ITU / BDT regional seminar

Network Planning for the CEE, CIS and Baltic

Belgrade, Serbia and Montenegro, 20– 24 June 2005

Integrated Planning Process

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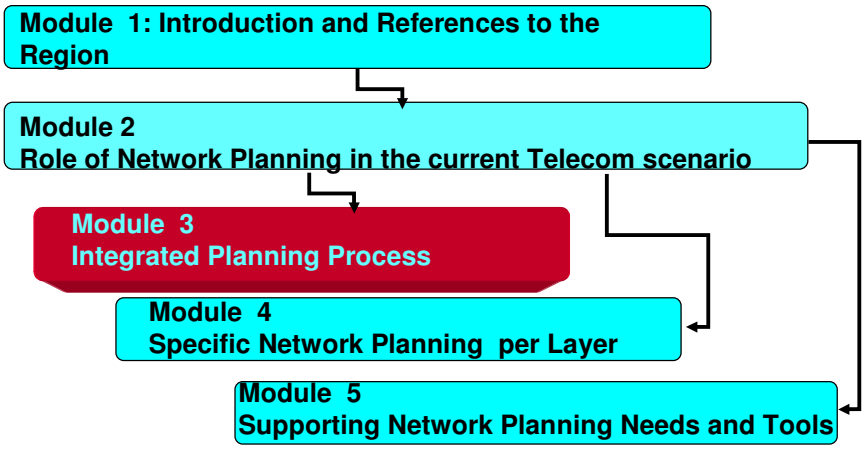
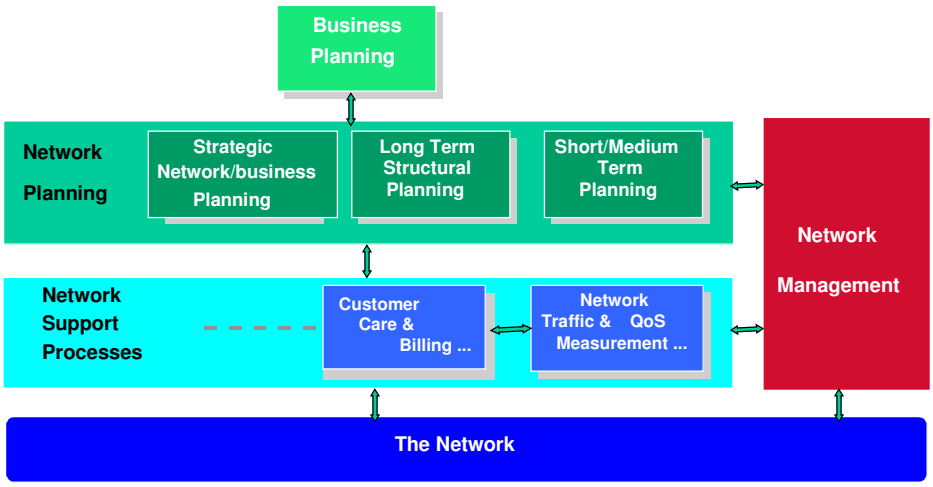
BDT workshop on Network Planning



Integrated Planning Process Content

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

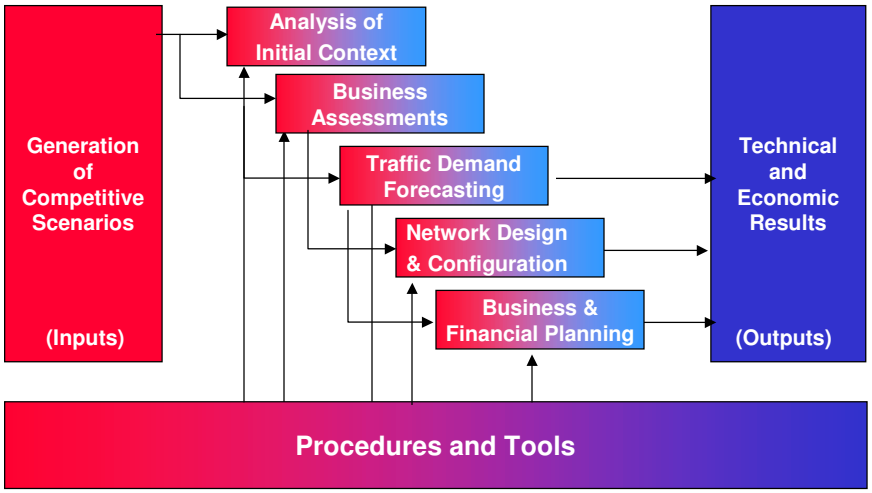
Integrated Planning Process Scope: Related Processes



Integrated Planning Process
Flows among Processes

- Data on topologies, architectures, location, routing, etc from long term planning are transfered to the medium term and iteratively to short term activities
- Planning results are transfered 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

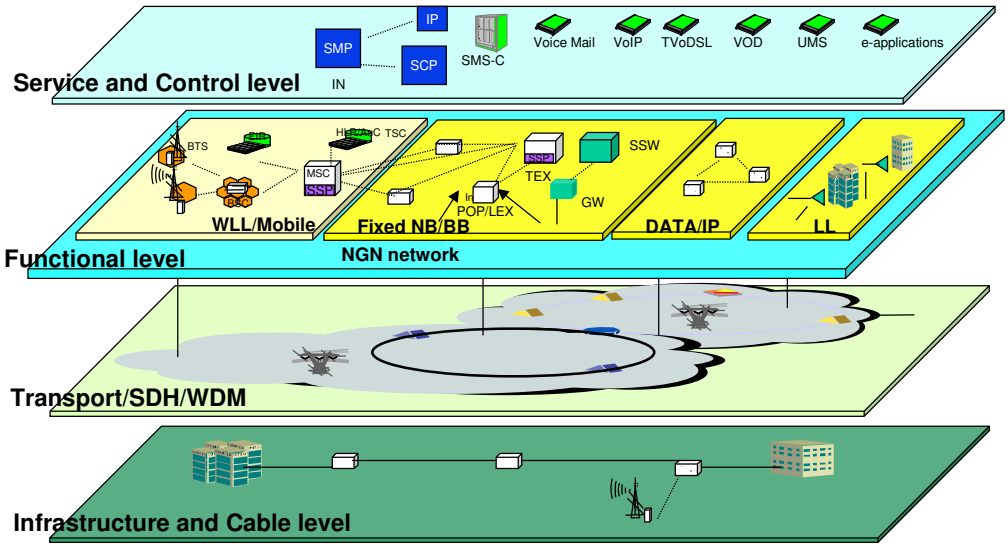
Planning Methodology:
Integrated Iterative Planning Process



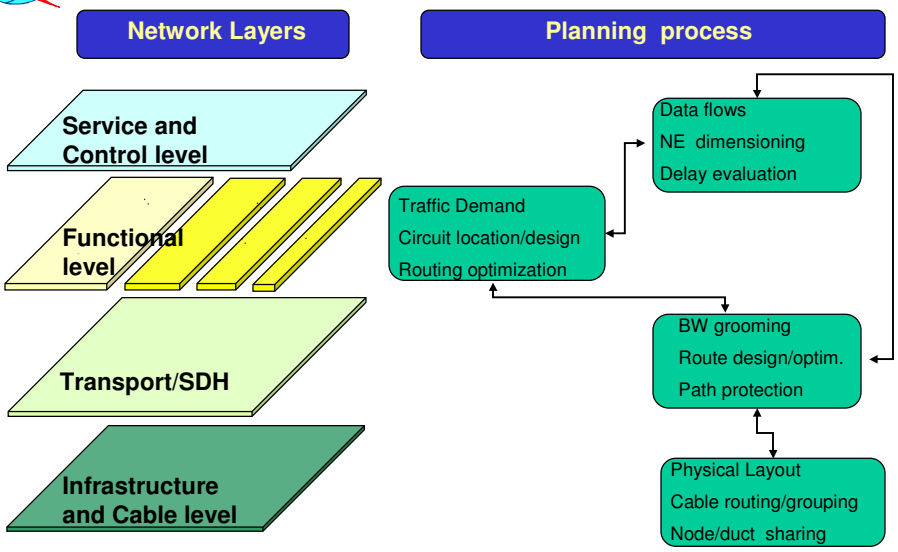
Integrated Planning Process
Iterative sub-processes

- Telecom network scenarios are generated with the premises derived from realistic competitive sitiation
- Final objective is to have a quantified design fullfiling 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 alghoritms 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 feasible solutions. More detailed business plan is obtained at the end

Integrated Planning Process
Strategic view: Network Layer Modeling



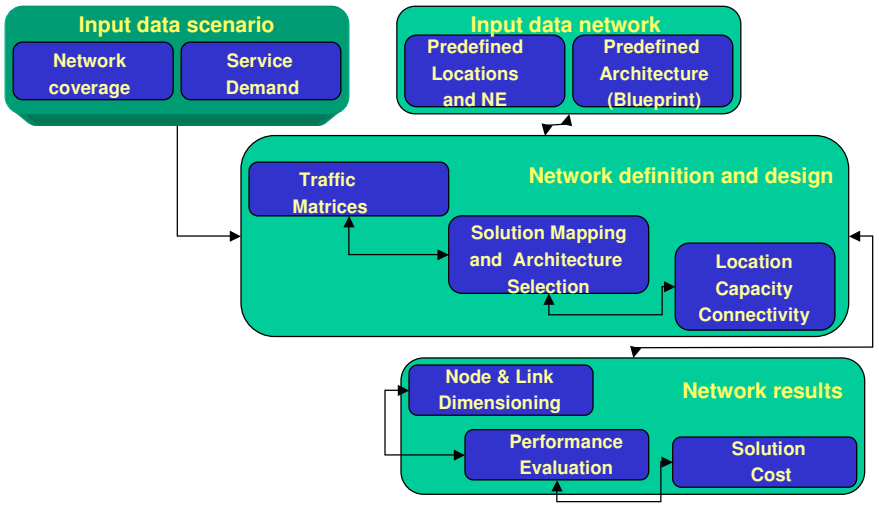
Integrated Planning Process
Multilayer planning sequence



Integrated Planning Process
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**

Integrated Planning Process
The Functional Network Design Tasks



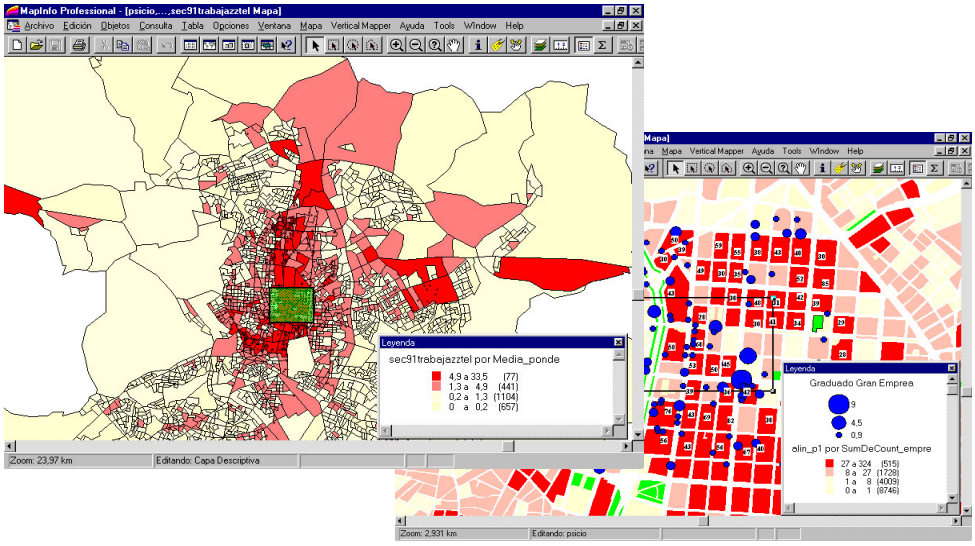
Integrated Planning Process
Input Data

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

Integrated Planning Process
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

Integrated Planning Process
Input data : Geo maps



Integrated Planning Process
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

Integrated Planning Process
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

Integrated Planning Process
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.)

Integrated Planning Process
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

Integrated Planning Process
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

Integrated Planning Process
Input data

- **Economical**
  - **Generic (for all technologies)**
    - Macroeconomic data (GDP, etc.)
    - Interest rates
    - Exchange 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