



ITU-BDT Regional Seminar on Broadband Wireless Access (BWA) for European and CIS Countries

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Strategic Planning and Solution Mapping for BWA

Oscar González Soto
ITU Consultant Expert
Strategic Planning and Assessment

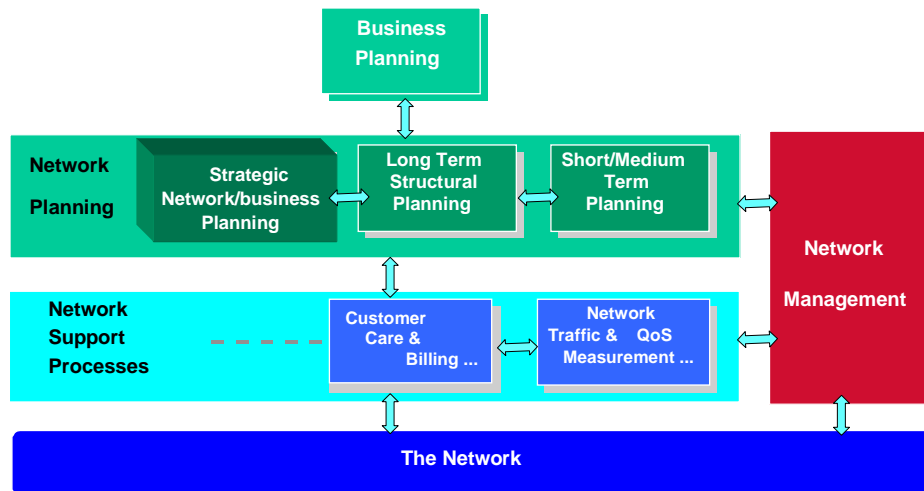


Strategic Planning and Solution Mapping Content

- **Network Planning : Types, requirements, and activities**
- **Strategic Planning and new Technologies.**
- **Solution mapping per access scenario**



Strategic Planning and Solution Mapping Types of Network Planning and Interrelation



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Strategic Planning and Solution Mapping Key requirements in competition (I)

- **Strategy Oriented Needs**

- What selection of **customer classes** and associated services?
- What **technologies** are selected for target networks?
- When to decide **migration** to new technologies and what speed?
- Which level of **convergence** versus specialization?
- What resources to **built and what to lease** ?
- Which are the most convenient **partnerships** with other operators and suppliers?

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Strategic Planning and Solution Mapping Key requirements in competition (II)

- **Business Oriented Needs**

- 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** ?
- How to **price services** and bundles?
- How to optimize network **profitability**?



Strategic Planning and Solution Mapping Key requirements in competition (III)

- **Network Oriented Needs**

- How to **forecast new 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** ?
- How to plan capacity evolution and solutions **migration** at access, local and transit segments?
- How to ensure **QoS** across multiple domains?
- How to ensure **protection level** and survivability?
- How to ensure and manage **SLA** ?



Strategic Planning and Solution Mapping Key requirements in competition (IV)

- **Operation Support Needs**
 - How to evaluate alternatives for **direct vs outsourced operation** ?
 - How to organize the **operation processes** ?
 - Which **level of integration** is needed to operate multimedia services?
 - Which **IT applications** ensure an efficient support to operation ?
 - How to plan **labor force training** on the new operational activities ?

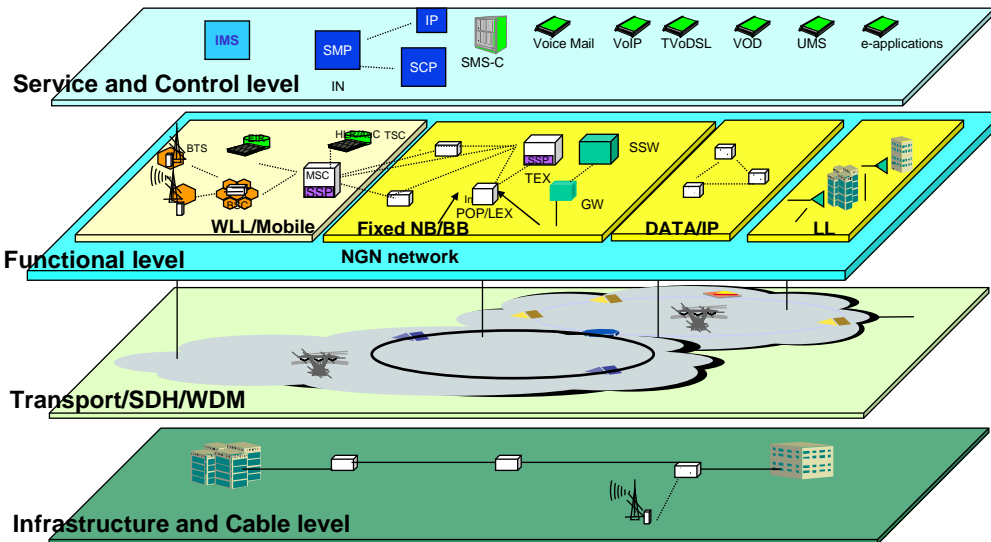


Strategic Planning and Solution Mapping Network Modeling for planning

- **High complexity of the whole Network requires a modeling and splitting in subnetworks to facilitate analysis , design and planning.**
 - **By Layers** in a vertical dimension following the client-server relation (one layer is supported in the layer below and provides resources for the layer up). **Physical, Transmission, Switching, etc.**
 - **By Segments** or splitting of the end to end communication into sub-areas as customer premises, access, core national, core international
 - **By Technologies** or underlying technique as SDH, WDM, ATM, IP, IMS, GSM, 3G, WiMax, etc.....



Strategic Planning and Solution Mapping Network Layer Modeling for planning



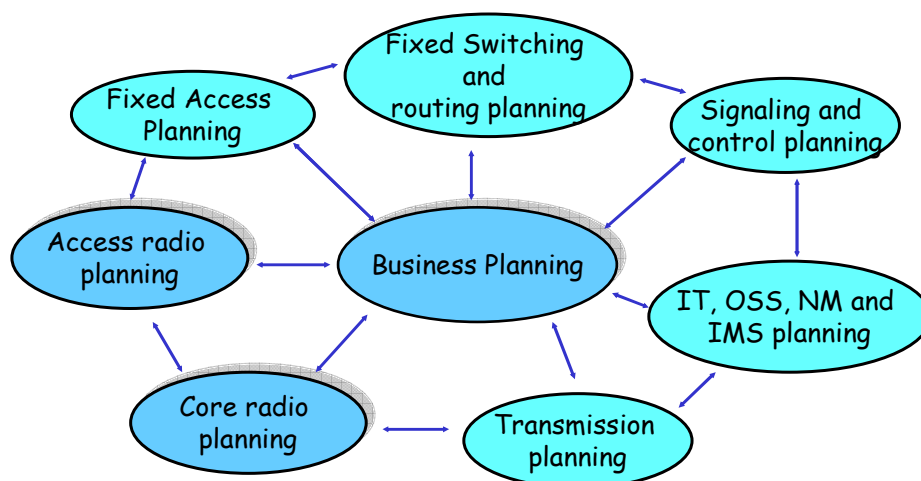
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Strategic Planning and Solution Mapping Network Planning Domains



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Strategic Planning and Solution Mapping

Modeling issues for NGN, 3G and BWA

- New **traffic models** needed to represent multiservice flows
- New **dimensioning methods** for resources handling multimedia services with QoS
- New **measurement procedures** for aggregated multiservice traffics
- New **multicriteria dimensioning** for 3G, xG and BWA combining coverage by frequency, service speed and data traffic capacity
- Procedures to ensure **interoperability** and end-to-end performance across multiple domains



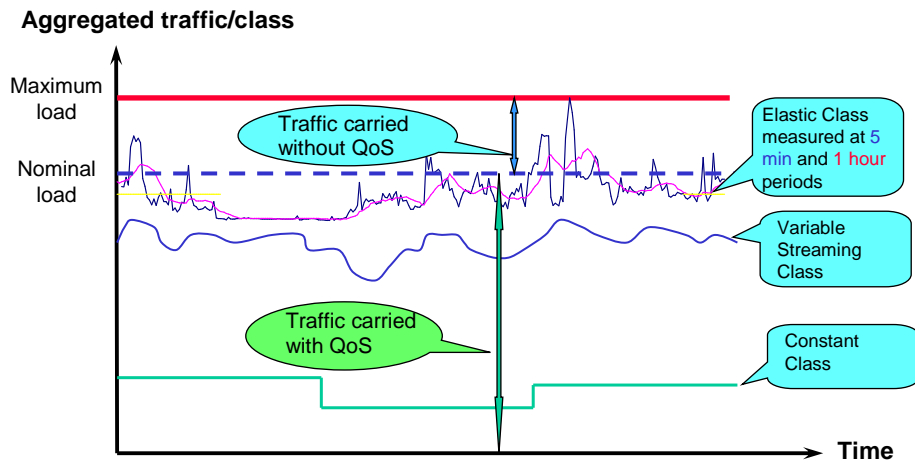
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Multiservice Traffic flows for QoS based dimensioning

- C1) **QoS constant stream**: bandwidth transmission at a constant speed with a specified delivery and jitter (ie: CBR, SDH, video distribution)
→ **“peak rate” models**
- C2) **QoS variable stream** : bandwidth transmission at a variable speed derived from a user information and coding algorithm which requires guaranteed quality and specified jitter (ie: VoIP, Video streaming, audio streaming, etc.)
→ **“multirate-erlang” models**
- C3) **QoS elastic**: bandwidth transmission at a variable speed without jitter restrictions and asynchronous delivery (ie: browsing, file transfer, mail, UMS, etc.)
→ **“processor sharing” models**



Strategic Planning and Solution Mapping IP multiservice Traffic profiles per QoS class



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Strategic Planning and Solution Mapping Content

- Network Planning: Types, Requirements and activities
- Strategic Planning and new Technologies.
- Solution mapping per access scenario

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Strategic Planning and Solution Mapping

Strategic planning tasks for Technologies

- **Technological alternatives:** Which, When and Where
- Evolution and **Migration path** towards the target network
- **Architecture** at core and access segments
- Operation and **business support** applications
- **Convergence strategy** for network, services and operations

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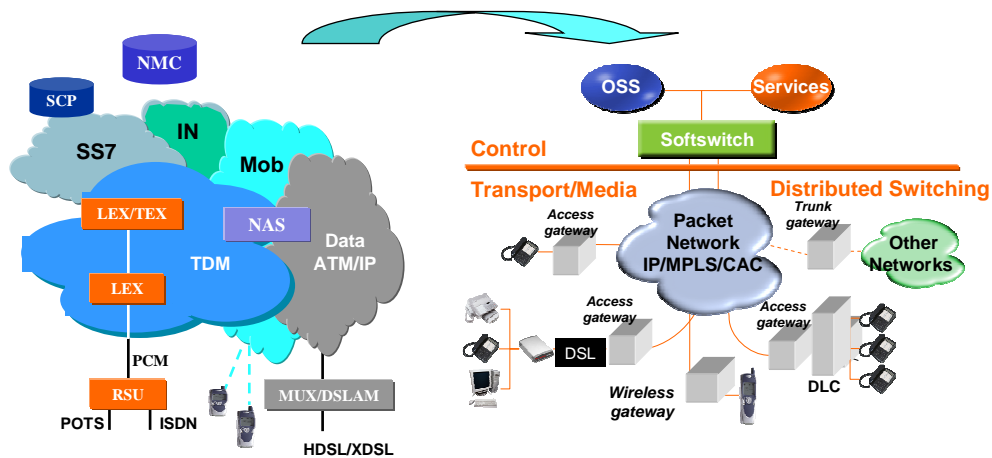
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Strategic Planning and Solution Mapping

Architecture migration: Topology

What changes from current scenario towards target network ?



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Strategic Planning and Solution Mapping Architecture Consolidation: Topology

Topological changes impact on infrastructure and are slower to implement than technology substitution

- **Less network nodes and links** due to the higher capacity of systems (one order of magnitude).
- **Same capillarity** at access level due to identical customer location
- Topological **connectivity higher** for high capacity nodes and paths due to security
- **High protection** level and diversity paths/sources in all high capacity systems, both at functional and physical levels



Strategic Planning and Solution Mapping Content

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Strategic Planning and Solution Mapping Solution Mapping

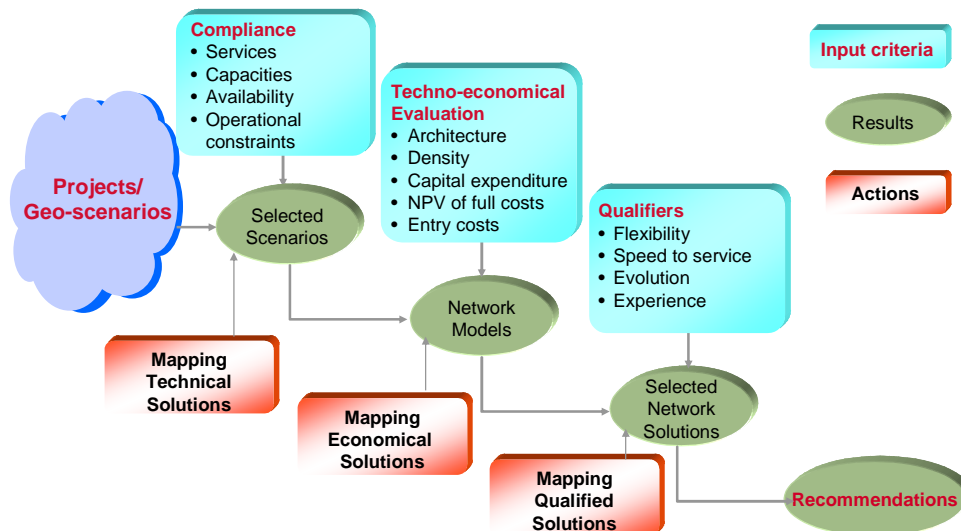
Objectives: Associate best technologies to serve and compete at each geo-scenario

Procedure:

- Characterize **variety of geo-scenarios** within the country in customer density and services demand
- Define and **estimate key parameters** per scenario and solution
- **Techno-economical evaluation** to minimize Cost of Ownership and maximize benefits



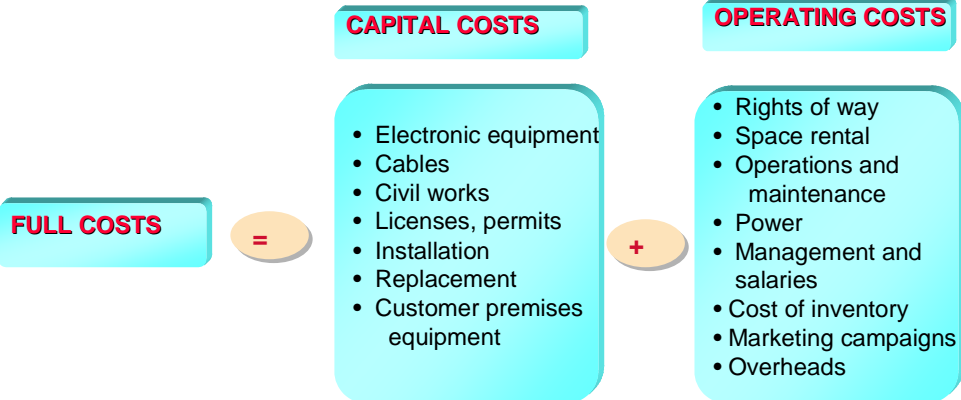
Strategic Planning and Solution Mapping Solution Mapping: Methodology





Strategic Planning and Solution Mapping

Solution Mapping: Cost Modeling



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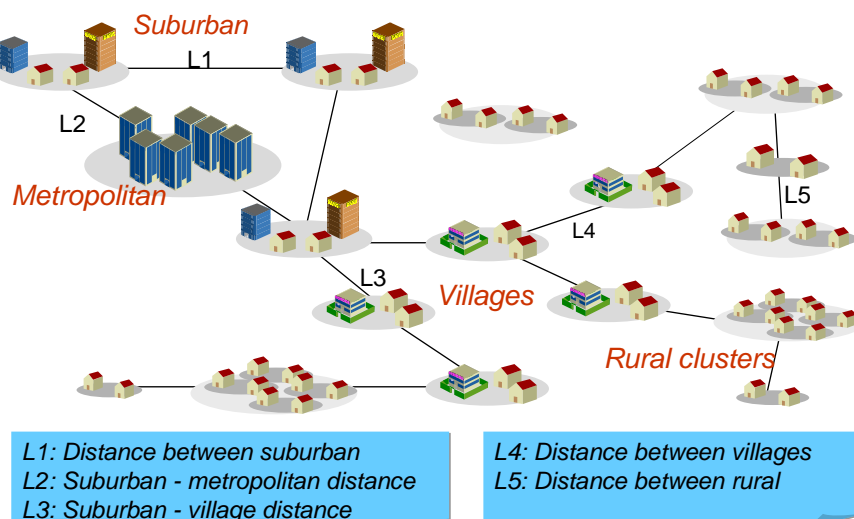
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Solution Mapping: Example of Geo Scenarios



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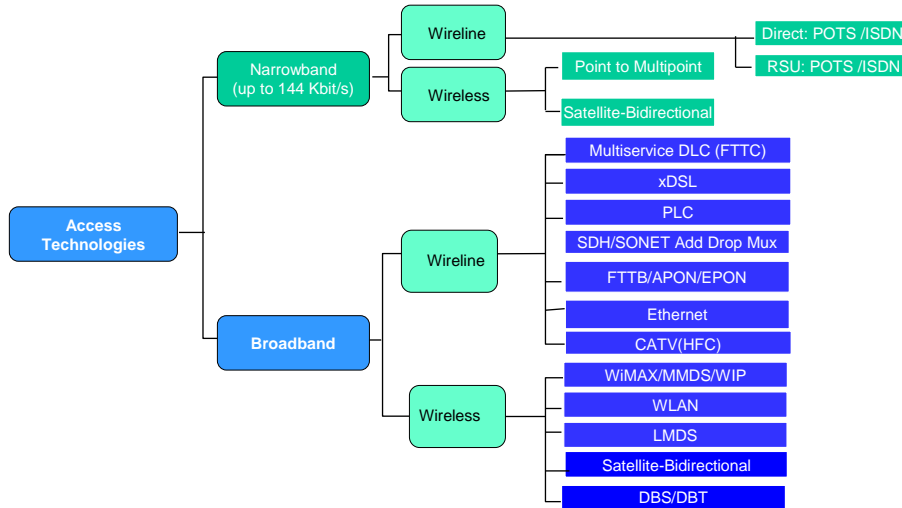
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Solution Mapping: Technological alternatives at access (Fixed)



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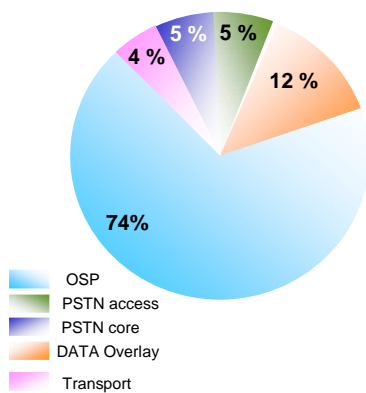
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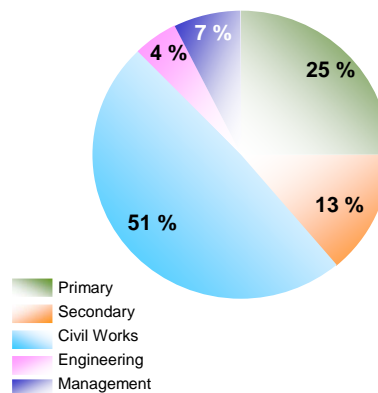
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Solution Mapping Investment Splitting in Greenfield Access

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



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



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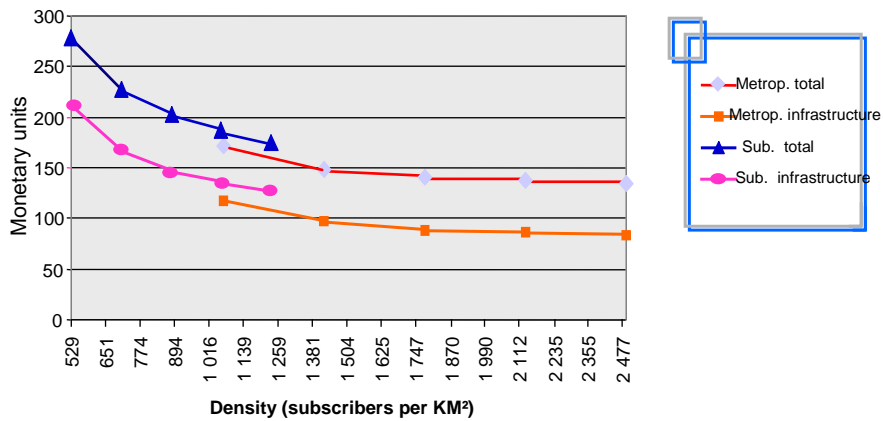


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Solution Mapping

Investment sensitivity to density in WL Access

High density areas



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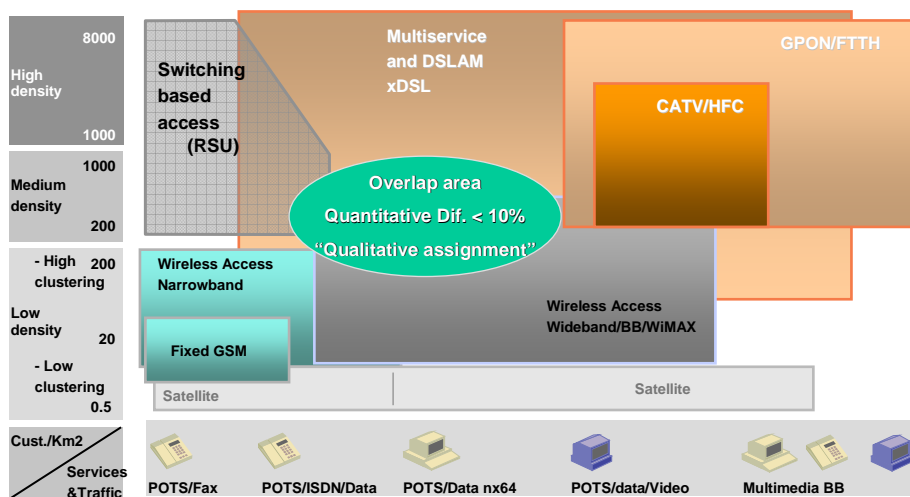
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Strategic Planning and Solution Mapping

Example of mapping recommendation



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Strategic Planning and Solution Mapping Recommendation for Access

Access dominated by physical infrastructure cost and deployment time

- Quick deployment of DSL and Multimedia Services on existing infrastructures
- FO closer to customer (FTTH, FTTC) when implementing new outside plant or renovating existing one
- New Wireless technologies: WiMAX for low density customer scenarios and niche areas.
- Shorter LL length and cell radius than classical network to be prepared for high bandwidth Multimedia services



Strategic Planning and Solution Mapping 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*