**

- *Reference Manual on Telecom Network Planning for Evolving Network Architectures* Version 02, ITU, Geneva, 2005

link : <http://www.itu.int/ITU-D/tech/network-infrastructure/index.html>

- Background for the content is the experience on planning projects, the needs by operators in competition and the know-how of capabilities of new technologies

Network Planning Tools Specs Need for multiple tools

- **Multiple dimensions of the planning activities**

- Due to timeframe for planning at short, medium or long term
- Due to variety and complexity of network solutions
- Due to new technologies
- Due to different network layers
- Due to planning type: strategic, tactical or operational

- **Need for combination of tools**

- Tools should specialize to solve different problems
- Interrelation is needed to combine evaluations and decisions
- Assessment is required to select and combine most appropriate tools

Network Planning Tools Specs Document Structure (I)

1.- Introduction and scope

- 1.1. ITU Vision on Network Planning
- 1.2. Who should use this Reference Document
- 1.3. Content of the Reference Document
- 1.4. Relation to other ITU documents

2.- Needs for planning by ITU members

- 2.1. Needs for assessment on proper tools and tool combination
- 2.2. Needs for training on tool applicability and capabilities
- 2.3. Needs for documentation
- 2.4. Needs for tool support, updates and maintenance
- 2.5. Selection criteria for planning tools

Network Planning Tools Specs Document Structure (II)

3.- Network planning problems to be addressed

- 3.1. Network planning problems and activities
- 3.2. Network planning types and domains

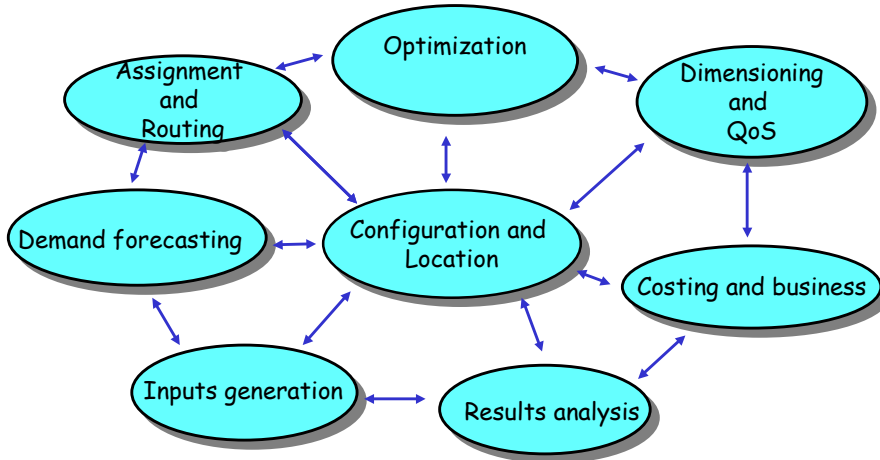
4.- Technical requirements per planning domain

- 4.1 Business
- 4.2 Fixed switching and routing
- 4.3 Transmission
- 4.4 Fixed access
- 4.5 Signalling, control and NM
- 4.6 Radio access
- 4.7 Core radio
- 4.7 IT,OSS and Applications

Annex: Example of RFP for a planning tool

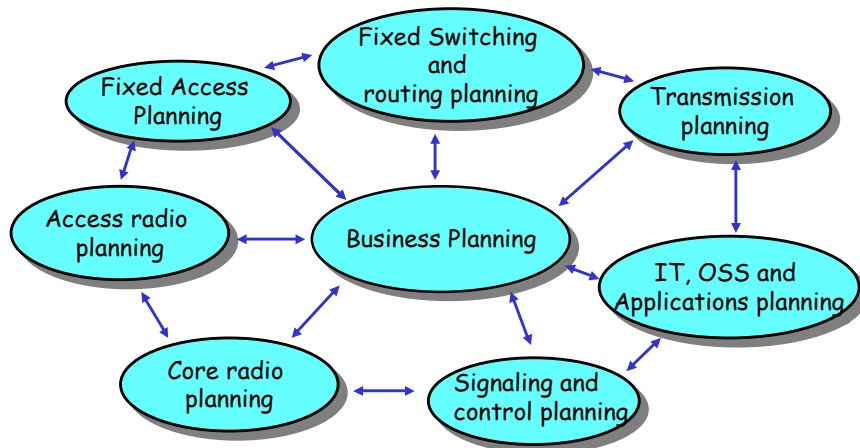
**Network Planning Tools Specs
Type of requirements**

A large variety of Planning activities needed



**Network Planning Tools Specs
Type of requirements**

Interrelation among planning domains to be addressed

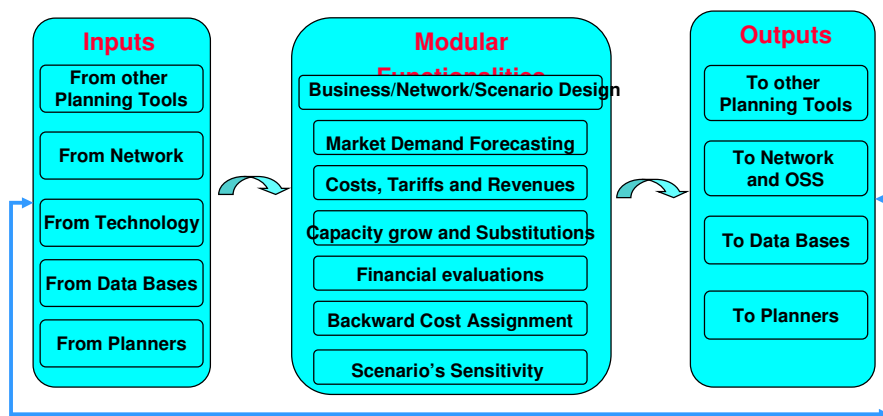


Network Planning Tools Specs Technical requirements per domain

- Scope and main characteristics
- Network model - network architecture, customers, services, traffic, etc.
- Forecasting - services, traffic matrix, users distribution and user segments
- Calculation modules, network dimensioning and optimization
- Input/output data- GUI, maps, reports
- Platform- tool architecture and system requirements
- NGN- requirements related to NGN and new technologies

Network Planning Tools: Overview of modular requirements

Illustration of functional requirements for the business planning domain



**Network Planning Tools Specs
Tendering requirements**

Requirements to observe and criteria for the tool selection

- Capability to model modern technologies and technical requirements
- Commercial availability
- Capability to interrelate different planning tools
- Explicit documentation of models, inputs and results
- Commitment for periodical updates and maintenance
- Training program with reference cases
- Validation process for a range of cases
- Being well proven in the field