



ITU/ BDT «Training and Trials on Network Planning Tools for Evolving Network Architectures»

June 4-8 2007
Moscow, Russian Federation

Requirements for decision making. Strategic Planning and Solution Mapping

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Requirements for planning Content

- Requirements to the Network Planner
- Scope and activities within the network planning area
- Strategic Planning and new Technologies.
- Solution mapping per scenario



Requirements for planning Key requirements in competition



- **Business Oriented Needs**

- What are the best customer segments to address ?
- Which services have to be introduced through time ?
- What is the best service bundling per customer type ?
- How to maximize revenues ?
- How to reduce capital expenditure ?
- How to reduce operational expenditure ?



Requirements for planning Key requirements in competition



- **Network Oriented Needs**

- How to forecast services and traffic demands?
- How many nodes to install ?
- What is best location for systems and related communication media ?
- What is the best network architecture and routing ?
- Best balance between built and lease ?
- How to plan capacity evolution and solutions migration ?
- How to ensure SLA and protection level ?



Requirements for planning Key requirements in competition

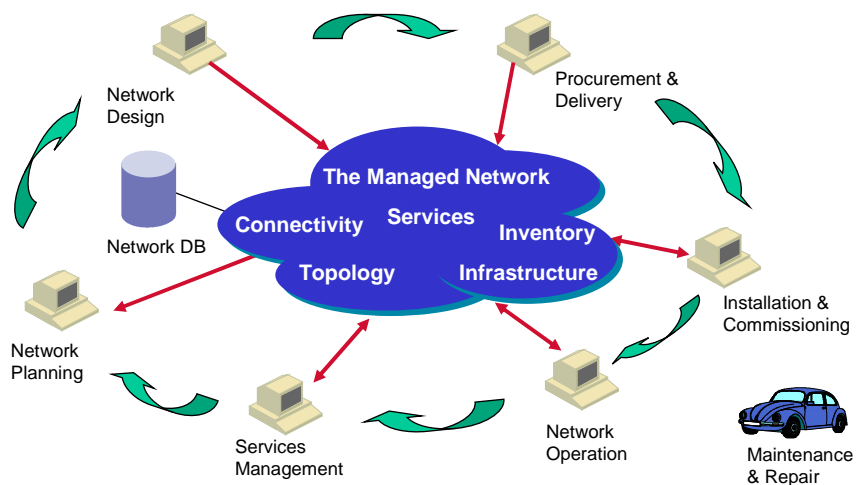


- **Operation Support Needs**

- How to evaluate alternatives for direct operation and outsourcing ?
- How to organize the operation processes ?
- Which IT applications ensure an efficient support to operation ?
- How to train labor force on the operational activities ?



Requirements for planning Role within the network lifecycle





Requirements for planning Scope: Mission



“Decision making on the network deployment to Optimize Business based on quantitative evaluation”

- Considering geo-marketing scenarios and traffic demand
- Overall vision on the network layers
- Deciding network topology, interconnection and routing
- Optimizing balance between performance/SLA and cost (CAPEX + OPEX)
- Considering regulatory constraints
- Anticipating business evaluation and feasibility



Requirements for planning Scope: Main supporting pillars



NETWORK PLANNING METHODOLOGY

Market and demand forecasting

Teletraffic Methodology

Economical Engineering

Operational Research and optimization

Architecture and Technology Know-How



Requirements for planning Scope: Main supporting pillars



NETWORK PLANNING METHODOLOGY

Market and demand forecasting

- Historical projection: ARMA, ARIMA, etc.
- Analogy with other demands
- Evolutionary (grow lifecycle)
- Causal on originating factors
- Scenarios (alternatives and feasibility)
- Visionary (imagination)



Requirements for planning Scope: Main supporting pillars



NETWORK PLANNING METHODOLOGY

Teletraffic Methodology

- Statistical flow modeling for arrival rates and holding times
- Capacity models based on stochastic processes: Analytical and Simulation
- Dimensioning based on efficiency and QoS
- Good founding on the multiple contributions from the International community (ITC)



Requirements for planning Scope: Main supporting pillars



NETWORK PLANNING METHODOLOGY

Operational Research and optimization

- Linear programming → method of "simplex"
- Non linear modeling → procedures based on gradients
- Flow Optimization → critical path, maximum flow, etc.
- Combinatorial processes → "branch and bound"
- Iterative processes → decision by successive comparisons
- Heuristic procedures → hybrid with emphasis on constraints and equipment characteristics



Requirements for planning Scope: Typical activities (1)



- 1) Problem and Network Partitioning to reduce complexity
- 2) Data Gathering to match real needs
 - Geo- scenarios
 - Existing Network & carried services
 - Current Performance and waiting lists
- 3) Demand Forecasting and traffic characterization
- 4) Definition of Solution Alternatives



Requirements for planning Scope: Typical activities (2)



- 5) Mapping best alternatives to requirements in coverage and technologies
- 6) Nodes/Links Design, Location and Dimensioning
- 7) Network Costing in CAPEX and OPEX
- 8) Optimization for routing and deployment
- 9) Sensitivity Analysis to demand level, QOS, etc.
- 10) Documentation of Network Plan and deployment



Requirements for planning Scope: Dimensions



- **By Time** → Short, Medium, Long term
- **By Level of Detail** → Strategic/Business/Network/NE
- **By Network Layer** → Service layer up to Infrastructure
- **By Network Segment** → Access, Metro, Core, end-to-end
- **By Technology** → PSTN, SDH, Radio, ATM, IP, etc
- **By Service** → POTS, Data, LL, Video, etc





Requirements for planning Strategic view



Key decisions to guide the overall network structure, services and technologies:

- **Role and market segments within competition**
- **Main evolution for technologies and architectures. NGN**
- **Solution mapping per scenario**



Requirements for planning Strategic Planning: Role in competition



- **Selection of market segments: economy of scale**
- **“Make” versus “outsource” decision**
- **Policy on revenues and financing**
- **Partnership selection**
- **Priorities definition**



Requirements for planning Evolution on Technology and architecture



- Technological alternatives: Which, When and Where
- Architecture at core and access segments
- Operation support applications
- Planned evolution steps
- Convergence strategy



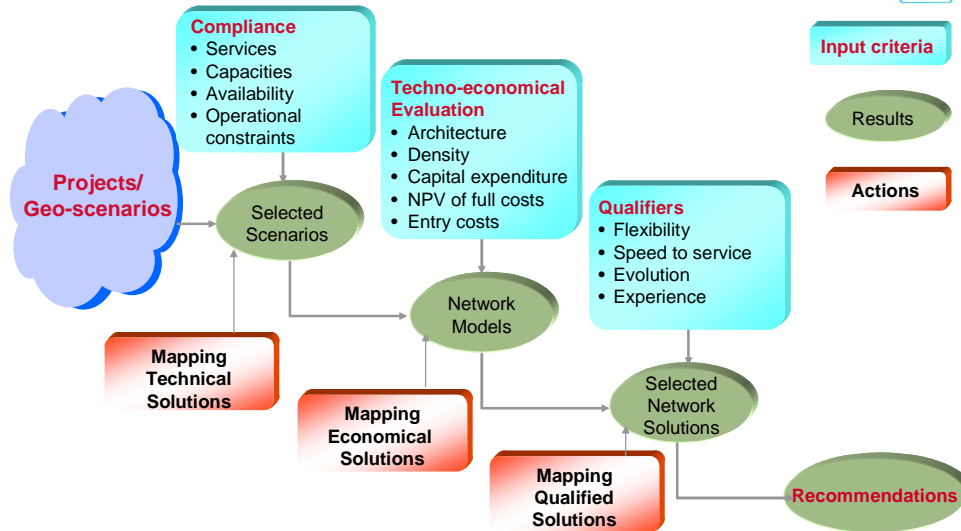
Requirements for planning Solution Mapping



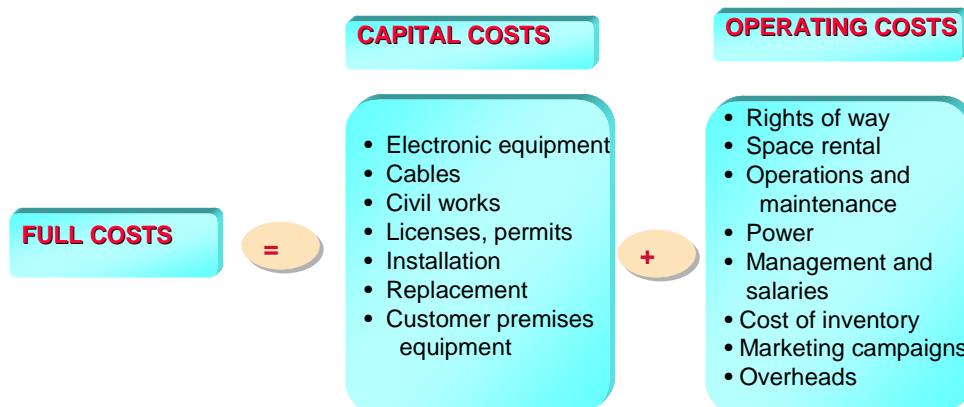
- Characterize variety of geo-scenarios within the country
- Define parameters for scenario and solutions
- Techno-economical evaluation to select best Cost of Ownership



Requirements for planning Solution Mapping: Methodology

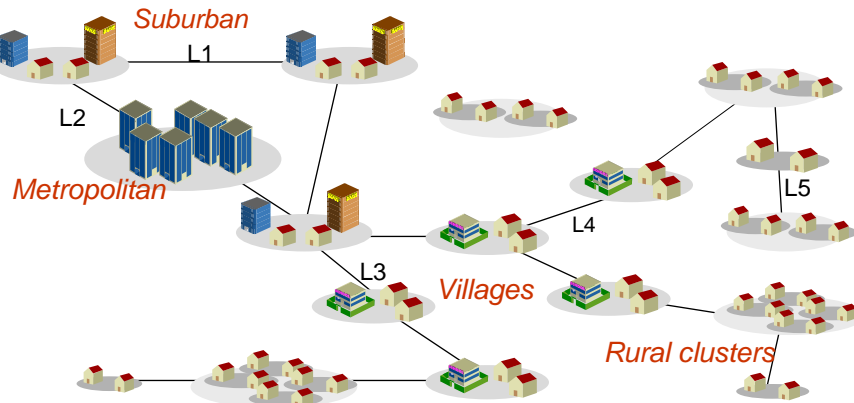


Requirements for planning Solution Mapping: Cost Modeling





Requirements for planning Solution Mapping: Example of Geo Scenarios

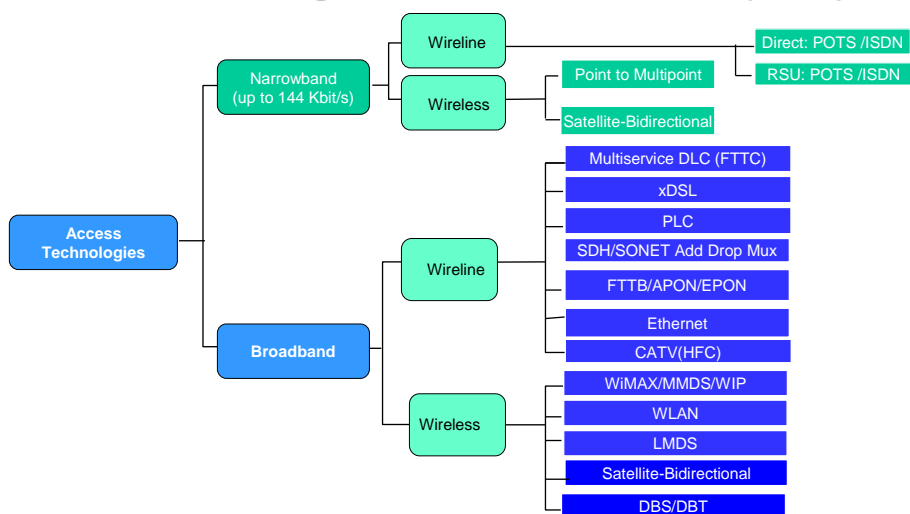


L1: Distance between suburban
L2: Suburban - metropolitan distance
L3: Suburban - village distance

L4: Distance between villages
L5: Distance between rural



Requirements for planning Solution Mapping: Technological alternatives at access (Fixed)



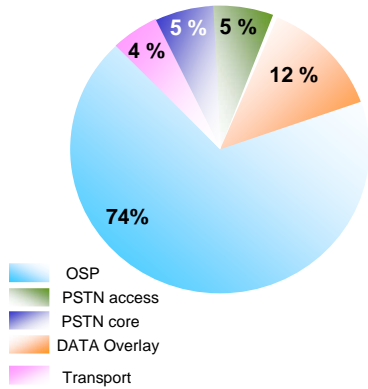


Requirements for planning

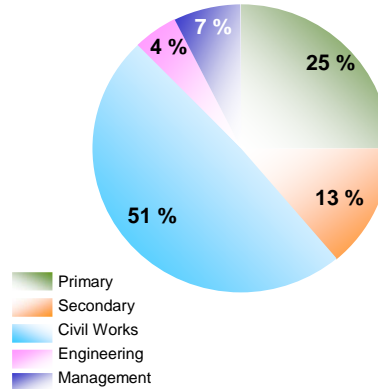


Solution Mapping Investment Splitting in Greenfield Access

Network Cost Composition for overlay PSTN and Data (Metropolitan 1 node Ducts+ Aerial)



Infrastructure (OSP) Cost Composition (Metropolitan 1 node Ducts+Aerial)

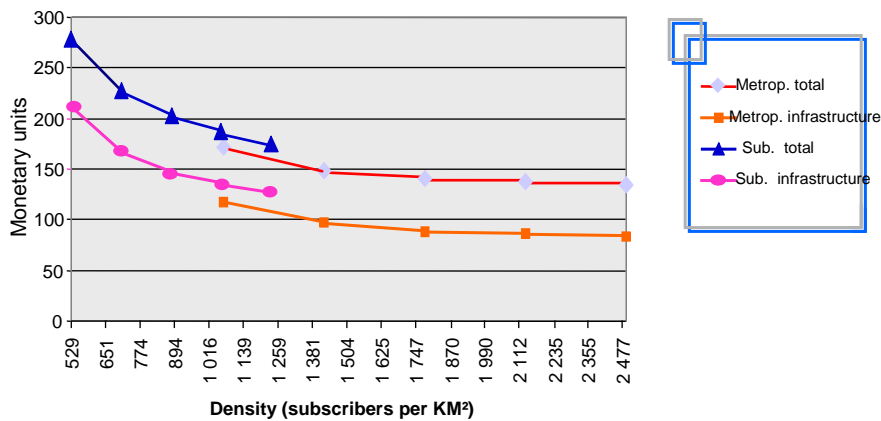


Requirements for planning



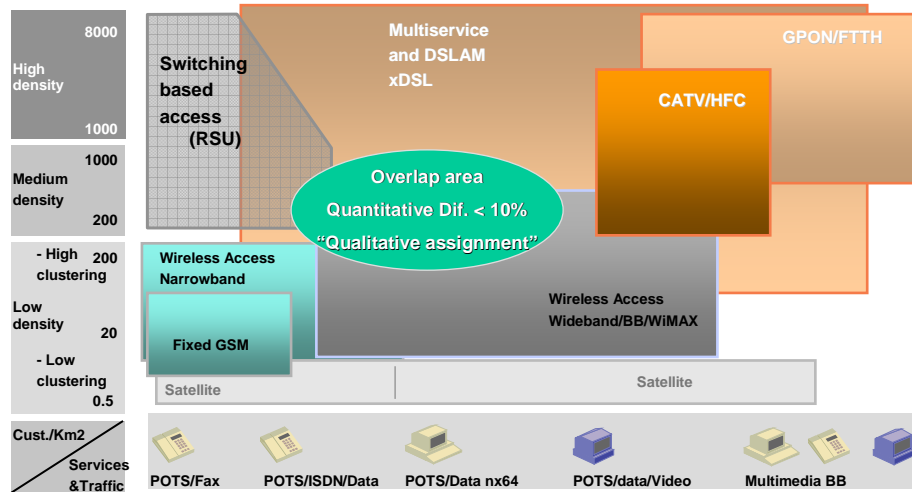
Solution Mapping Investment sensitivity to density in WL Access

High density areas





Requirements for Planning Example of mapping recommendation



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Requirements for planning Reference benefits



- Adequate definition of customer segments, services and business to ensure efficient operation in competition
- Anticipation of 2 to 3 years in the positive IRR
- Saving factors of 20% to 200 % by best solution/technology mapping in the access segment
- Additional gains between 20 to 40 % by topology/routing optimization

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