ITU / BDT Regional seminar
Guidelines on the smooth transition of existing mobile networks to IMT-2000 - ARB Region

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Economical Evaluation of 2G to 3G Migration and Business Planning

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Economical Evaluation for 2G to 3G Content

- Factors in the 2G to 3G evolution
  - Motivation and Key economical issues
  - Driving services
- Techno-Economical and Business modeling
  - Demand, services and revenues
  - Dimensioning criteria
- Tool based planning
  - Techno-economical tool modeling
  - Typical planning results

Economical Evaluation for 2G 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

Economical Evaluation for 2G to 3G
Key Economical 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%)

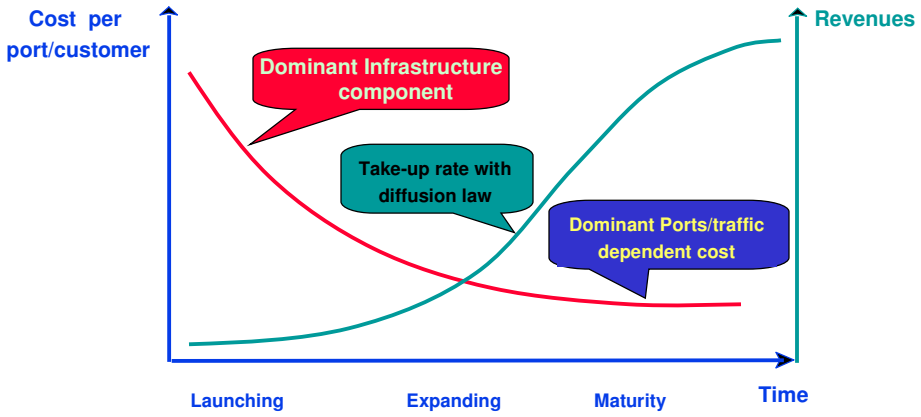
– Significant savings by physical resources sharing among operators

– Business profitability as a function of Revenues for new services, Take-up rate and Cost of Ownership

Impact on business? ⟹ What-if analysis

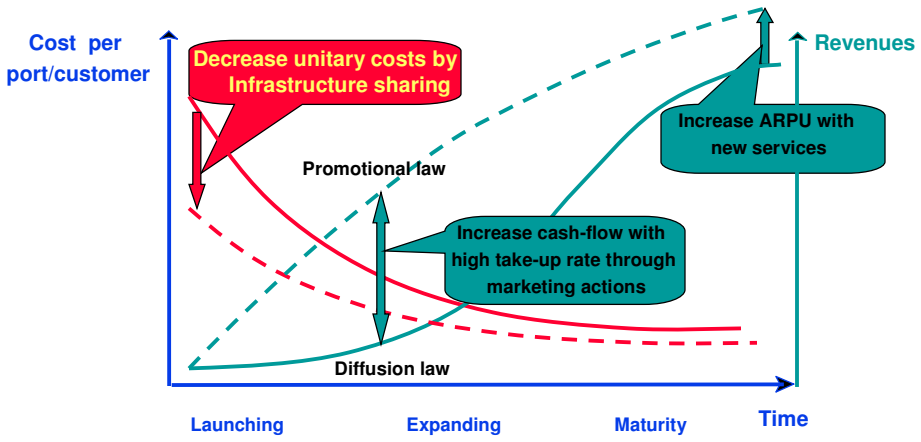
Economical Evaluation for 2G to 3G
Key Economical Factors

- Evolution for unitary costs and revenues



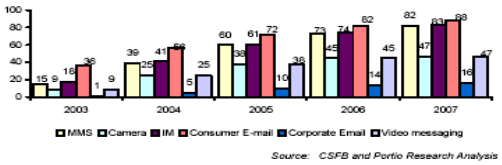
Economical Evaluation for 2G to 3G
Actions for profitability

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



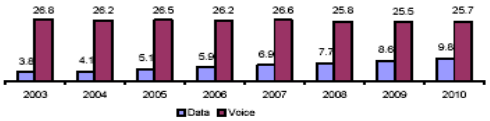
Economical Evaluation for 2G to 3G Capabilities and Revenue evolution

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



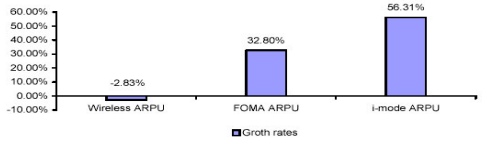
Source: CSFB and Portio Research Analysis

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



Source: ING

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



Source: Portio Research Analysis

Economical Evaluation for 2G 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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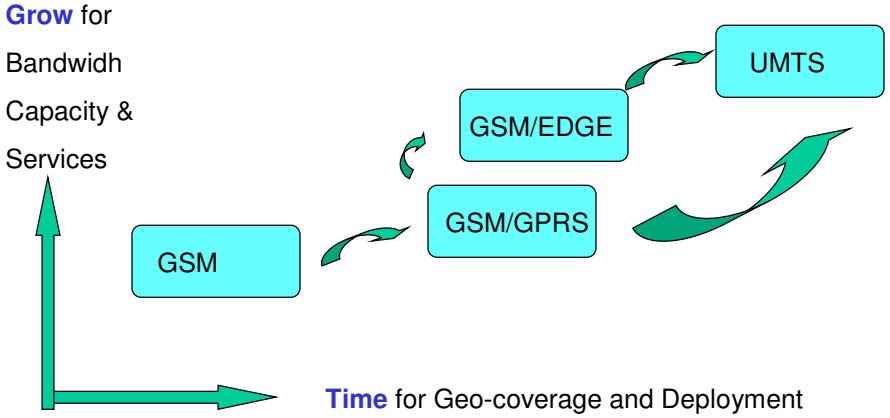
Economical Evaluation for 2G to 3G Service classes modeling by groups

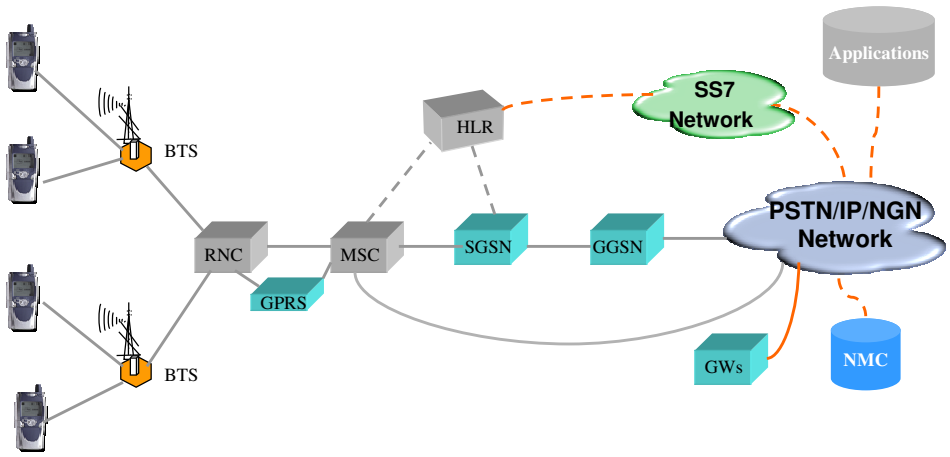
Technology	Services	Revenue function
GSM	Voice	Time function
	Data/circuit 9.6Kbps	Subscription/Time function
GPRS/EDGE	Data/circuit up to 64Kbps	Subscription/Time function
	Data/packet up to 144Kbps	Subscription/Message/ Information volume function
UMTS	Voice	Time function
	Data/circuit up to 64Kbps	Subscription/Time function
	Data/packet up to384/2Mbps	Subscription/Message/ Bandwidth/Information volume function

Economical Evaluation for 2G to 3G Network Evolution steps



Migration strategy is strongly dependent on country Geo-structure and density

Economical Evaluation for 2G to 3G Evaluated architectures



Economical Evaluation for 2G 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

Economical Evaluation for 2G 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

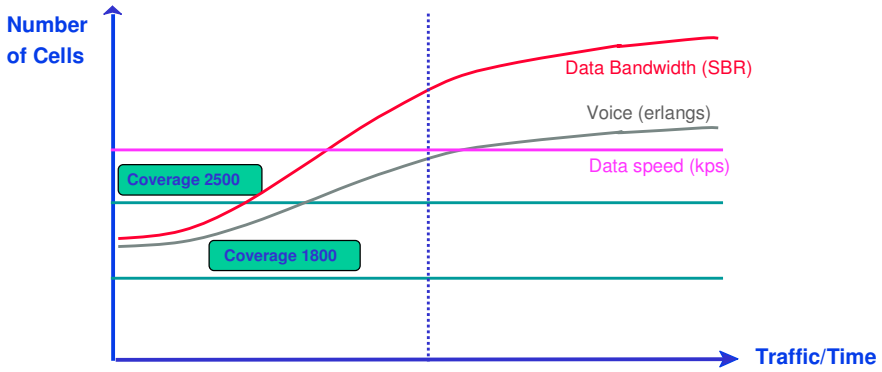
C3) - Data services quality as a function of speeds: dominant in suburban and rural scenarios

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

Economical Evaluation for 2G to 3G
Dimensioning criteria in 3G

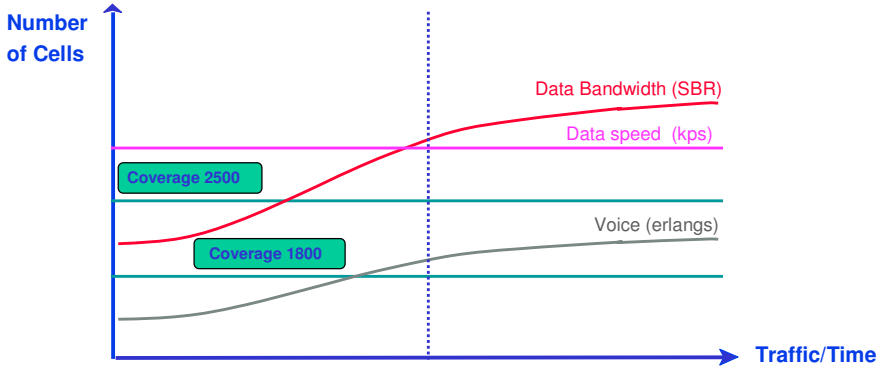
Illustration of Multicriteria Dimensioning for QoS (urban case)



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

Economical Evaluation for 2G to 3G
Dimensioning criteria in 3G

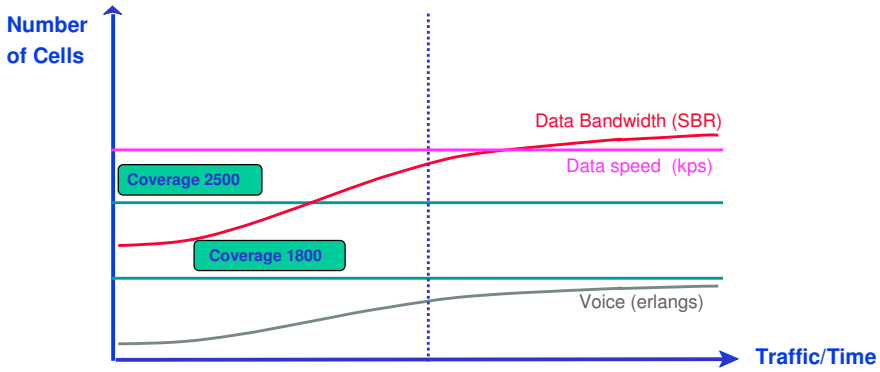
Illustration of Multicriteria Dimensioning for QoS (suburban case)



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

Economical Evaluation for 2G to 3G
Dimensioning criteria in 3G

Illustration of Multicriteria Dimensioning for QoS (rural case)



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

Economical Evaluation for 2G to 3G
Infrastructure Sharing Scenarios for cost saving

Sharing Levels for economy of scale

- A) No sharing with full overlay and independent networks
- B) Site and Tower sharing
- C) Site, Tower and physical BST sharing
- D) Mobile Virtual Operator or leasing for all accessibility subnetwork

Economical Evaluation for 2G 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

Economical Evaluation for 2G to 3G Resources modeling over time

- Network resources are associated to Network elements per type
- Resources modeled by capacity, utilization, physical lifetime and depreciation policy
- Capital cost structure modeled with trends over time
- Operational costs modeled for: Maintenance, Churn, Decommissioning, Connection, Rental, Usage and Operation costs
- Models keeps track and history for all these capital and operational costs components for later reverse cost allocation

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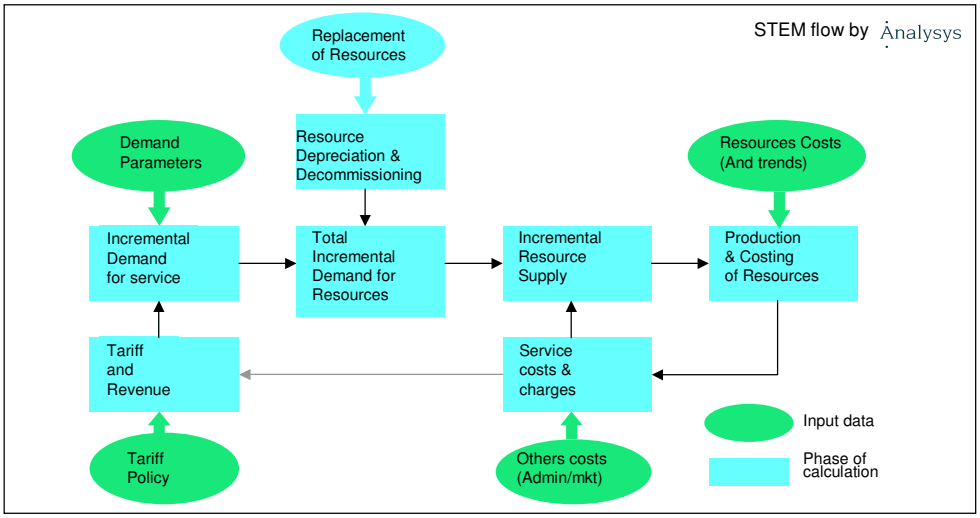
Economical Evaluation for 2G to 3G Support tools: Business

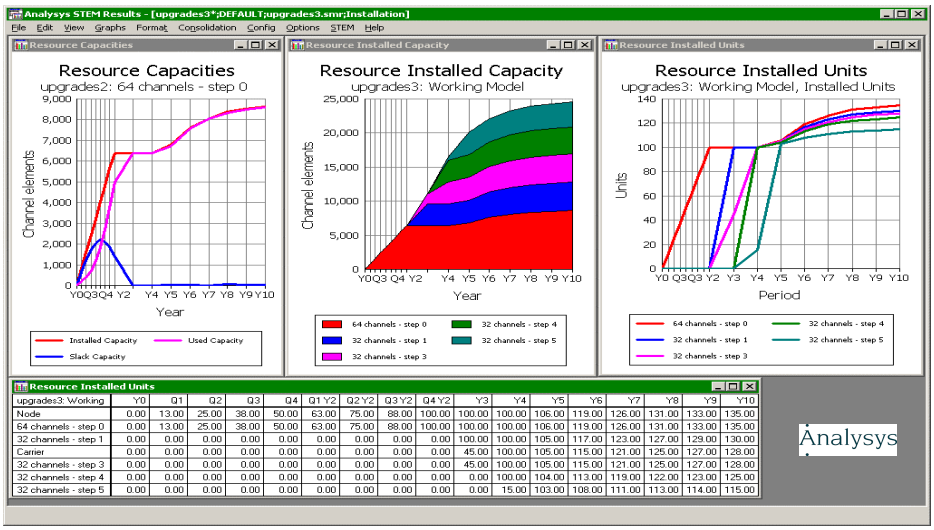
- **Required functionality for Business tools**

  - Service Demand Projection
  - Dynamic modeling for technology substitution and migration rates
  - Dimensioning multiple flows (circuit and packet modes)
  - Evaluation of network resources and associated investment (CAPEX)
  - Evaluation of revenues for given tariffs and installation rate
  - Modeling multiple resource lifetimes
  - Modeling of demand elasticity to tariffs
  - Interrelation between network growth and operational cost (OPEX)
  - Cost assignment as a function of utilization rates
  - Generation of standard financial results like Cash Flow, Profit & Loss, Balance Sheet, NPV, IRR, etc.

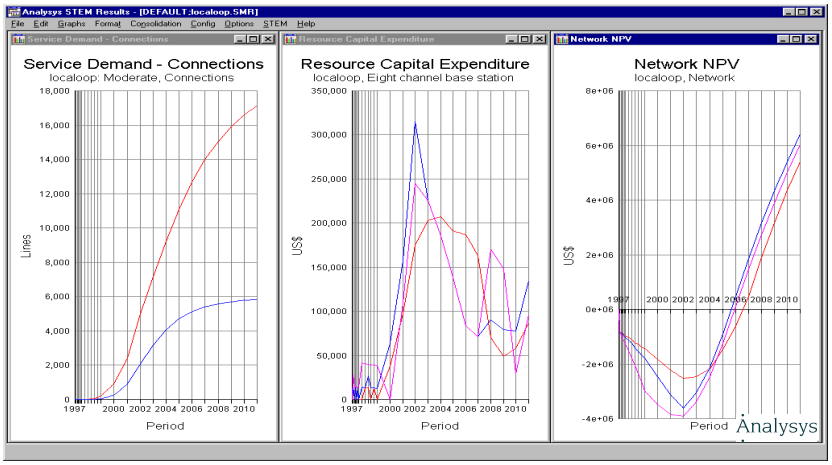
Economical Evaluation for 2G to 3G
Tool activity flow



Economical Evaluation for 2G to 3G
Example of tool results for business analysis



Economical Evaluation for 2G to 3G
Example of scenario results with STEM



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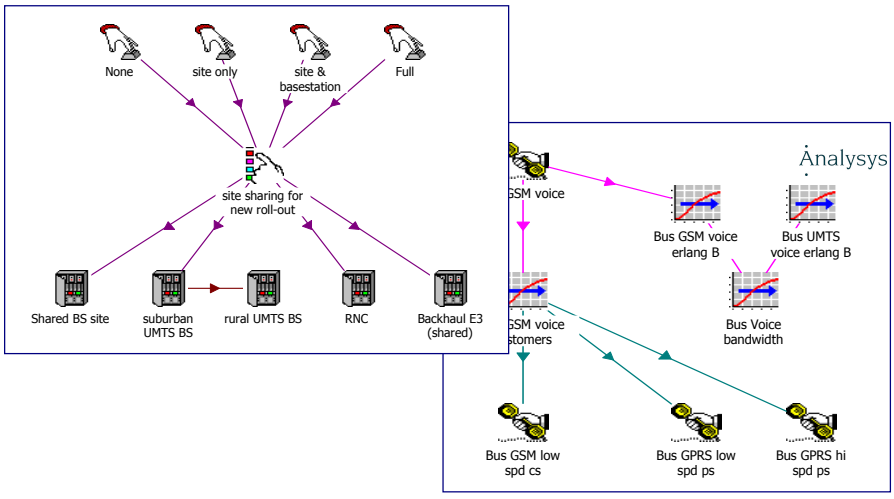
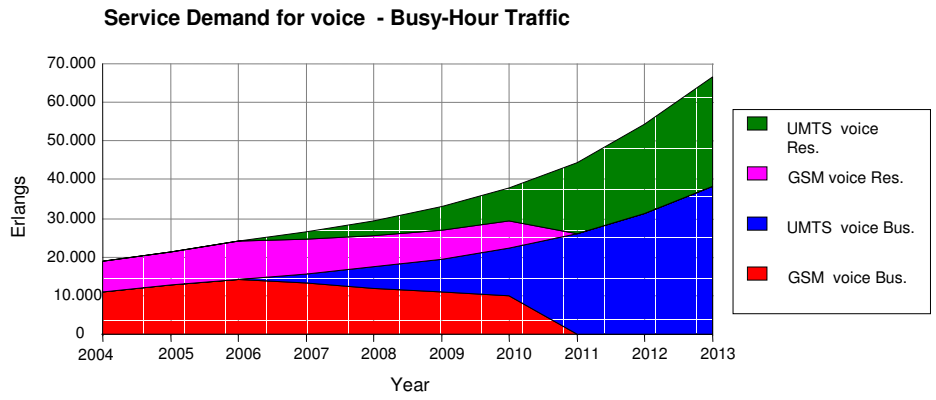


Economical Evaluation for 2G to 3G
Typical planning results



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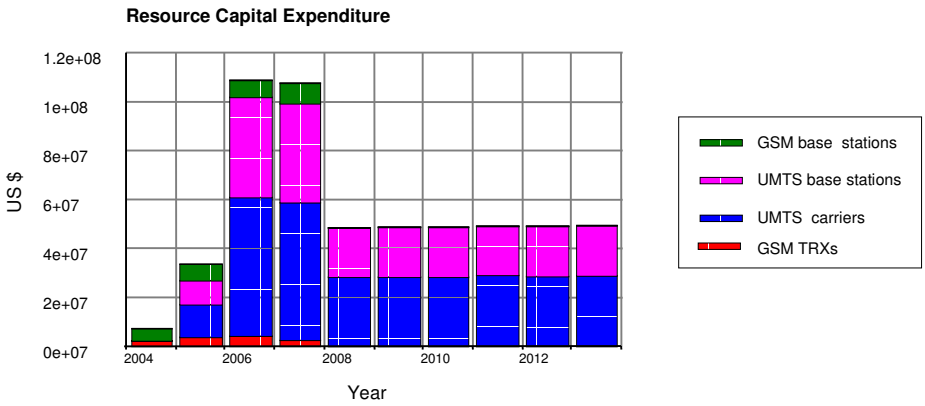
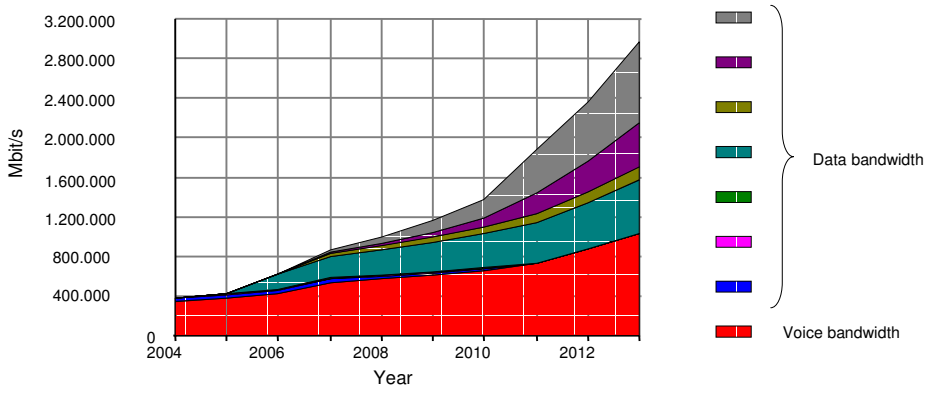
Typical planning results



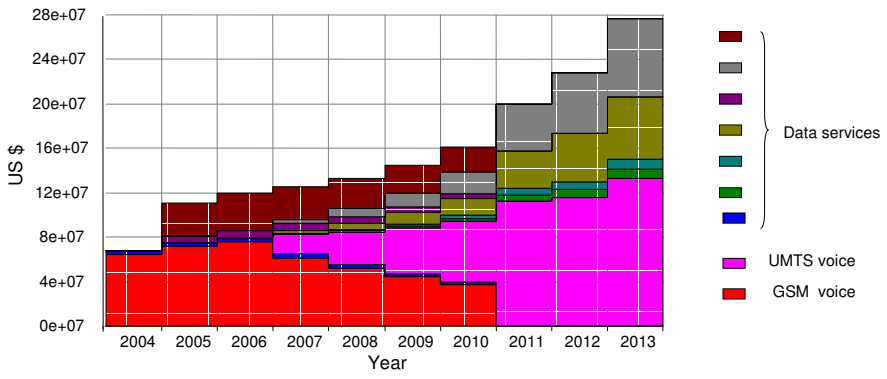
Economical Evaluation for 2G to 3G
Typical planning results

Bandwidth per service class of business customers



Economical Evaluation for 2G to 3G
Typical planning results

Revenue per service type for consumer customers



Economical Evaluation for 2G 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