ITU-D/ ITU-T Seminar on Standardization and Development of Next Generation Networks for the Arab Region

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Business Case Studies with STEM

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Business Case Studies Content

- **Business evaluation and STEM tool**
- **Study for Migrating voice and data services to an NGN platform**
- **Study for the business case for WiMAX vs DSL in rural areas**

Business Case Studies
Role of Business Planning

– Forecast solutions, costs and revenues

– Evaluate future Cashflows, NPV, IRR, ROI, etc.

– Perform "What-if" analysis for optional alternatives on Volume of customers, customer mixes and services domains

– Perform benchmarking with "best in class" operators

– Decision making on strategy and actions in competition based on quantified evaluations

– Recommend alternatives and actions to ensure success

Business Case Studies
Support tools: Business planning

- **Required functionality for Business tools**

  - Service Demand Projection per service class
  - 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.

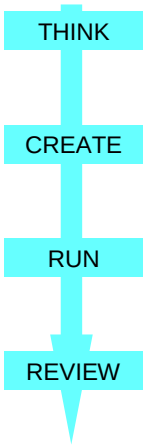
Business Case Studies
STEM® tool

- STEM: Strategic Telecoms Evaluation Model* by Analysys
- A consistent language and flexible framework for evaluating investments in telecoms business
- A high-level communication tool which uses icons to represent the key drivers in a business plan
- A time-based revenue, capex and opex calculator which supports network roll-out and investment decisions

® * developed over 20 years with the emerging telecoms economy by:
Analysys Limited, Cambridge, UK
www.analysys.com/stem/

Business Case Studies
STEM integrates communication with calculation

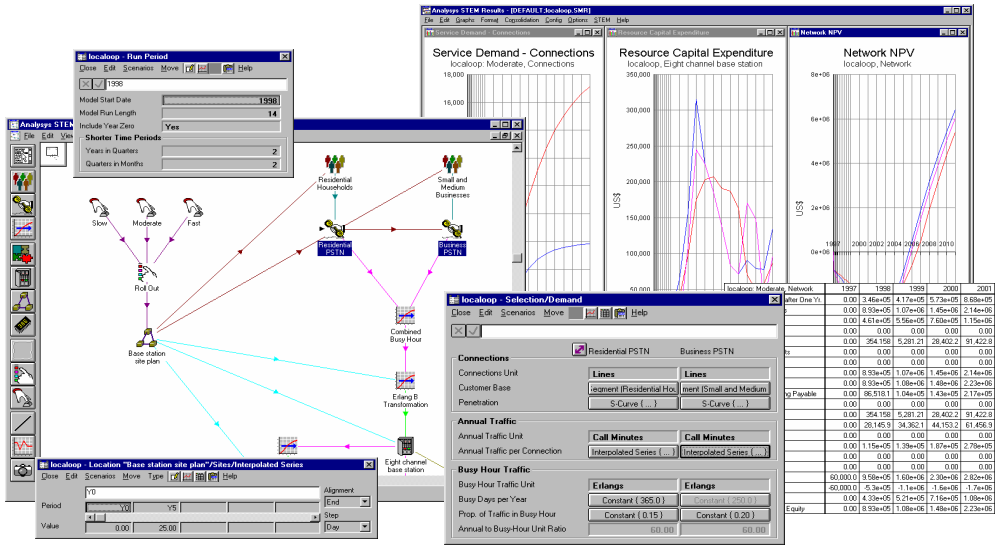
- Provides a brainstorming and presentational tool for rapidly developing network business models
- Automatically generates demand / cost-allocation formulae, geographical variants and scenarios
- Calculates annual, quarterly and monthly service connections, traffic and revenues, equipment installation and replacement, capex and opex
- Delivers hundreds of built-in results through an integrated charting interface which can drill-down into individual elements, revenues and costs



Business Case Studies
Consistent financial framework

- Service elements capture demand characteristics and tariff assumptions ⇨ REVENUE
- Resource elements represent unit costs and build constraints for hardware, software, licences, buildings and human resources ⇨ CAPEX, DEPRECIATION and OPEX
- Connection, traffic and location-based dimensioning rules are shown as graphical links ⇨ PROFITABILITY and BALANCE SHEET

Business Case Studies
Intuitive graphical interface



Business Case Studies
Overview of two STEM case studies

- Migrating separate voice and data services to an NGN platform

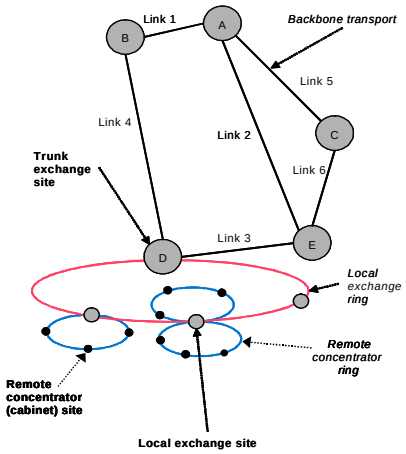
- The business case for WiMAX vs DSL in rural areas

Business Case Studies

Migrating separate voice and data services to an NGN platform

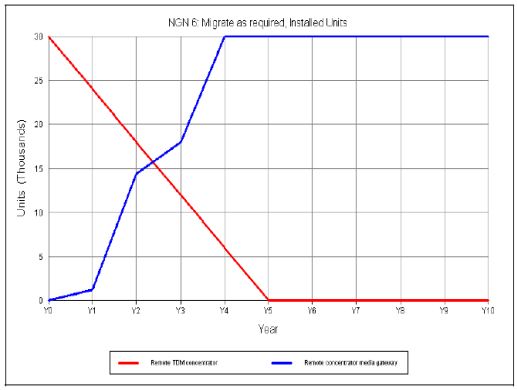
Business Case Studies
Initial Network topology

- Five trunk exchanges are connected via an SDH backbone with six links
- Local exchanges uplink via local-exchange rings
- Voice customers are connected to local exchanges via remote concentrators and remote-concentrator rings
- Data customers are served directly at local exchanges



Business Case Studies
Migration process

- There are two steps to the migration from the traditional network to NGN:
  - first the IP network is deployed and run alongside the traditional infrastructure while customers are being migrated
  - the legacy network equipment is then removed once the migration is complete

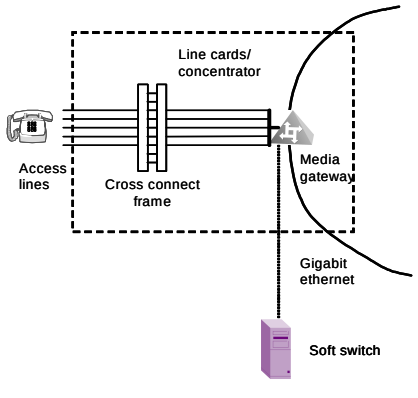


Business Case Studies
Model granularity

- The five trunk exchanges in the network are modelled individually, but it is not necessary to model every local exchange to compare business-case scenarios
- Assumptions for the local exchanges and access aggregation are averaged over each trunk exchange area
- The model structure for each trunk exchange is automatically generated from a template
- The traffic generated on the 15 routes is mapped onto the trunk exchanges using an access matrix and a core matrix
- These matrices are used to calculate the traffic on each trunk exchange interface by multiplying the traffic carried for each service by route by the multiplier for the exchange and summing over all services

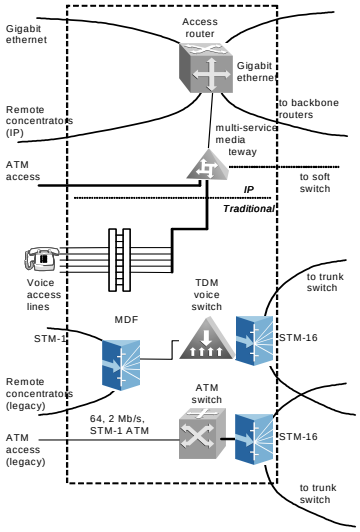
Business Case Studies
Media gateways and soft switches

- A media gateway is installed at a remote concentrator site, converting TDM circuits to IP and multiplexing them onto a gigabit Ethernet network
- The GigE network is connected to an IP access router at the local exchange
- The media gateway equipment includes new line cards (voice/DSL-capable) and the GigE interface
- A soft switch is deployed at each trunk exchange site, establishing call sessions and identifying destination IP addresses for media packets



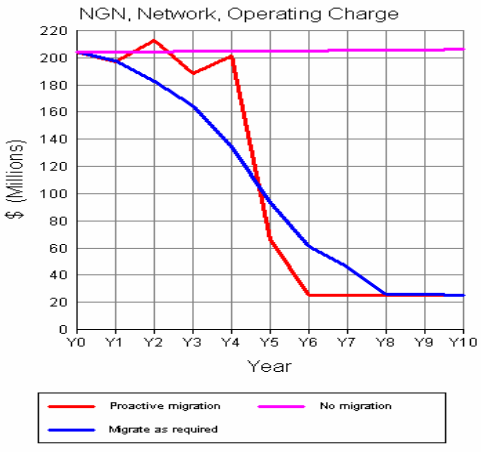
Business Case Studies
Multi-service media gateways for ATM

- An IP access router is deployed at each local exchange site
- Remote concentrators are connected to this access router via a GigE ring
- Each router is connected to other access routers on the local exchange ring and to the backbone routers via further GigE rings
- ATM access circuits are migrated from the traditional ATM switch to the access router via a multi-service media gateway



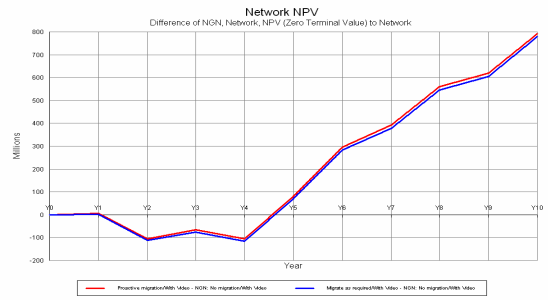
Business Case Studies
Migration scenarios and results

- Three scenarios are modelled:
  - proactive: customers are migrated to the IP network before the end of the traditional network's life
  - migrate-as-required: customers are migrated only when a given access network reaches the end of its life
  - no migration: the legacy networks are maintained, as a base for comparison with the main scenarios
- The key model results are the opex, capex and depreciation for the various networks and scenarios considered



Business Case Studies
Impact of migration on the NPV

- The initial NGN model focuses on cost savings achieved by migrating services to a single IP platform – it does not examine revenues
- The cost savings alone are NPV positive after 4–5 years

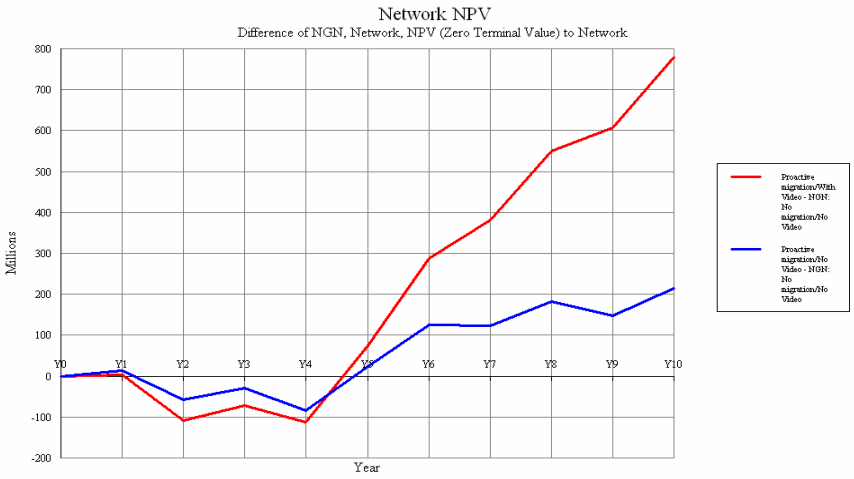


Business Case Studies
Exploiting new revenue opportunities

- NGN migration has installed broadband-ready lines to all customers
- A service offering IP-based video to residential users could be provided over these lines
- Will this service improve the overall payback time?

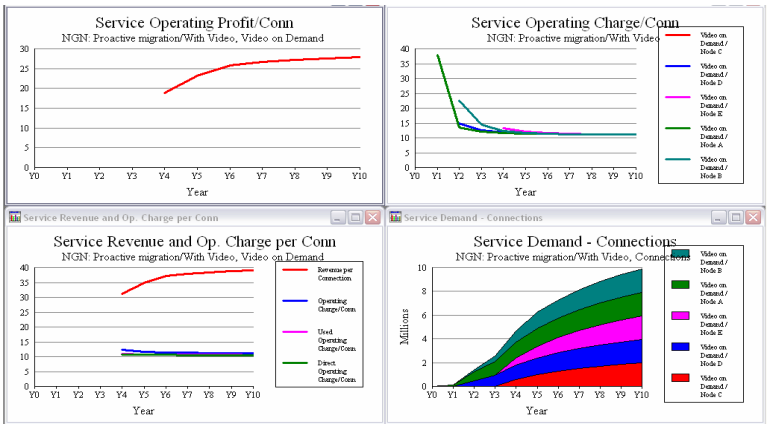
Business Case Studies

With VoD, the NPV breaks even earlier, with much greater profits in the long run



Business Case Studies

The cost of the service converges at all nodes, and provides a good margin



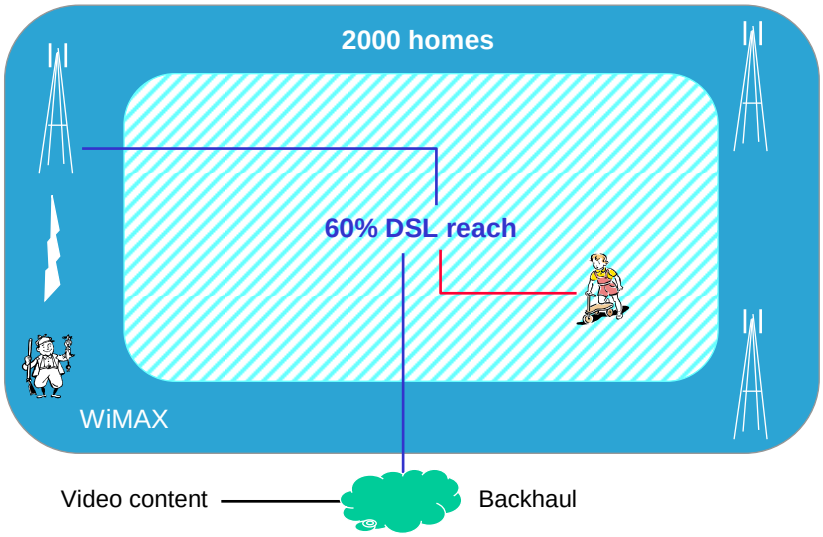
Business Case Studies

The business case for WiMAX vs DSL in rural areas

Business Case Studies
The economics of rural access

- Operators are considering BBFWA technologies such as WiMAX as a more cost-effective solution for delivering IP-based services in low-density subscriber areas
- 2000 homes are connected over conventional copper to a local exchange, but in this rural area, only 60% are within reach of the current available DSL technology
- WiMAX is suggested as an alternative broadband solution, and a network will be deployed during 2006, with the launch of commercial service scheduled for January 2007
- The model considers scenarios for each technology in isolation, and also running both in parallel.

Business Case Studies
The big picture



Business Case Studies
Service classes

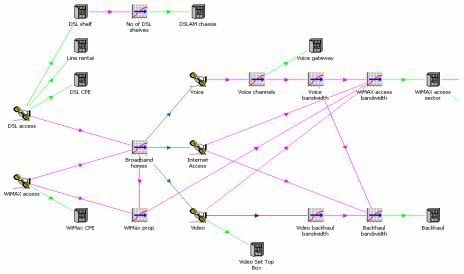
- WiMAX is offered as a total replacement technology for the outlying homes: voice and Internet services will both be carried over WiMAX for those subscribers
- Revenue arises from these separate access platforms, as well as from the individual services
- The model makes a high-level dimensioning of the relevant network elements according to the numbers of subscribers and associated traffic levels
- The model also considers the addition of an IPTV service, and its impact on service revenues and required network elements

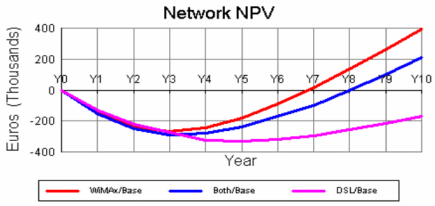
Business Case Studies
Simplified network architecture

- DSL or WiMAX CPE
- DSLAM (and line rental, if this is an alternative operator)
- WiMAX access sectors and base stations
- Backhaul
- Core network
- Set-top box and video server
- Two different access technologies, but the same backhaul and core network are used by both systems

Business Case Studies
Quick and easy model

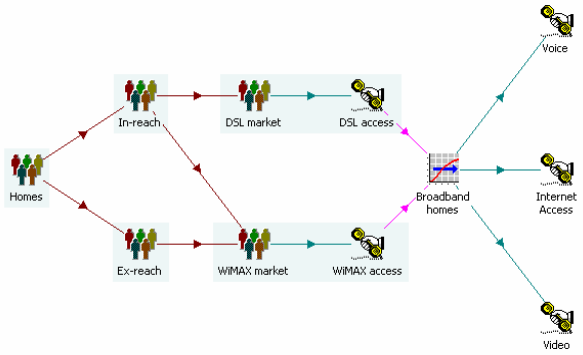
- The model is built on the STEM business-modelling software for networks
- Graphical user interface facilitates rapid and team-oriented editing of the model structure and assumptions
- STEM handles the structure and execution of the calculations





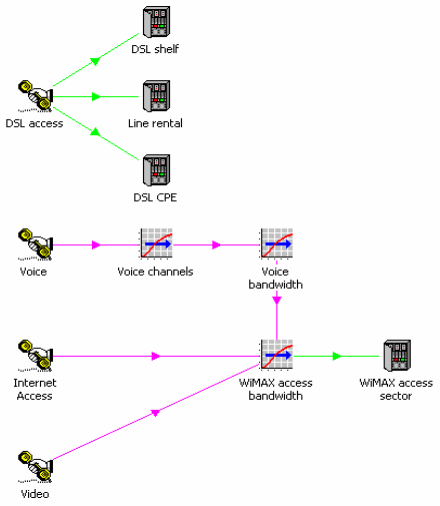
Business Case Studies
Market and service structure

- Target market for broadband access (BBA)
- Estimated take-up rate
- Optional services and associated tariffs:
  - voice
  - Internet access
  - IPTV



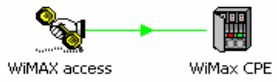
Business Case Studies
Connections and bandwidth

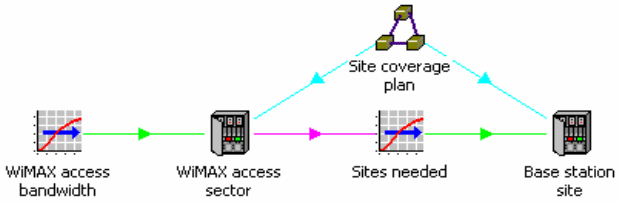
- DSL access customers drive DSL ports
- Busy-hour Erlangs drive channel based voice bandwidth
- Voice, Internet and video bandwidth drive WiMAX capacity
- Voice and Internet plus video-feed bandwidth drives backhaul



Business Case Studies
WiMAX architecture

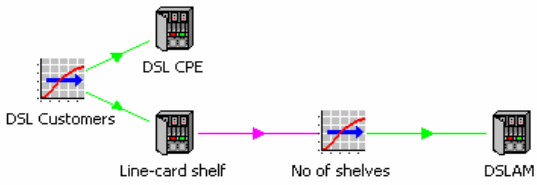
- WiMAX CPE per WiMAX customer
- Calculate WiMAX access sectors by 30 Mbit/s capacity
- Max 3 sectors per tower drives number of towers
- Independent site plan to allow for coverage constraints





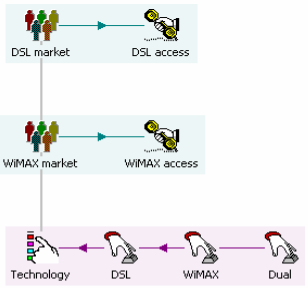
Business Case Studies
Simplified DSL architecture

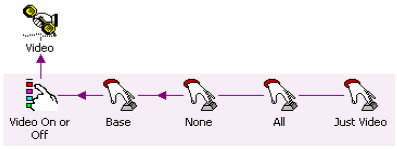
- Each DSL access customer requires a DSL modem
- Line-cards supplied in unit of packed shelves with 320 ports
- DSLAM chassis can accommodate up to five shelves
- DSLAM backplane throughput capacity assumed to be 'enough'



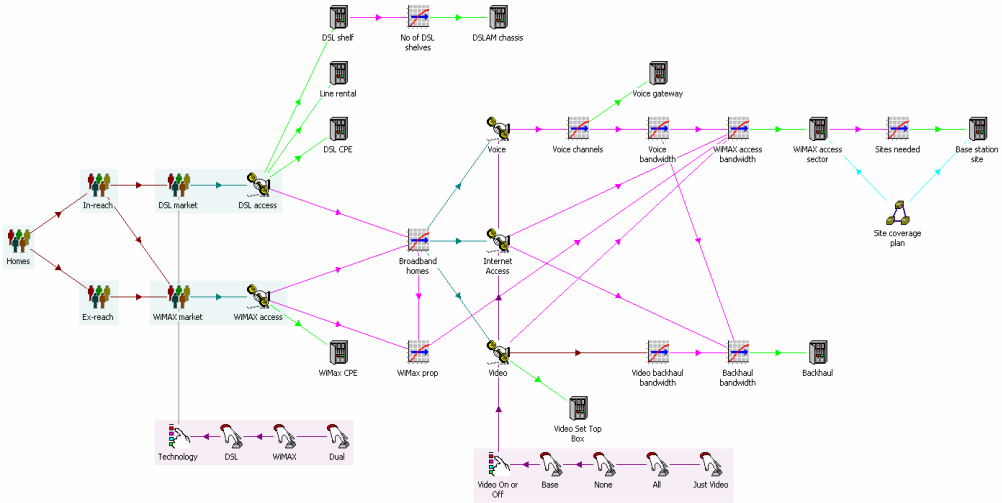
Business Case Studies
Technology scenarios

- Technology choice drives relative markets:
  - less DSL subscribers if WiMAX is available
- Video on–off choice varies proportion of customers with video:
  - sensitivity of WiMAX case to bandwidth saturation from video

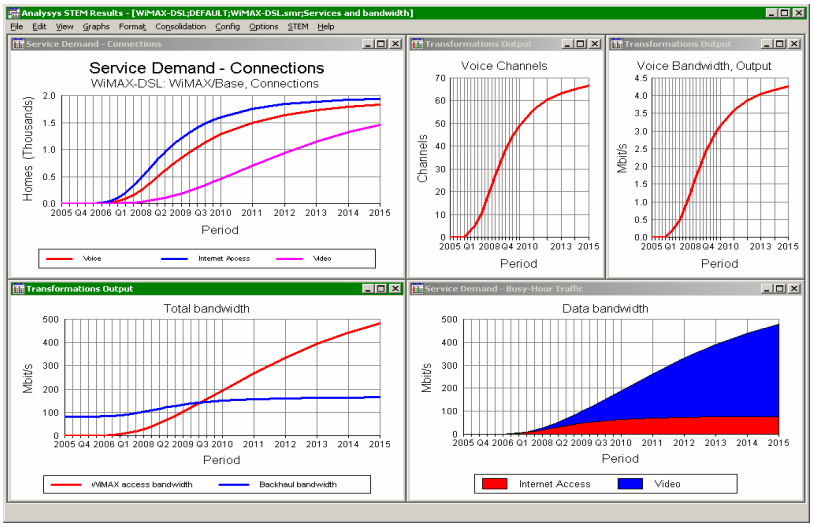




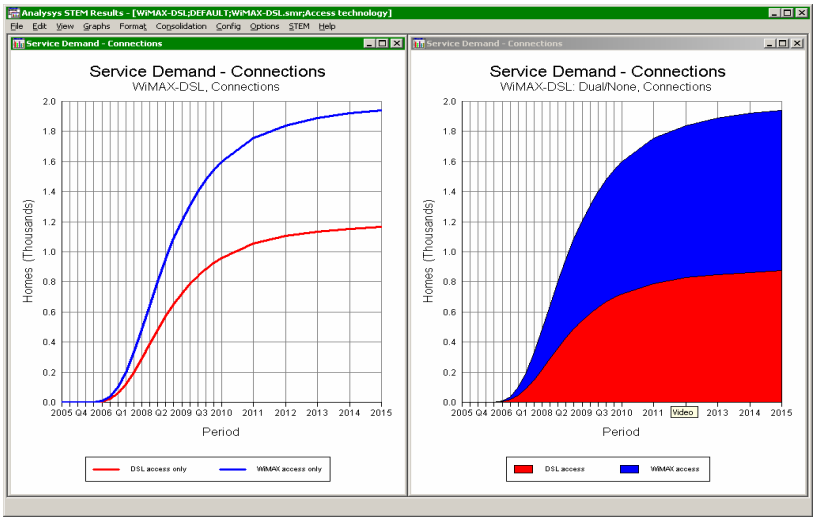
Business Case Studies
Complete model structure



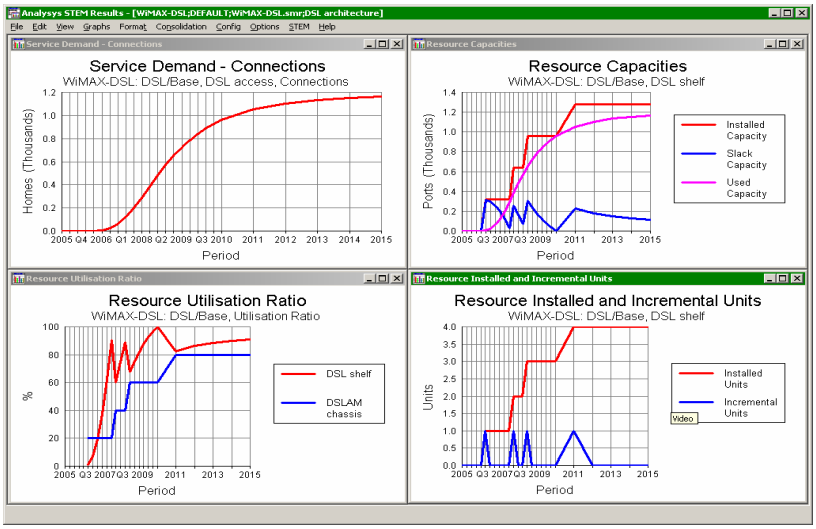
Business Case Studies
Services and bandwidth



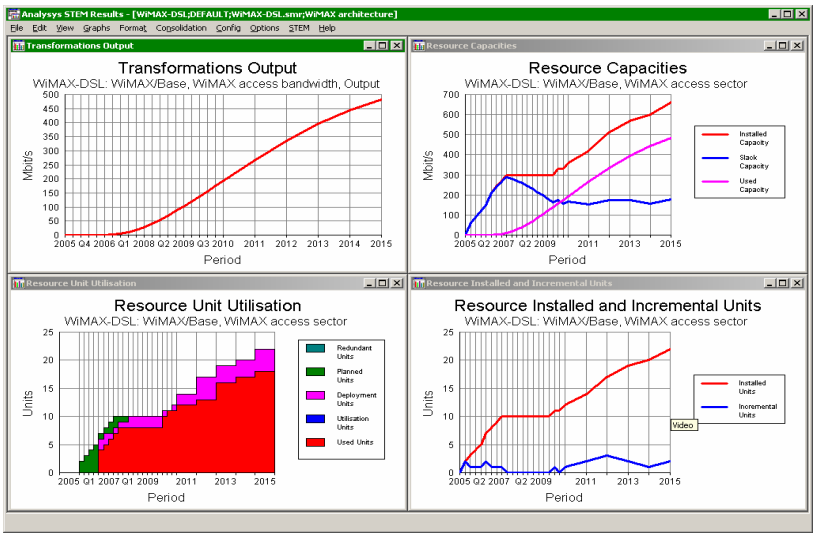
Business Case Studies
Access technology



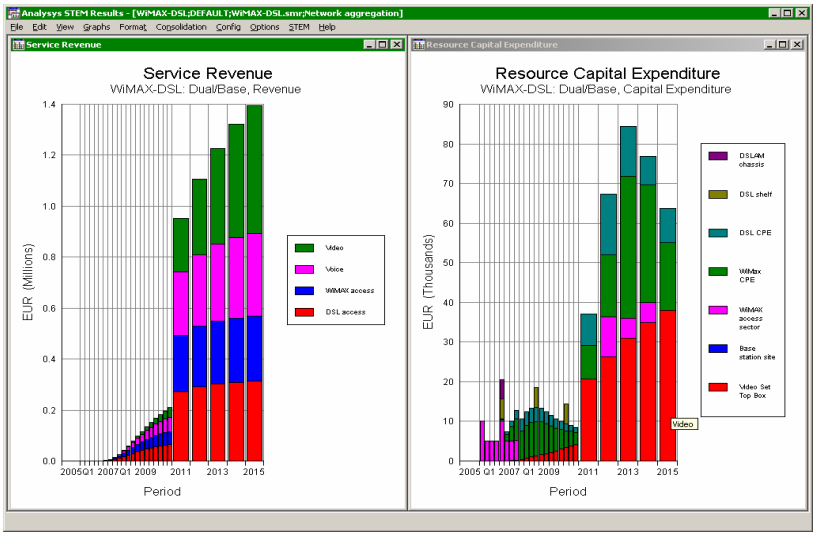
Business Case Studies
DSL architecture



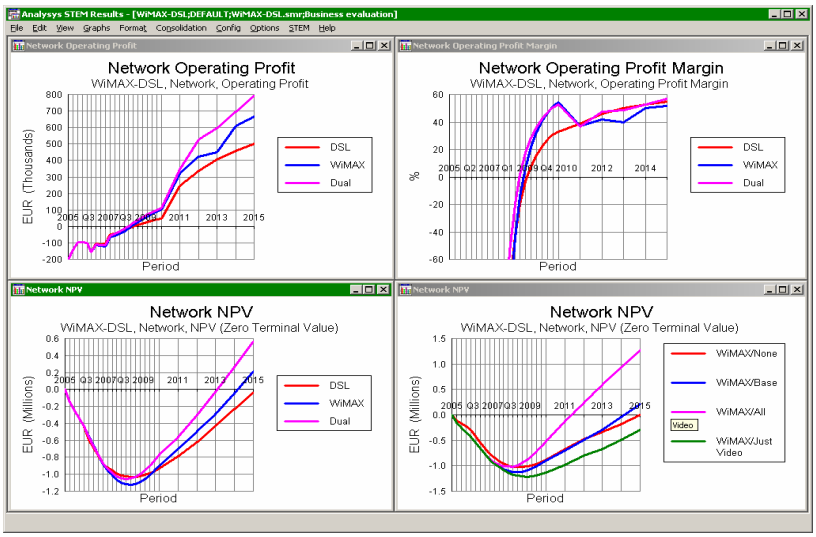
Business Case Studies
WiMAX architecture



Business Case Studies
Network aggregation



Business Case Studies
Business evaluation



Business Case Studies
Some conclusions for access

– Quick and flexible business modeling quite flexible for What-if analysis in migrating scenarios

– xDSL solution more economical when existing lines and distances on-reach

– WiMax solutions more economical when new networks in low density areas and not high bandwidth consumption due to video

– Dual strategy is the most convenient for common hybrid scenarios

Business Case Studies
Concluding Remarks

- Wide number of scenarios

requiring business analysis today

- Major differences between alternatives of migrating towards NGN and introduction of access technologies

- Need of powerful and high quality tools to support the planning process