



ITU / BDT workshop

Warsaw, Poland,

6 – 10 October 2003

Network Planning

Lecture NP- 3.1

Integrated Planning Process

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Lecture NP - 3.1 - slide 1



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

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Lecture NP - 3.1 - slide 2

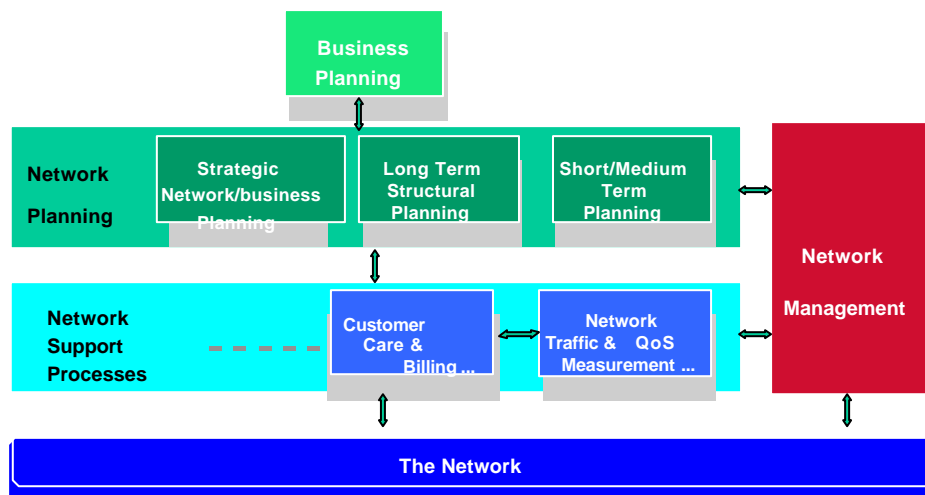


Content Chapter 3.1

- **Definiton of processes and interrelations**
- **Network design tasks**
- **Parameters and Data to be used in the planning**



Network Planning Scope: Related Processes





Network Planning Flows among Processes

- Data on topologies, architectures, location, routing, etc from long term planning are transferred to the medium term and iteratively to short term activities
- Planning results are transferred to NM applications and viceversa, NM measurements and status are provided as inputs to the planning activities
- Operating System Processes also provide data to the short/medium term planning activities on the traffic demand, performance and Origin/destination flows

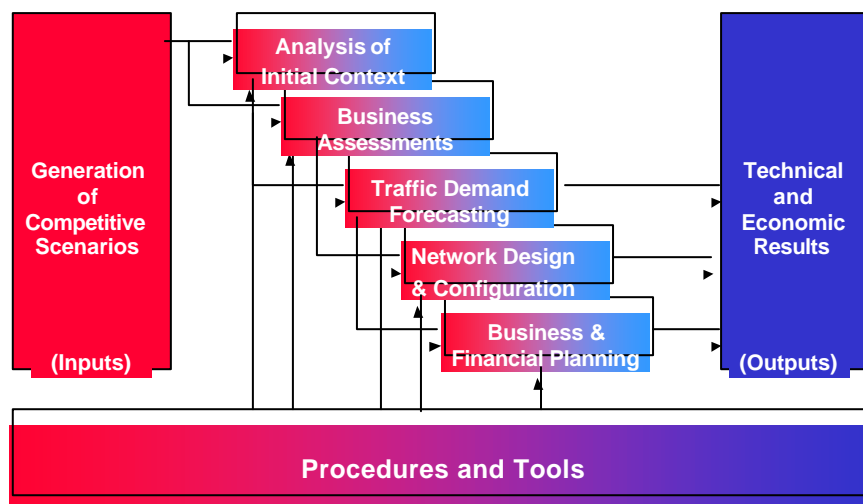
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Planning Methodology: Integrated Iterative Planning Process



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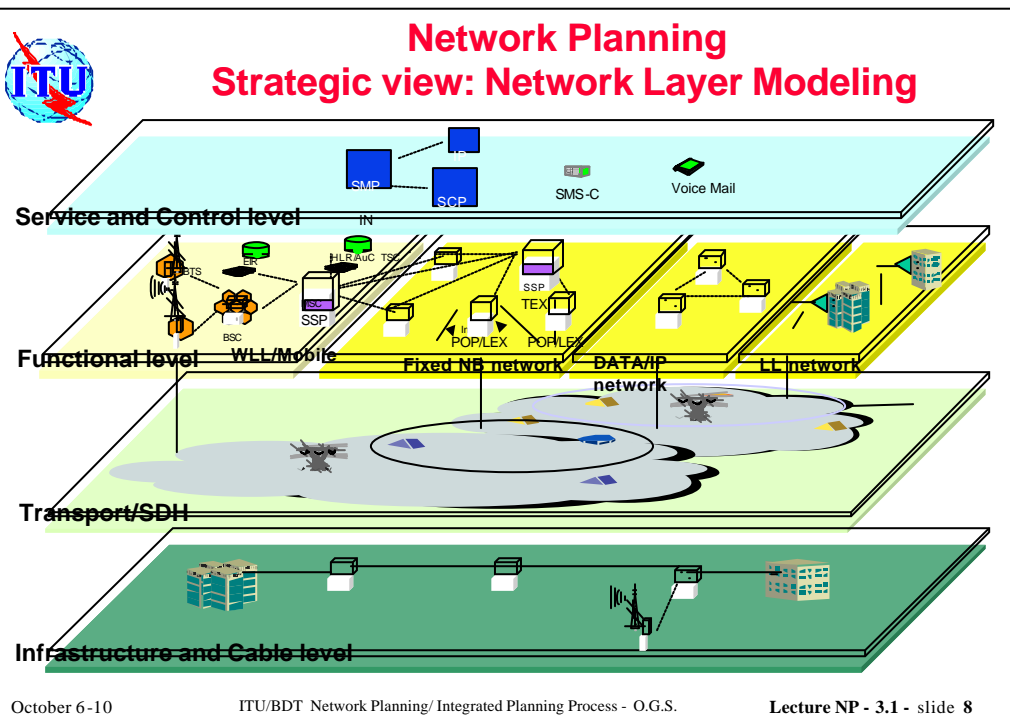
Network Planning Iterative sub-processes

- Telecom network scenarios are generated with the premises derived from realistic competitive situation
- Final objective is to have a quantified design fulfilling the strategy for the operator and the requirements of the society
- Defined processes and tasks are needed for all solutions and technologies. Internal data and algorithms vary for each case
- Feedback among activities is needed to incorporate results of the optimization on the inputs and assumptions
- Business assesment is made at the process start to select feasi ble solutions. More detailed business plan is obtained at the end

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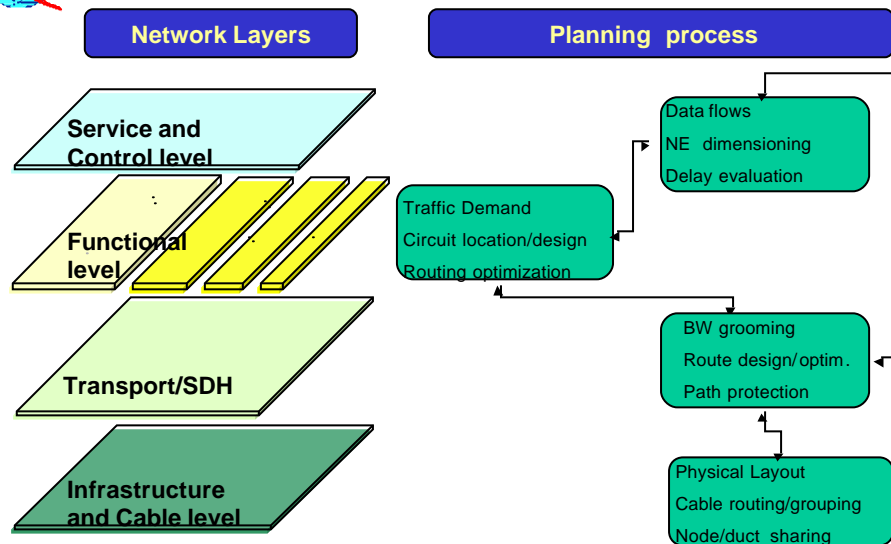
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Planning Methodology: Multilayer planning sequence



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Network Planning Task sequence

- Starts with services and traffic demand projection
- First design is made for the functional level: switching, routing, mobile, data, etc.
- Intermediate results are given as inputs for Transmission and control layers
- Transmission results are provided as inputs to the Physical layer
- Iteration is made among layers and basically to the functional for consolidation

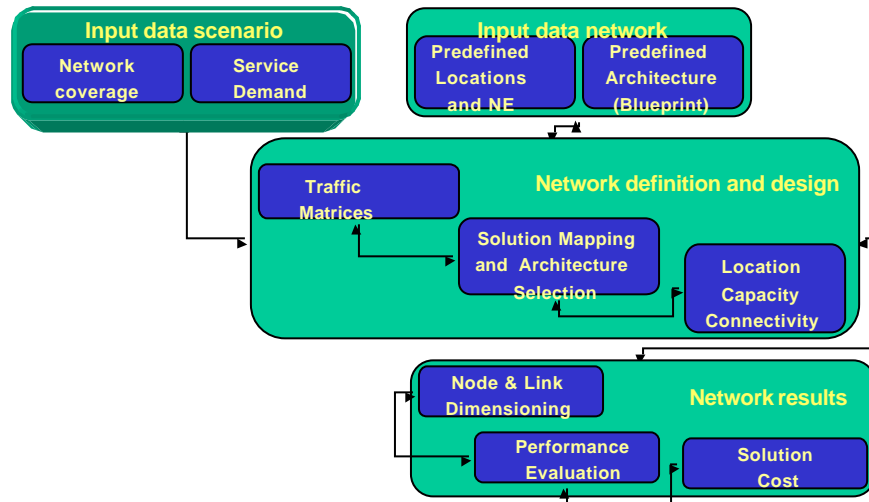
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Planning Methodology: The Functional Network Design Tasks



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Network Planning Input Data

- Input categories
 - Geo-scenario
 - Customers, Services and traffic
 - Existing network
 - Technology characteristics and capacities
 - Performance
 - Economical

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Network Planning Input data

- **Geo scenario**
 - Number of differentiated service areas:
(Metropolitan, Suburban, Villages, Rural)
 - Surface for each area
 - Distance to the core service area
 - Population per area (volume and density)
 - Number and distribution of households
 - Customer density and clustering
 - Digitalised maps (scales 1:5000 to 1:1000)
 - Regulatory rules
 - Interconnection locations and constraints

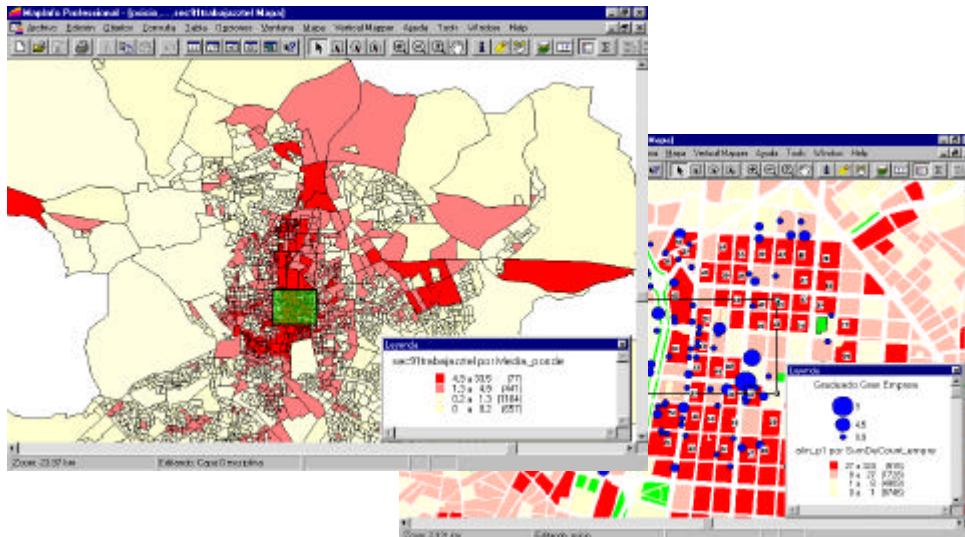
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Network Planning Input data : Geo maps



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Network Planning Input data

- **Customers, services and traffic (1)**
 - Customer segments (as a function of degree of detail)
 - Residential (Low and High end)
 - SOHO
 - SME
 - Large institutions and corporations
 - Services
 - POTS, 64kb/s data, ISDN Basic/primary access
 - Leased Lines (64, n x 64, 2 Mb/s)
 - ADSL (high speed internet), HDSL, SDSL
 - IP mode
 - Video
 - FO, SDH, Managed bandwidth



Network Planning Input data

- **Customers, services and traffic (2)**
 - Traffic (per customer class and service type)
 - Customer calling rate
 - Erlangs per customer
 - IN messages per call
 - IP sessions per customer
 - Average Packet and Bit rates per IP mode flow and/or customer (PCR and SCR)
 - NM and control messages/packet rate



Network Planning Input data

- **Technology related:**

- Physical elements sizes (cabinets, racks, boards, etc.)
- Capacity per main NE:
 - Switches, routers, ADM, CxC and RSU
 - Processors (Packet Rate, Message Rate, etc.)
 - Memory
 - Channels (max bandwidth and guaranteed)
- Routing types
- Load sharing rules
- Performance parameters (Availability, QoS, etc.)



Network Planning Input data

- **Existing network:**

- Existing node locations, sizes and service areas
- Existing link locations and capacities
- Existing cable maps, capacities and spares
- Existing NE locations, capacity and filling degree
- Building locations, capacities and conditioning
- % reusability of civil infrastructure in primary over all area
- % reusability of civil infrastructure in secondary over all area



Network Planning Input data

- **Performance**

- Waiting lists per customer type
- Call completion rates (overall, per type and per O/D)
- QOS (Loss probability, Node and End to end Delays, etc.)
- Availability (MTBF, MTTR, etc.) in overall and per cause: power, HW, SW, etc.
- Bit error rate



Network Planning Input data

- **Economical**

- **Generic (for all technologies)**

- Macroeconomic data (GDP, etc.)
- Interest rates
- Change rates

- **Reference costs (per solution)**

- NE costs for typical economy of scale (minimum configuration and incremental per modularity)
- Civil works and labor-force
- Engineering, installation, testing and commissioning
- Operational and Maintenance resources
- Interconnection
- Marketing and overheads