Analysys STEM® case studies

Migrating separate voice and data services to an NGN platform

Measuring the economic potential of ADSL

Adding data revenues in transition from GSM to UMTS

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Outline

- Brief introduction to STEM case studies:
  - migrating separate voice and data services to an NGN platform; short Q&A

  - measuring the economic potential of ADSL; short Q&A

  - adding data revenues in transition from GSM to UMTS; short Q&A

- General Q&A

Migrating separate voice and data services to an NGN platform

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Convergence is inevitable

- Voice and data services are traditionally handled by separate network architectures
- Major capex and opex savings may be made by migrating these services to a common NGN platform where individual services are delivered at the edge of the network by multi-service access gateways
- The best strategy will vary according to the design and age of the existing network
- We explore the cost implications of different transition scenarios through a scaleable methodology for modelling these diverse architectures

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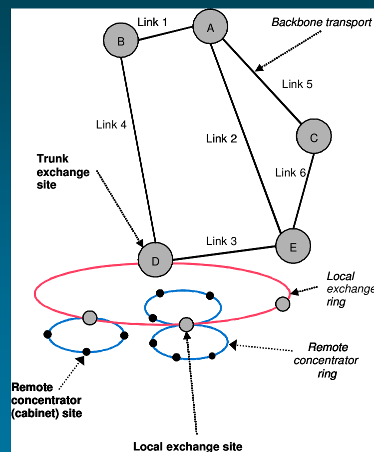
NGN modelling with STEM

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



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NGN modelling with STEM

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

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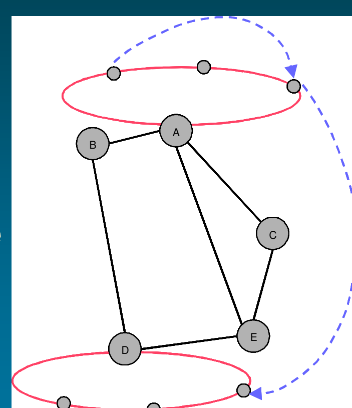
Services and routes

- This reference case only considers three services:
  - voice, 64kbit/s ATM and 2048kbit/s ATM
- Demand is defined for each of the possible routes between the trunk exchanges – defined simply in terms of the endpoints – for example node A to node C
- The intermediate path is captured in a core traffic matrix
- For the five trunk exchanges, there are 15 possible routes, and therefore 15 sets of [3] services

A-A	A-B	A-C	A-D	A-E
B-B	B-C	B-D	B-E	
C-C	C-D	C-E		
D-D	D-E			
E-E				

Inter- and intra-node traffic

- Demand is specified for each of the 15 routes, without being specific about individual local exchange sites
- So, for example, traffic for route A–A is from any local exchange on trunk switch A to any local exchange on the same trunk switch …
- … whereas traffic for A–D is from any local exchange on trunk switch A to any local exchange on trunk switch D



Traffic matrices

- 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

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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

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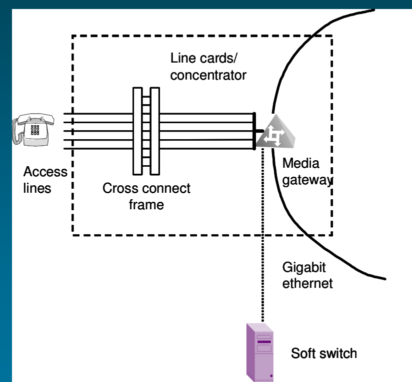
Media gateways and soft switches

- 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



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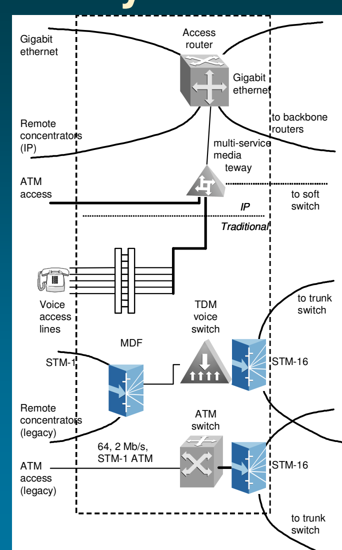
Multi-service media gateways for ATM

- 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



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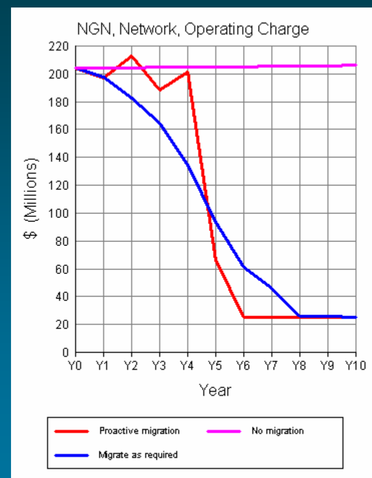
Migration scenarios and results

- 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



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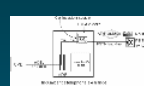

Measuring the economic potential of ADSL

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Local loop unbundling

- The model explores the economics of a competitive ADSL provider …
- … with different service offerings for the business and residential markets
- A number of scenarios are modelled:
  - at how many local exchanges DSLAMs are deployed
  - the effect of also offering an analogue voice service (POTS) over ADSL

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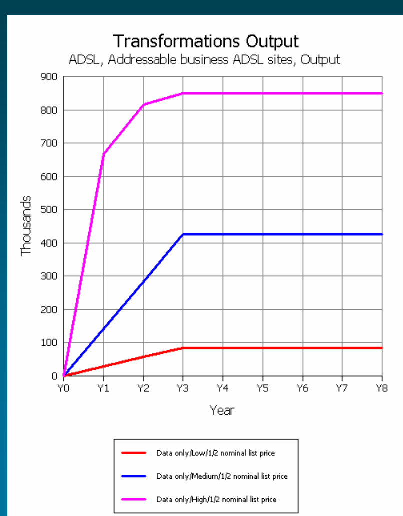
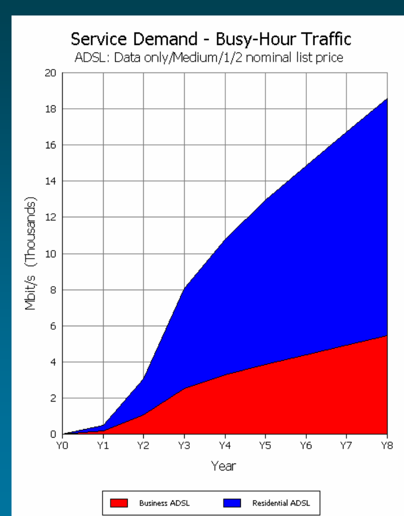
Market coverage and traffic





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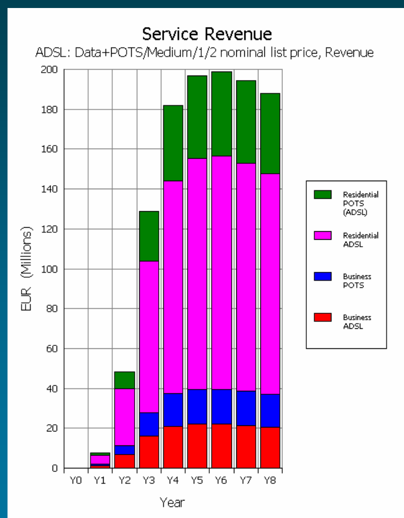
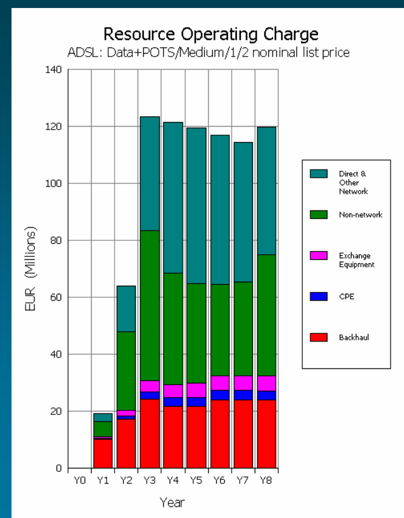
ADSL modelling with STEM

Revenue and cost





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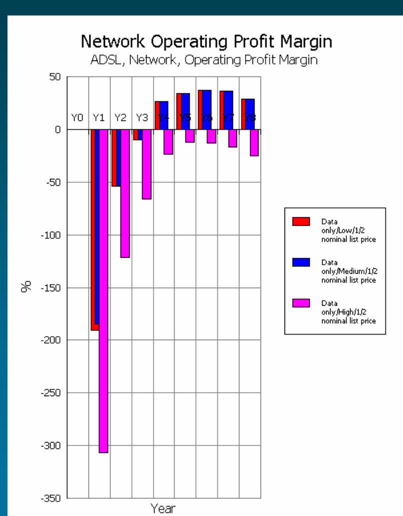
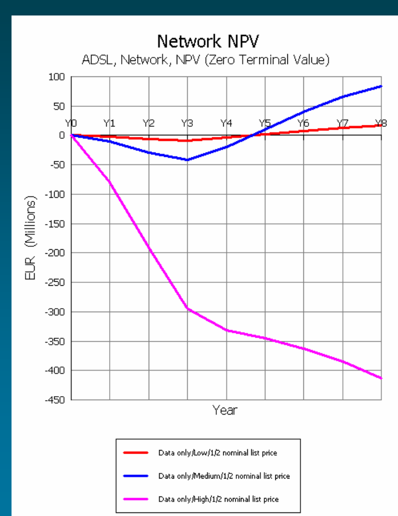
ADSL modelling with STEM

Profitability and cashflow analysis





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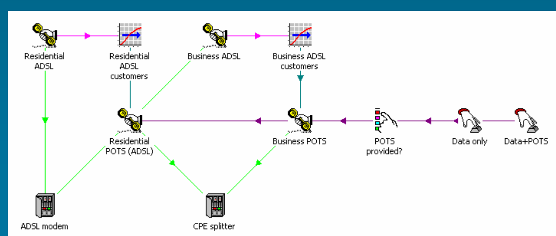
Effect of adding POTS over ADSL

- Splitter required as CPE for standard ADSL
- Rental charge per line doubles to a full unbundling charge
- Additional equipment required at the local exchange
- Requires backhaul and switching



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Adding data revenues
in transition from GSM to UMTS

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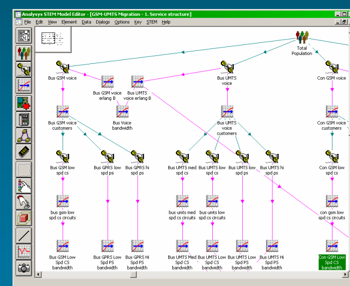
GSM network and UMTS overlay

- Objective is to model the changing infrastructure of a cellular network over the next ten years as it migrates from GSM to GPRS to UMTS
- We explore the impact on capital expenditure and operating costs of sharing UMTS equipment with other operators



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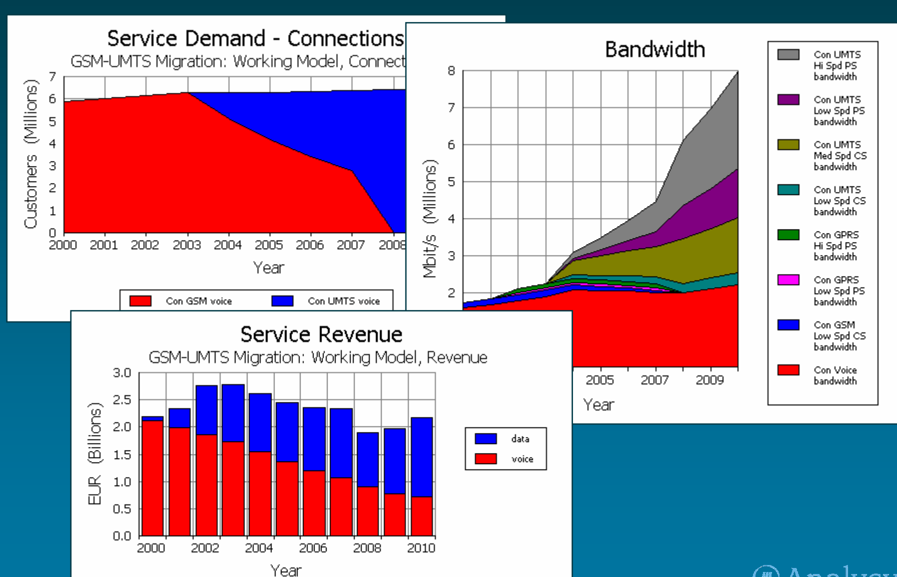
Revenues from new services



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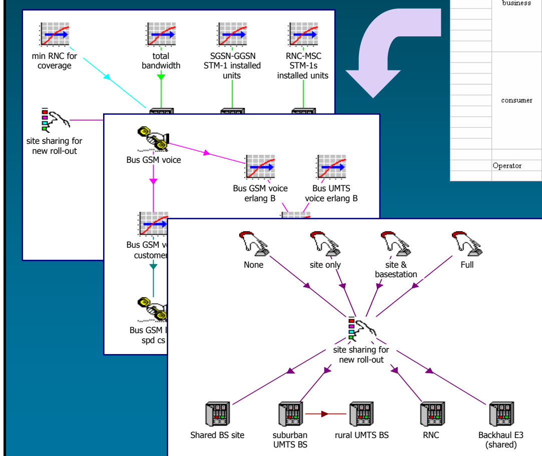
Outline model structure

Input sheet: Services

Market	Technolgy	Service	start year	penetration	
business	GSM	business GSM voice	2000	5.00%	of total market
		business GSM data: low speed cs	2000	5.00%	of GSM voice customers
	GPRS	business GPRS data: low speed ps	2001	10.00%	of GSM voice customers
		business GPRS data: high speed ps	2001	10.00%	of GSM voice customers
	UMTS	business UMTS voice	2003	1.00%	of total market
		business UMTS data: med speed cs	2003	5.00%	of UMTS voice customers
		business UMTS data: low speed cs	2003	5.00%	of UMTS voice customers
		business UMTS data: low speed ps	2004	15.00%	of UMTS voice customers
		business UMTS data: high speed ps	2004	15.00%	of UMTS voice customers
consumer	GSM	consumer GSM voice	2000	10.00%	of total market
		consumer GSM data: low speed cs	2000	10.00%	of GSM voice customers
	GPRS	Consumer GPRS data: low speed ps	2002	10.00%	of GSM voice customers
		Consumer GPRS data: high speed ps	2002	10.00%	of GSM voice customers
	UMTS	consumer UMTS voice	2003	1.00%	of total market
		Consumer UMTS data: med speed cs	2004	6.00%	of UMTS voice customers
		Consumer UMTS data: low speed cs	2004	6.00%	of UMTS voice customers
		Consumer UMTS data: low speed ps	2004	10.00%	of UMTS voice customers
		Consumer UMTS data: high speed ps	2004	10.00%	of UMTS voice customers
Operator	N/A	Renting space on own sites	2003	50%	



- Inputs specified through Excel
- Detailed model of network functions
- Scenarios for different levels of sharing

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Modelling approach

- There are significant distinctions between different customer revenue types
- Demand is mapped into common network circuit or bandwidth requirements …
- … and then disaggregated into different geographical classifications
- The model captures critical distinctions of deployment (configuration and cost)

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Working smarter with the STEM business-case modelling software for networks

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Business cases the hard way

- Business-case models are typically built from the bottom-up each time in Excel:
  - laborious re-working of basic calculations
  - scope for copy errors; slow handover
- STEM wraps up core elements of telecoms business planning, enabling rapid and reliable, same-day development of business cases
- Consistent structure and graphics act provide a common language across divisional teams

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STEM business-case modelling software for networks

Consistent financial framework

- Service elements capture demand 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

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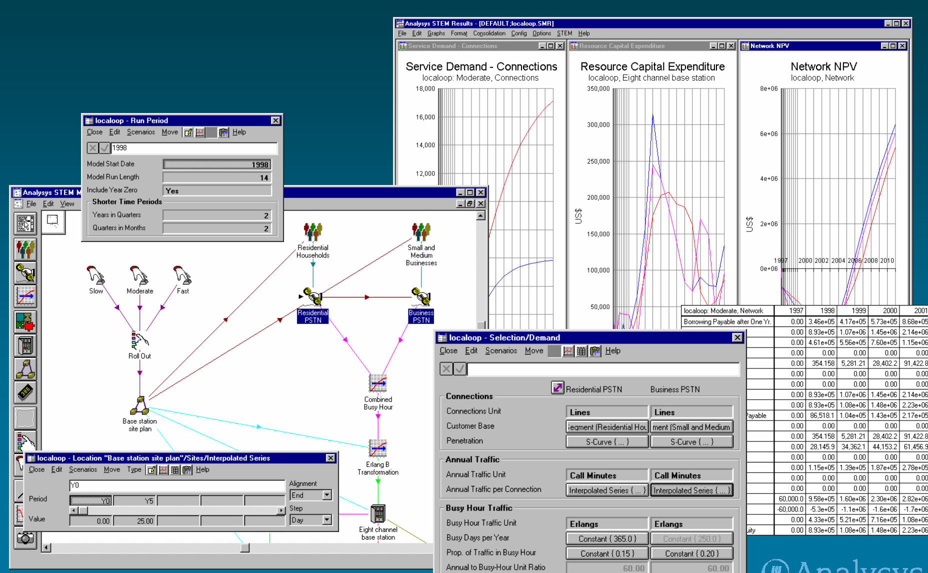
STEM business-case modelling software for networks

Intuitive graphical interface



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STEM business-case modelling software for networks

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

THINK

CREATE

RUN

REVIEW

STEM business-case modelling software for networks

Professional modelling process

- Iconic presentation and pre-defined algorithms encourage **focus** on issues rather than formulae
- General connection/traffic/location dimensioning rules are applicable to a broad range of technologies and ensure **consistent** structure and data gathering
- Purpose designed interface accelerates modelling process and increases **productivity**
- Concise representation of complexity makes models **robust** and **easier to maintain** (less errors)
- Industry-standard platform lends **credibility** to results

STEM creates business value

- **Flexibility** means quicker delivery of new cases, increased productivity, and greater focus on key issues, un-distracted by mundane spreadsheet maintenance
- **Robustness** saves hours of effort every time you alter the structure of the services or technology modelled, and helps avoid costly mistakes
- **Consistency** allows for the effortless exploration of new scenarios, enabling new insights which could be too time-consuming to explore in Excel

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