



ITU-BDT Regional Seminar on Mobile and Fixed Wireless Access for Broadband Applications for the Arab Region

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Business Planning and migration to 3G

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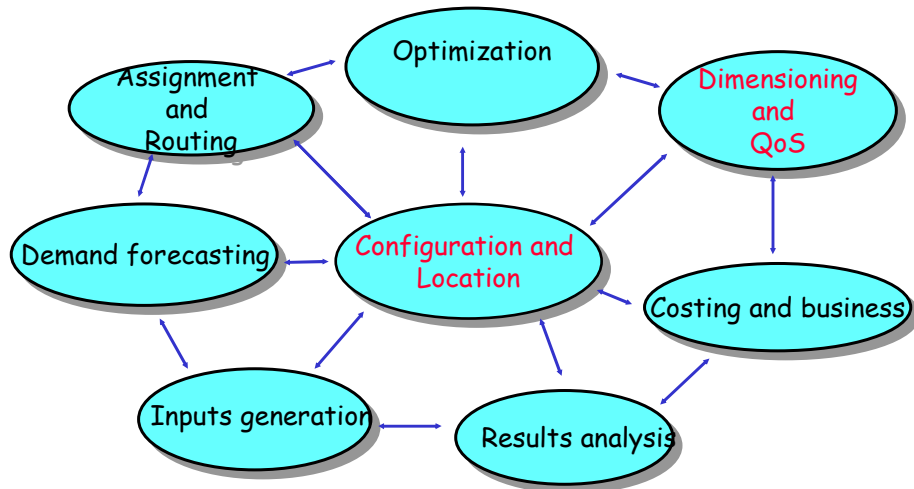


Business Planning and migration to 3G Content

- **Business planning factors for NGN and 3G**
 - Planning and modeling issues
 - Motivation and driving services
- **Techno-Economic and Business modeling**
 - Scenarios and Traffic modeling
 - Dimensioning criteria
- **Tool based planning**
 - Techno-economical tool modeling
 - Typical planning results



Business Planning and migration to 3G Planning Requirements and activities for NGN



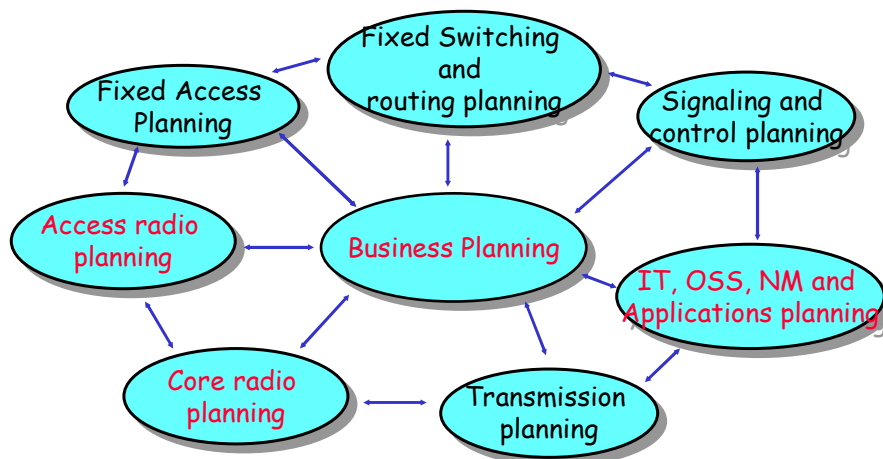
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Business Planning and migration to 3G Network Planning Requirements and Domains for NGN



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Business Planning and migration to 3G Modeling issues for NGN and 3G

- New **models** 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 and xG combining coverage by frequency, service speed and data traffic capacity
- Which procedures to ensure **interoperability** and **end-to-end performance across multiple domains?**
- Which units to define **dimensioning and costing units for interconnection?**

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Business Planning and migration to 3G QoS and Performance Issues

- Quality of Service (QoS) domains to be modeled, defined and/or extended for NGN and 3G. Measured in waiting time and/or loss probabilities
- Domains for QoS evaluation:
 - **Service accessibility**: capability to access a service
 - **Connection establishment**: Capability to get connection
 - **Information transfer**: Quality of information delivery
 - **Reliability**: Failure probability
 - **Availability**: Probability of system being active
 - **Survivability**: Capability to provide service in abnormal conditions
 - **Security**: Information and systems protection level
 - **Qualitative**: Intelligibility, audibility, visualization ... of information content as derived from user perception (MOS)

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Business Planning and migration to 3G Motivation for 3G

- Introduction of **New Services** generating more revenues
- Increase **Market share** addressing all market interests
- Design of **Bundles** of services optimized per customer category
- **Economies of scale** with higher increase of profitability for more customers and services than additional investments



Business Planning and migration to 3G Key Economic Factors

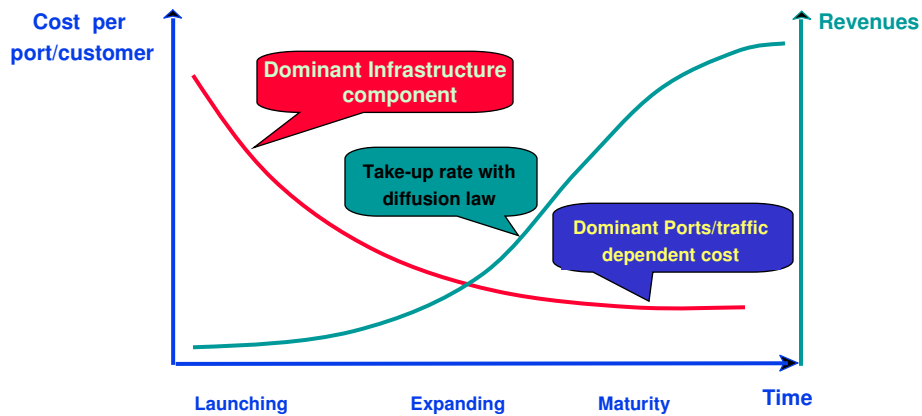
- Dominant dimensioning criteria evolving in 3 phases:
 - **Geo coverage** due to propagation at start phase
 - **Ports/users** as customers grow
 - **Traffic** increase due to applications
- High cost impact of network physical infrastructure (around 70%)
- Significant savings by physical resources sharing among operators
- Business profitability as a function of Revenues for new services, Take-up rate and Cost of Ownership

Impact on business? → What-if analysis



Business Planning and migration to 3G Key Economic Factors

- Evolution for unitary costs and revenues



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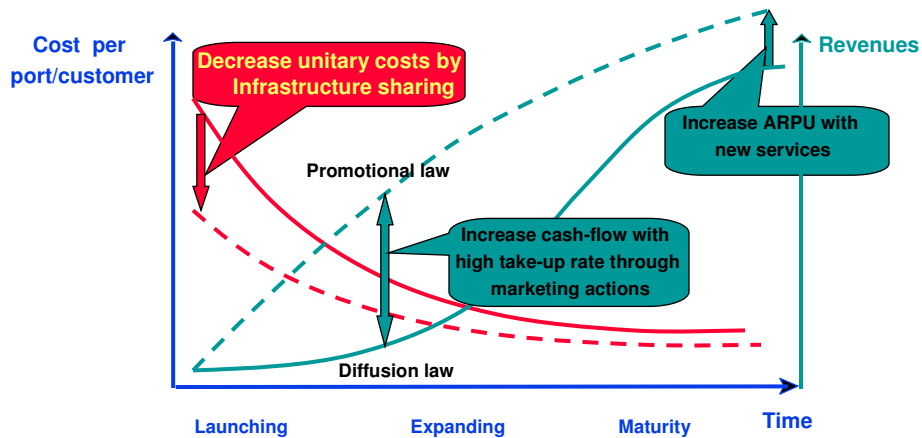
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Business Planning and migration to 3G Actions for profitability

!! Joint Techno-economical evaluation at all phases !!



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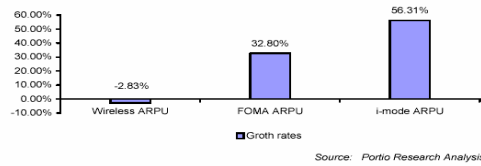
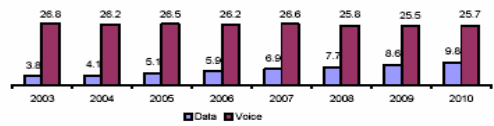
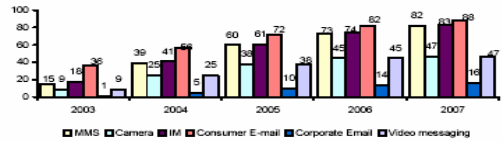


Business Planning and migration to 3G Capabilities and Revenue evolution

– Grow for data related capabilities and services in terminals and network

– Grow in rate of contribution of Data to Voice revenues (ie: ARPU - GBP projections for Vodafone in EU)

– Relative grow rates in 2003 for Data driven ARPU in DoCoMo - Japan



Business Planning and migration to 3G Driving new services for 3G

- Videocalls
- Audiostreaming
- Videostreaming
- Top News
- Location Based Systems
- Live-TV
- m- medicine and social applications



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Business Planning and migration to 3G Geo-scenarios

Geo-scenarios for network design as a function of customer density and traffic which require different dimensioning criteria

- A) Urban with high customer densities and high voice and data traffic
- B) Suburban with medium customer densities and average traffic
- C) Rural with low customer densities and low traffic volume
- D) Hotspots with specific high density and traffic requirements



Business Planning and migration to 3G How to define dimensioning and costing units for interconnection ?

- Requirements for service flow units to be used:
 - Should be **quantifiable** with defined engineering rules
 - Useful for interrelation between **demand/dimensioning/costing** for a given QoS and SLA
 - Reflecting **service provisioning** and market value across multiple networks
 - Applicable to **multiservice/multimedia flows**



Business Planning and migration to 3G Traffic flow types for QoS based dimensioning

- **T1) QoS constant stream**: bandwidth transmission at a constant speed with a specified delivery and jitter (ie: video distribution)
- **T2) 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.)
- **T3) QoS elastic**: bandwidth transmission at a variable speed without jitter restrictions and asynchronous delivery (ie: browsing, file transfer, mail, UMS, etc.)



Business Planning and migration to 3G Traffic units for aggregated flows

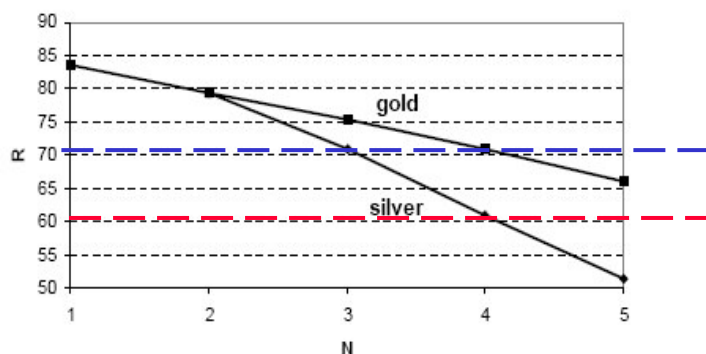
Proposal of NGN units in multiservice networks/interfaces for demand/dimensioning/costing :

- Equivalent Sustained Bit Rate (ESBR) or aggregated equivalent rates for same QoS category flows efficiently carried in a common reference busy period (ie. 5 minutes)
- Computed as weighted average for the services at QoS category (i) and customer classes (j) at each network element:
$$\sum_i \sum_j \text{ESBR}_{ij}$$



Business Planning and migration to 3G Performance Issues: case of VoIP

Perceived Quality of Service as a function of the number of crossed domains for the G.711+PLC coding with ppp = .01 and gold /silver SLA (19th International Teletraffic Congress September 2005, Beijing)



High importance of the number of crossed domains and quality per domain on the end-to-end performance



Business Planning and migration to 3G Dimensioning criteria in 3G

Multicriteria Dimensioning principles for multimedia services

C1) - **Radio Coverage** per frequency type: 900, 1800, 2500: dominant for low voice traffic without data.

C2) - **Traffic in erlangs** for voice: dominant in urban scenarios and hot-spots

C3) - **Data services** quality as a function of speeds: dominant in suburban and rural scenarios

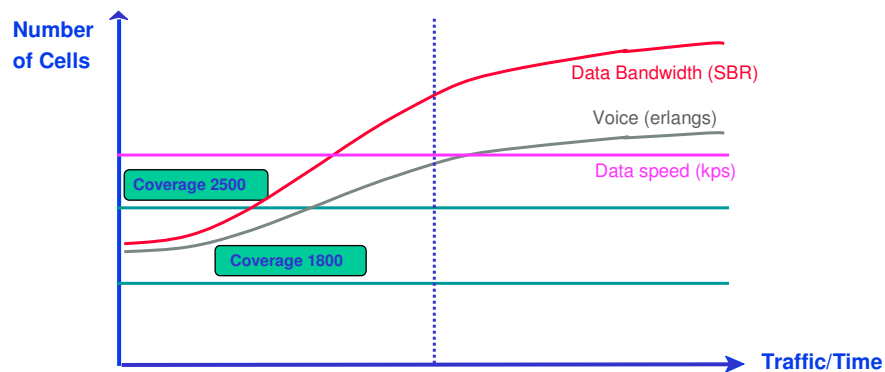
C4) - **Data bandwidth** as a function of mix of data services **Sustained Bit Rates** and QoS along the cell due to the cell-breathing effect: dominant for significant proportion of data and video consumption in all scenarios

Actual dimensioning for cells and equipment as a result of the convolution of all of them per geo-scenario



Business Planning and migration to 3G Dimensioning criteria in 3G

Illustration of Multicriteria Dimensioning for QoS (urban case)

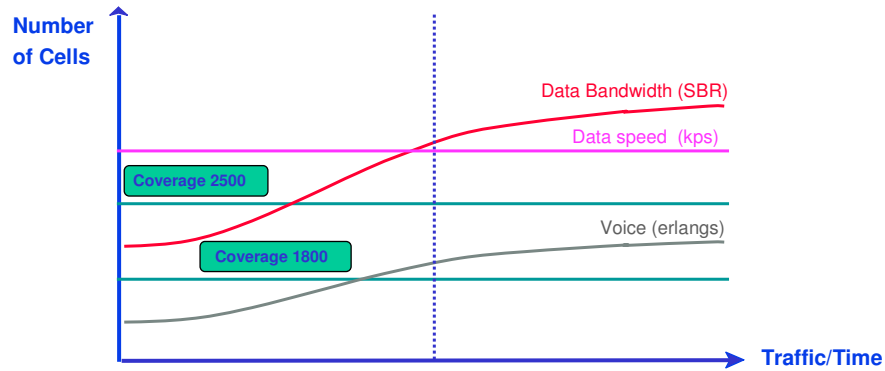


**!! Escape from dimensioning based only on coverage !!
Data BW criteria dominant in 3G**



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Illustration of Multicriteria Dimensioning for QoS (suburban case)

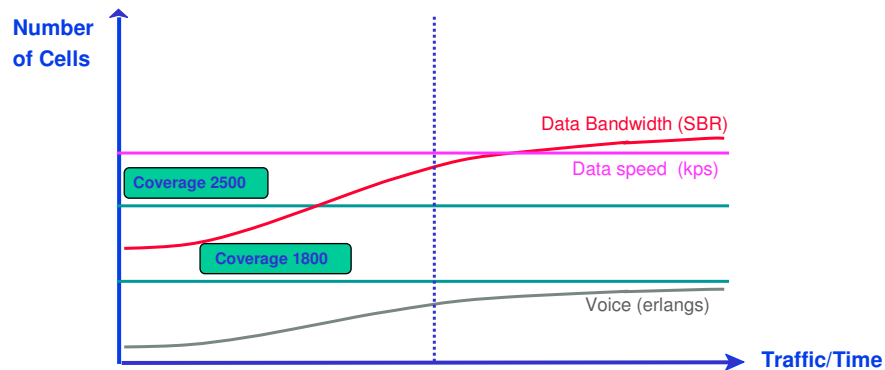


**!! Escape from dimensioning based only on coverage !!
Data BW criteria dominant in 3G**



Business Planning and migration to 3G Dimensioning criteria in 3G

Illustration of Multicriteria Dimensioning for QoS (rural case)



**!! Escape from dimensioning based only on coverage !!
Data BW criteria dominant in 3G**



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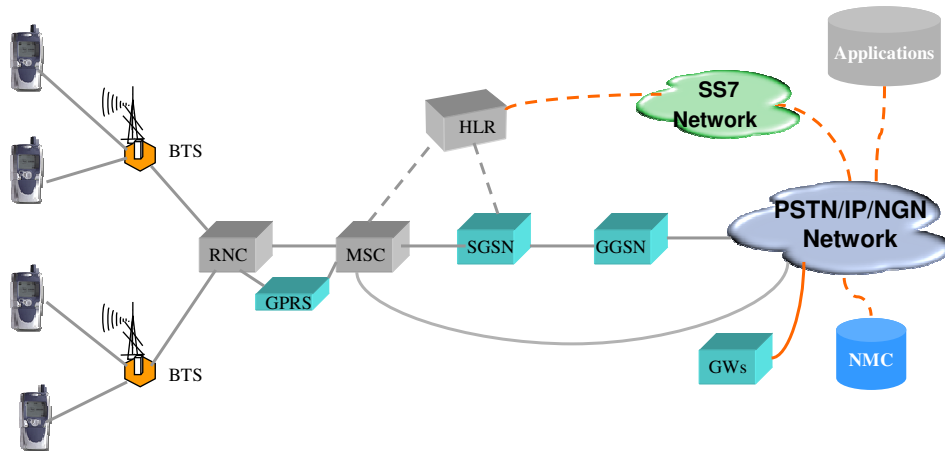


Business Planning and migration to 3G Network Systems Modeling for the migration

- **Customer Segments** (business, residential) and Services (Voice and Data low/medium/high speed)
- **Sites and Base Stations** at Urban, Suburban, Rural and Hot spots
- **Backhaul** per geo-scenario
- **Core Network** with the specific network elements in the architecture
- **Transport** for voice, circuit mode data and packet mode data
- **Interconnection** for voice and data



Business Planning and migration to 3G Evaluated architectures



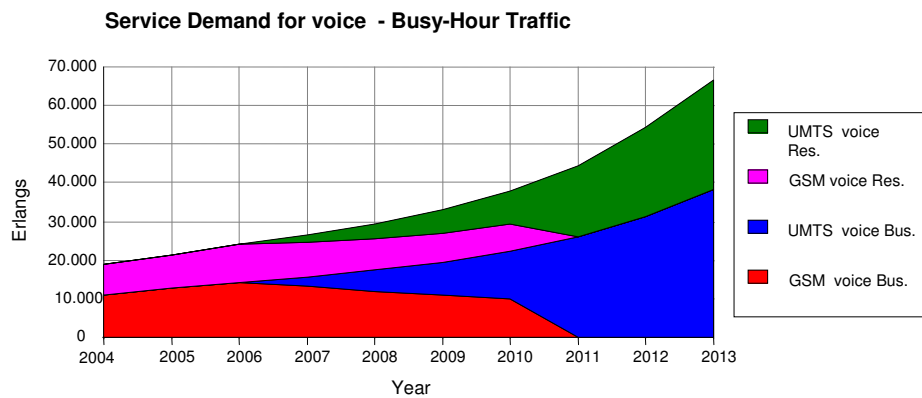
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Business Planning and migration to 3G Typical planning results



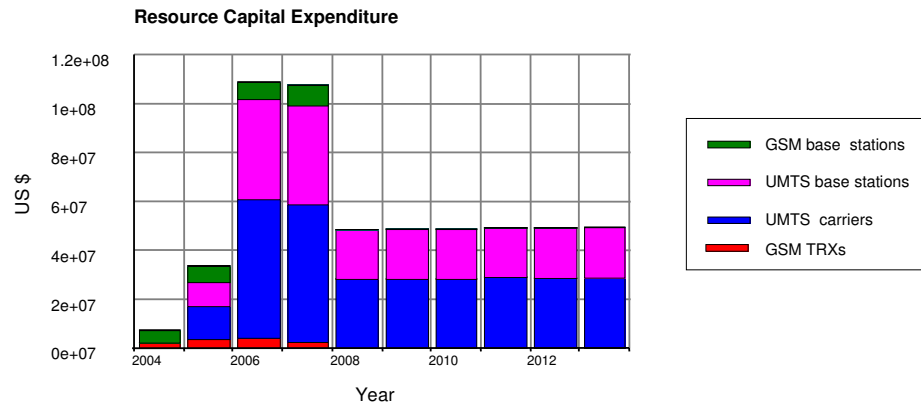
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Business Planning and migration to 3G Typical planning results



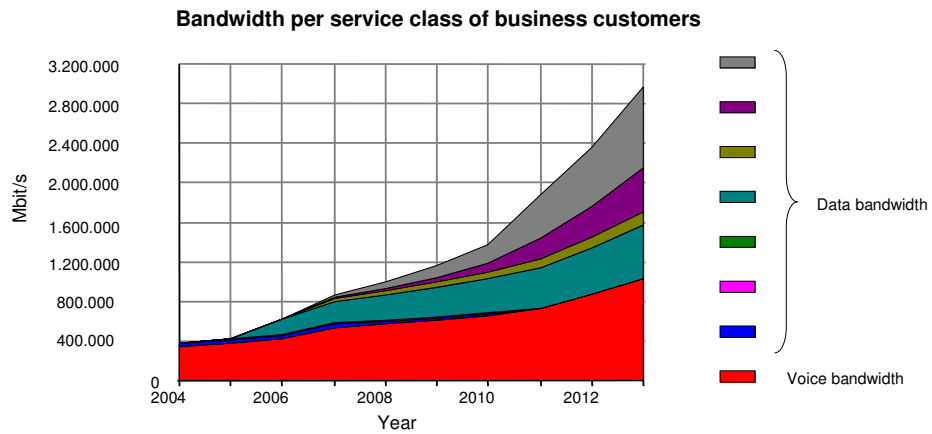
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Business Planning and migration to 3G Typical planning results



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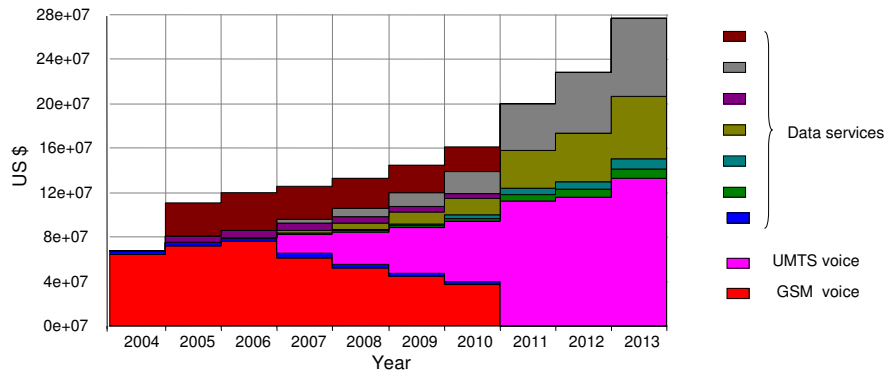
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Business Planning and migration to 3G Typical planning results

Revenue per service type for consumer customers



Business Planning and migration to 3G Conclusions

Key economical factors have to be considered with
dynamic models and validated

High impact of **sharing factors** and **take-up rate** in the
profitability

Critical multiple **dimensioning** criteria for QoS in 3G

Powerful support **tools** needed