ITU / BDT Regional Network Planning Workshop with Tool Case Studies for the Arab Region

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Requirements for decision making. Strategic Planning and Solution Mapping

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Requirements for decision making and 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 decision making and 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 ?

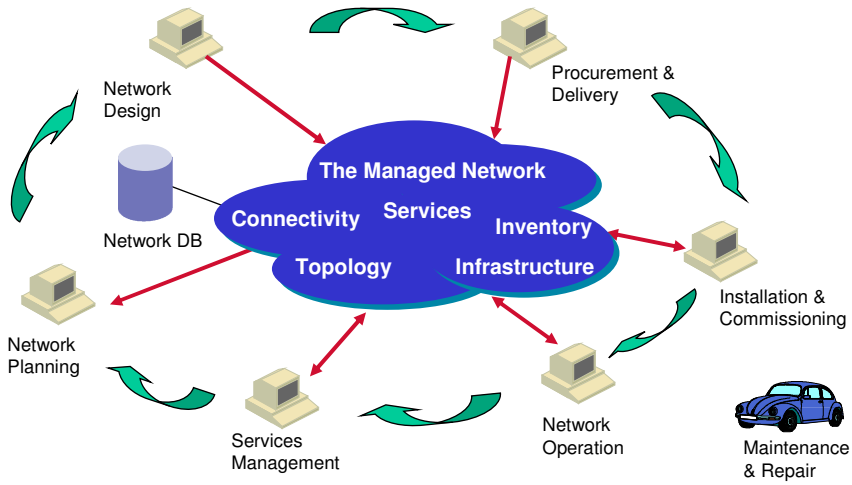
Requirements for decision making and planning
Key requirements in competition

- **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 decision making and 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 decision making and planning
Role within the network lifecycle



Requirements for decision making and 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 decision making and 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 decision making and 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 decision making and 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 decision making and 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 processess → "branch and bound”
- Iterative processess → decisión by succesive comparisons
- Heuristic procedures → hybrid with emphasis on constraints and equipment characteristics

Requirements for decision making and 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 decision making and 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 decision making and 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

By Solution → **Combination of the previous for a Project**

Requirements for decision making and 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 decision making and 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**

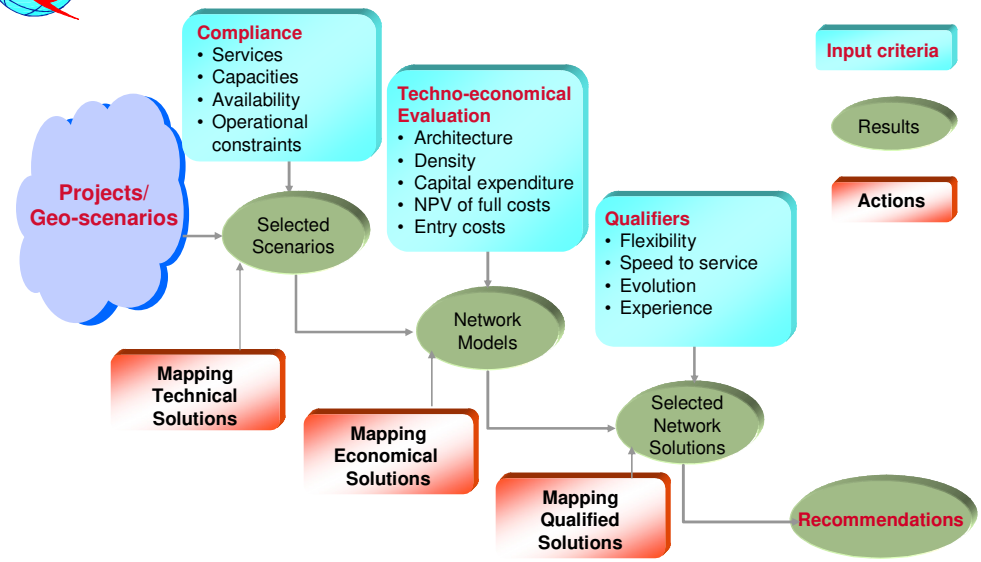
Requirements for decision making and planning : Evolution on Technology and architecture

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

Requirements for decision making and 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 decision making and planning
Solution Mapping: Methodology



Requirements for decision making and planning
Solution Mapping: Cost Modeling

FULL COSTS =

CAPITAL COSTS

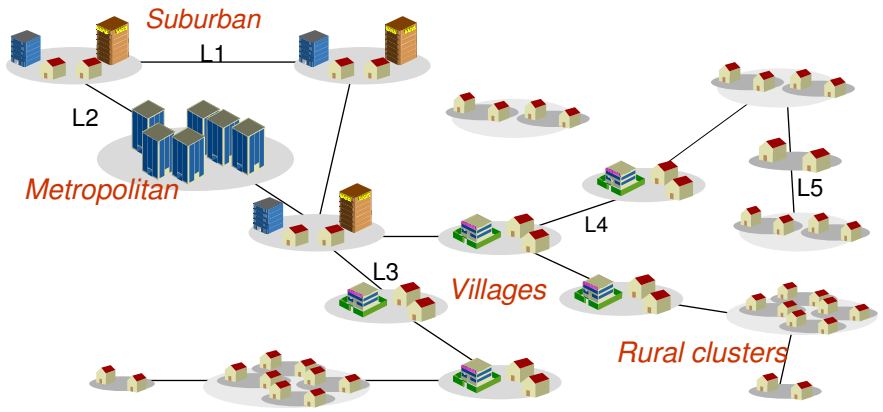
- Electronic equipment
- Cables
- Civil works
- Licenses, permits
- Installation
- Replacement
- Customer premises equipment

+

OPERATING COSTS

- Rights of way
- Space rental
- Operations and maintenance
- Power
- Management and salaries
- Cost of inventory
- Marketing campaigns
- Overheads

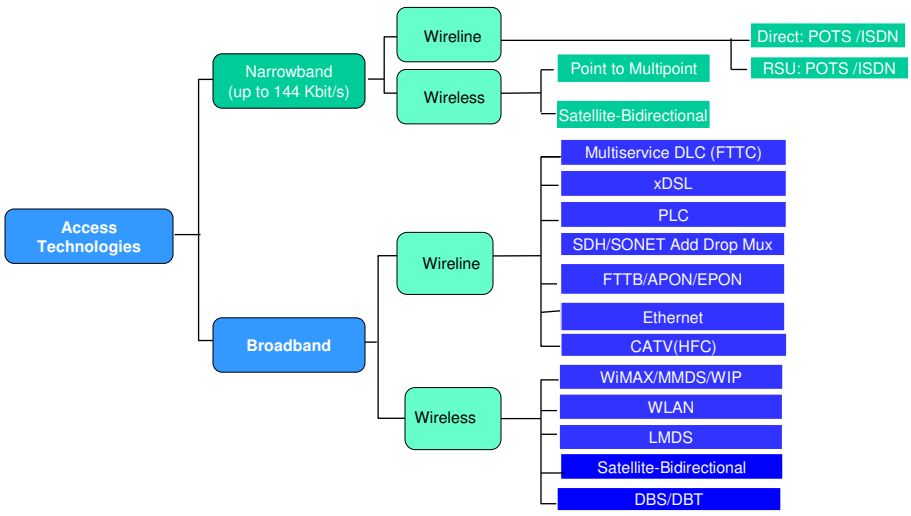
Requirements for decision making and planning
Solution Mapping: Example of Geo Scenarios



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

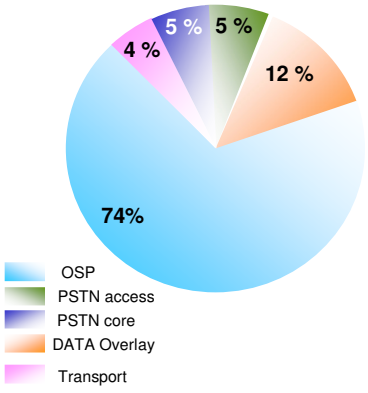
L4: Distance between villages
L5: Distance between rural

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

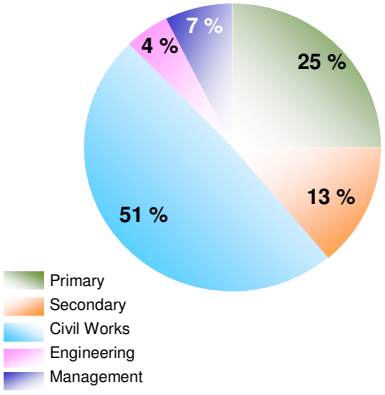


Requirements for planning: Solution Mapping Investment Splitting in Greenfield Access

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

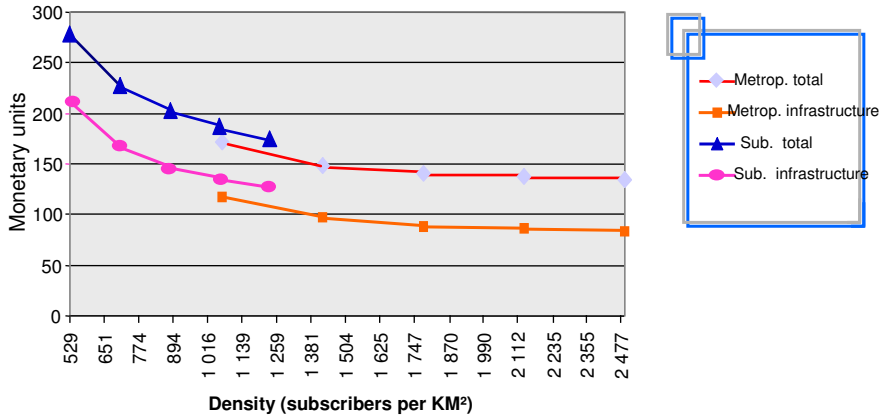


Infrastructure (OSP) Cost Composition
(Metropolitan 1 node Ducts+Aerial)

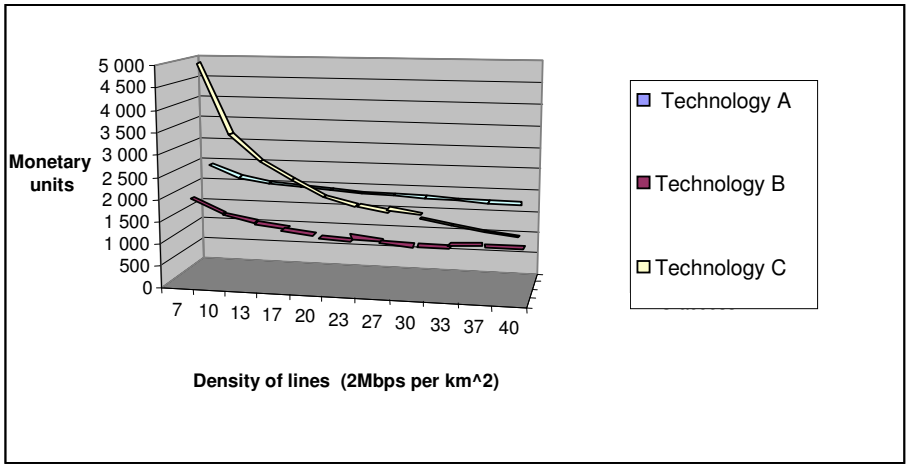


Requirements for planning: Solution Mapping Investment sensitivity to density in WL Access

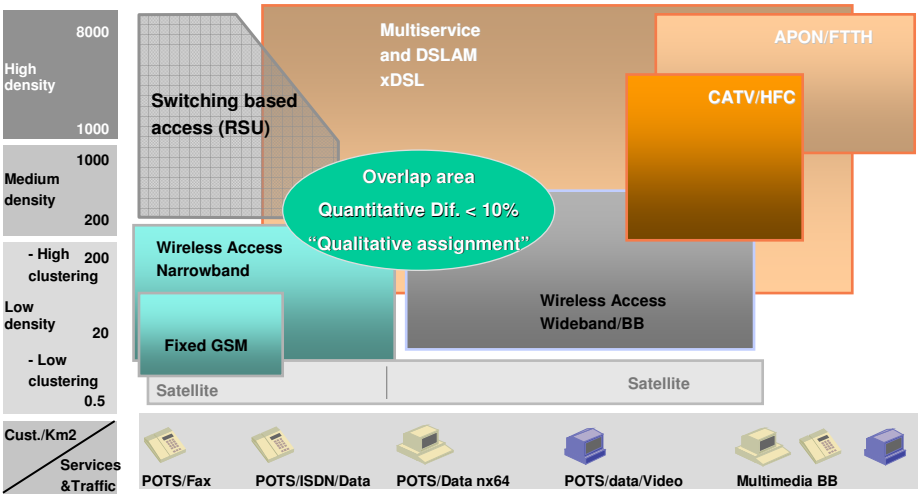
High density areas



Requirements for planning: Solution Mapping
Solution selection per customer density



Requirements for planning: Solution Mapping
Techno-economical Recommendation



Requirements for decision making and 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