SEMINAR ON NETWORK PLANNING STRATEGY FOR EVOLVING NETWORK ARCHITECTURES FOR ASIA PACIFIC REGION

Session 5.5

VPI: Strategic Planning with VPIaccessMaker™: Market Description, Forecasting, Clustering, Economic Analysis

Live demo:

AM_DSL

ITU, Bangkok, Thailand, 11-15 November 2002

Digital Subscribers Access Application
Project: Dsl

1. Project Goals

This case study deals with the various complex issues associated with access network planning, such as market definition and capture, technology selection and modeling, network planning and economic analysis. An extensive techno-economic model has been developed for analyzing the introduction of DSL services (ADSL, SDSL and VDSL) by an incumbent operator in a typical town for serving residential as well as business customers.

2. Market Modeling

The study period is 2001 – 2005.

Services

The services offered are defined as ADSL Basic , ADSL Gold, VDSL and SDSL-Medium Enterprises and SDSL-Small Enterprises.

Table 1 - *Service Classes* -

Service class	**Maximum effective bandwidth when all customers are ON**
ADSL Basic	256 kbps
ADSL Gold	0.5 Mbps
SDSL – Small Enterprises	0.5 Mbps
SDSL – Medium Enterprises	1 Mbps
VDSL	5 Mbps

Customer Classes

Five customer groups are modeled in the project. The settings for each customer class are listed below (Table 2).

Table 2 - *Customer Classes*

Customer class	**Subscription charge per month**	**Lines**
Residential ADSL Basic	30 Euro, decreasing to 20 Euro in 2005	1, constant
Residential ADSL Gold	40 Euro, decreasing to 27 Euro in 2005	1, constant
Small Enterprises (SDSL)	70 Euro, decreasing to 47 Euro in 2005	1, constant
Medium Enterprises (SDSL)	70 Euro per line, decreasing to 47 Euro in 2005	Increasing from 1 to 3.5 in 2005
Residential VDSL	50 Euro, decreasing to 32 Euro in 2005	1, constant

The respective price and evolution of lines are stored in the Define Evolution workflow step.

Area Description

The geographic area is relatively large (aprox. 35 kms by 15 kms) and consists of a set of sub-areas similar to exchange areas (Table 3). There is a city centre surrounded by urban areas with high customer density, while the areas in the edge are suburban areas. Each area is described with a specified mix between residential and business customers. The customer densities per square kilometer in the different areas are shown in Figure 1.

Table 3. *Number of customers per square km in city centre, urban and suburban areas*

Customers/Area type	**City Centre**	**Urban**	**Suburban**
Residential	2000	2000	1000
Small enterprises	1500	700	100
Medium enterprises	150	70	20

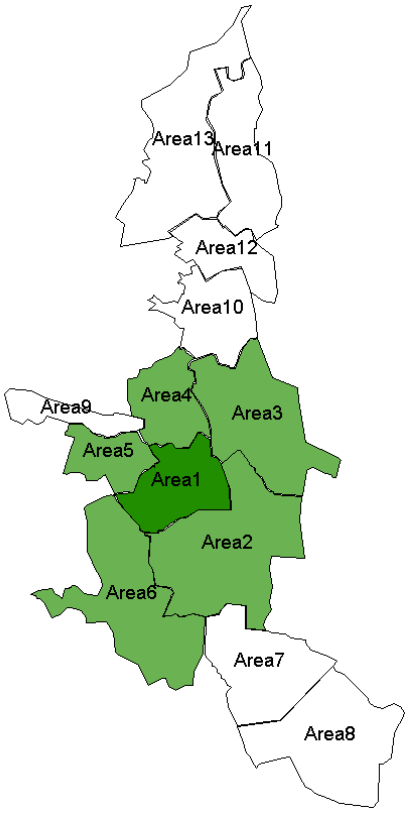

Figure 1 - Geographical areas used in the case study. City Centre (Area1-dark green), Urban Areas (light green) and Sub-Urban Areas (white).

Market penetration forecasts

In each area, specific forecasts are made for services and user groups. The forecasts describe the potential penetration and the market share to the incumbent operator for the different services taking into account the competition from other broadband players.
Two sets of residential forecasts are made for ADSL Basic, VDSL Gold, ADSL and LMDS. In the first set (denoted in the densities as “no HFC”), it is assumed that there is no competition from a cable operator. Those are the densities used in the project. As a reference, we have also developed a second set of forecasts assuming competition from a cable operator using HFC; those forecasts are noted in the densities as “HFC”.

Figure 2 shows, as an example, the forecasts for Urban areas. The penetration forecasts for the city center are in both cases 10% higher, while the forecasts for suburban area are 10% lower than in urban areas.

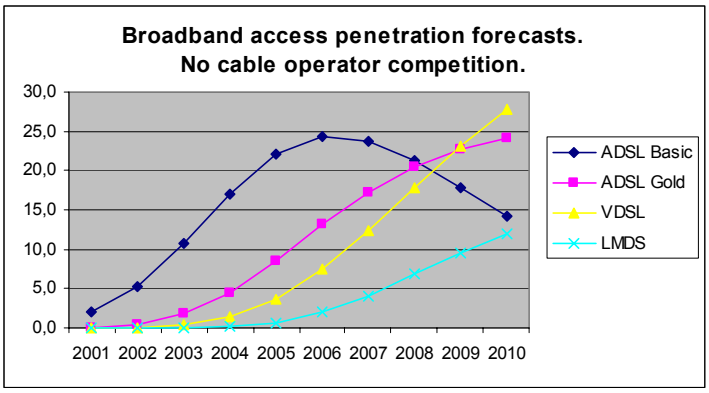

Figure 2 - Broadband penetration forecasts in Urban areas where there is no competition from a cable operator.

Broadband business penetration forecasts are also developed for small enterprises and medium enterprises. We assume that the demand in City center is 10% higher than the demand in Urban areas, while the demand in Suburban areas is 10% lower than in Urban areas. In this case study it is assumed that the incumbent operator has 50%, 60% and 70% of the market demand forecasts for SDSL for small and medium enterprises, respectively in the City Center, Urban areas and Sub-Urban areas.

3. View Market Examples

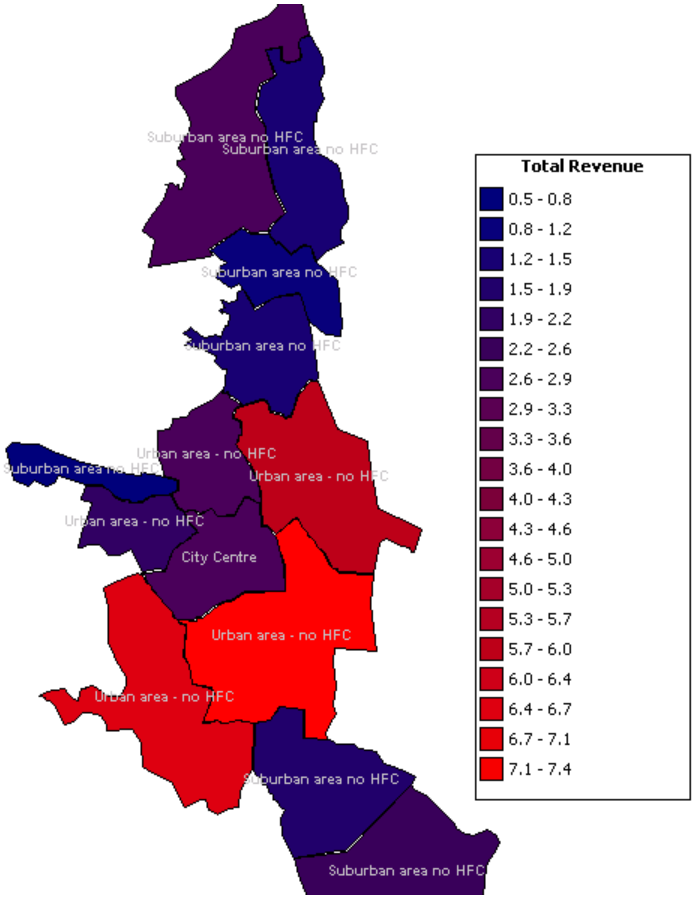

Figure 3 - Revenue distribution in the GIS.

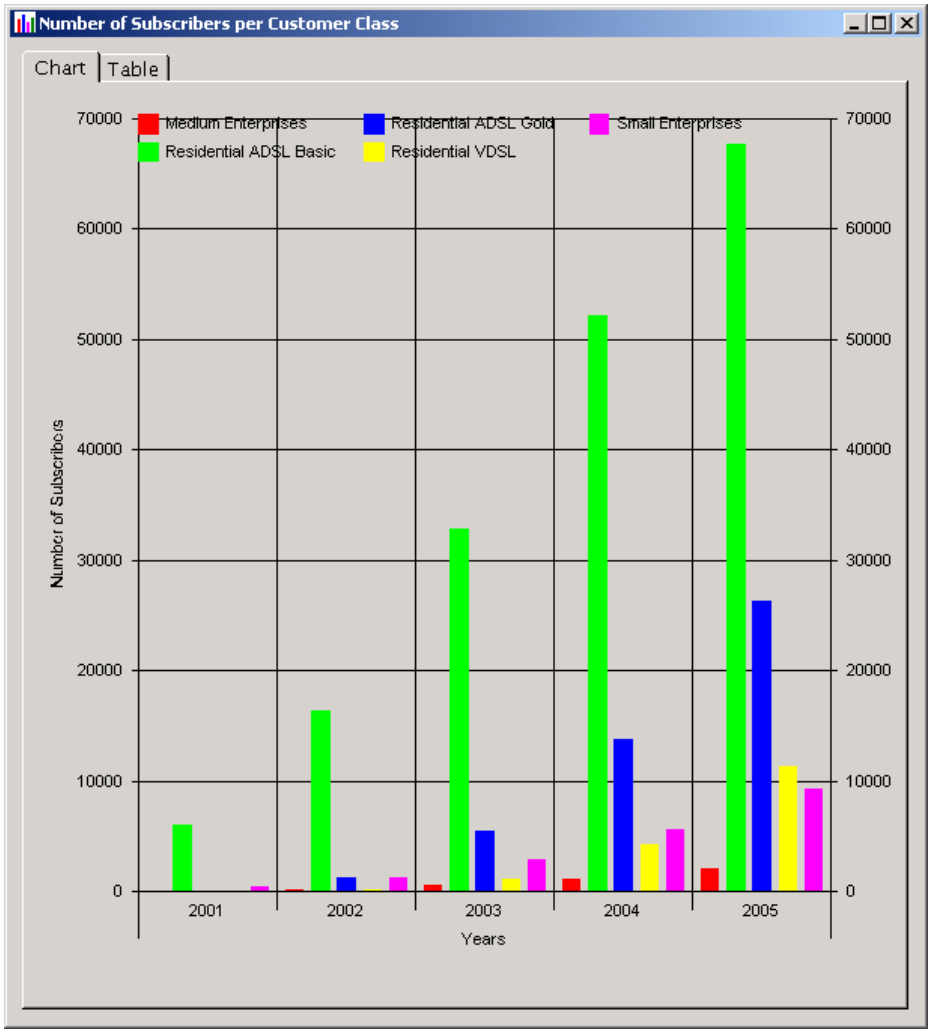

Figure 4 - Number of subscribers per customer class - Chart.

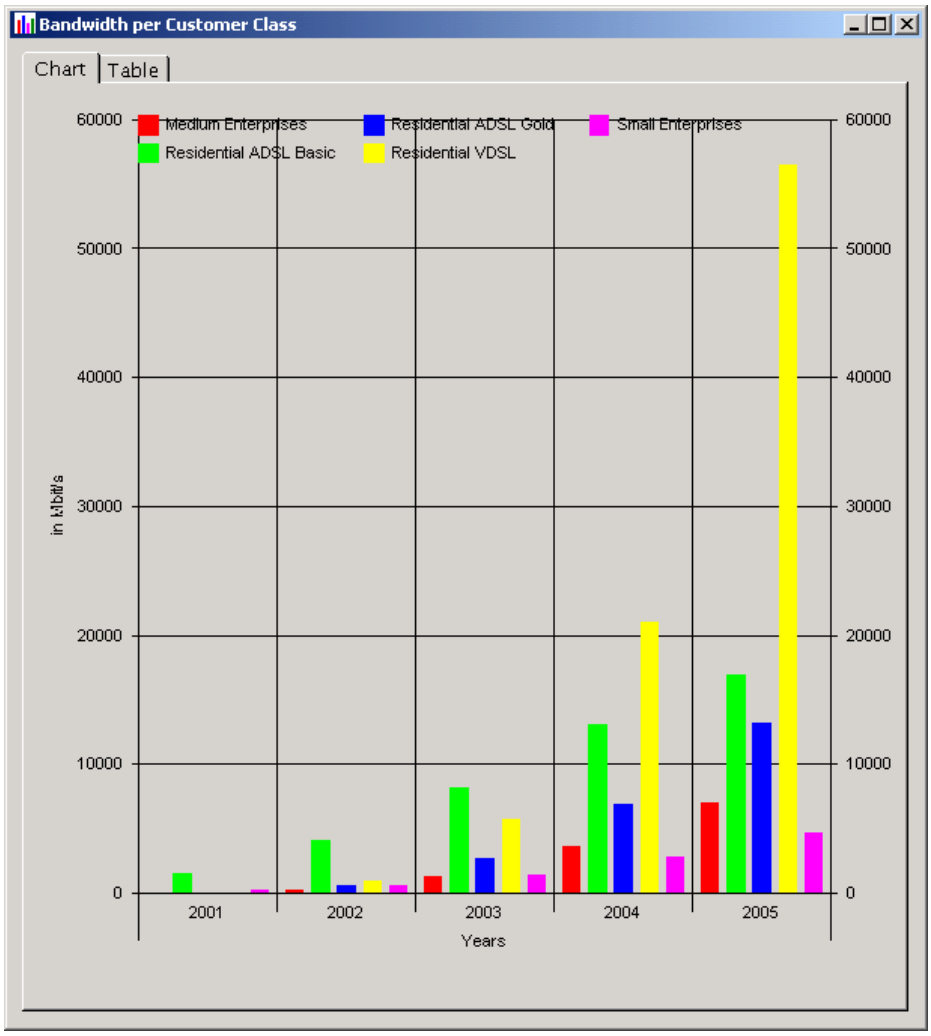

Figure 5 - Total bandwidth requirement per customer class – Chart.

4. Technology Modeling

Table 4 - Technology modeling settings - Technology DSL

Parameter	**DSL Access Mux**	**Add Drop Mux**	**Copper Pair**	**Fiber Link**
Name of element	**DSLAM**	**ADM-STM16**	**Copper Pair**	**Fiber Link**
DS Interface 1	ADSL (4 Mbps) rounded Up - No acq. cost = 200 Euro inst. cost = 25 Euro maint. cost = 5 EURO	STM-4 (622 Mbps) rounded Up - No acq. cost = 5,000 EURO inst. cost = 100 EURO maint. cost = 25 EURO	ADSL (4 Mbps) acquisition cost = 0 Euro installation cost = 15 Euro maintenance cost = 15 EURO/km	STM-4 (622 Mbps) acquisition cost = 5,000 Euro / km installation cost = 15,000 Euro / km maintenance cost = 5% of accumulated investment
DS Interface 2	SDSL (2 Mbps) rounded Up - No acq. cost = 500 EURO inst. cost = 35 EURO maint. cost = 5 EURO	-	SDSL (2 Mbps) acq. cost = 0 Euro inst. cost = 30 Euro maint. cost = 20 EURO/km	-
DS Interface 3	VDSL (24 Mbps) rounded Up - No acq. cost = 750 EURO inst. cost = 30 EURO maint. cost = 5 EURO	-	VDSL (24 Mbps) acq. cost = 0 Euro inst. cost = 20 Euro maint. cost = 25 EURO/km	-
US Interface	STM-4 rounded Up - No	STM-16 (2488 Mbps) rounded Up - No	-	-
Infrastructure	Not considered	Not considered	Not considered	Not considered
Capacity	8500 Mbps;	2488 Mbps	-	-
Compression factor	8	1	-	-
Maximum Length	-	-	3 kms	15 kms
Detour factor	-	-	-	-
Node/Link Acquisition cost	60,000 EURO fixed plus 5,000 EURO per up-stream interface	200,000 EURO fixed plus 15,000 EURO per up-stream interface	-	-
Node/Link Installation cost	10% of acquisition costs	10% of acquisition costs	-	-
Node/Link Maintenance cost	5% of accumulated acquisition	5% of accumulated acquisition	-	-
Component class	DSL Equipment; depreciated with the declining balance method, 20% a year. Acquisition costs vary throughout the planning period.	ADM Equipment; depreciated with the declining balance method, 20% a year. Acquisition costs vary throughout the planning period.	Cables; depreciated with the straight line method during 15 years.	Cables; depreciated with the straight line method during 15. years.
Existing element expansion	Use initial costs setting	Use initial costs setting	Use initial costs setting	Use initial costs setting

Chains

DSLChain: Copper Pair + DSLAM + Fibre Link + ADM-STM-16
DP radius = 0.3 kms

5. Network Design

The optimization processes is run with the DSL chain. The network is optimized for the year with the highest demand. No options are set in the Optimization Options dialog. A total of 6 ADMs and 20 DSLAMs are obtained.

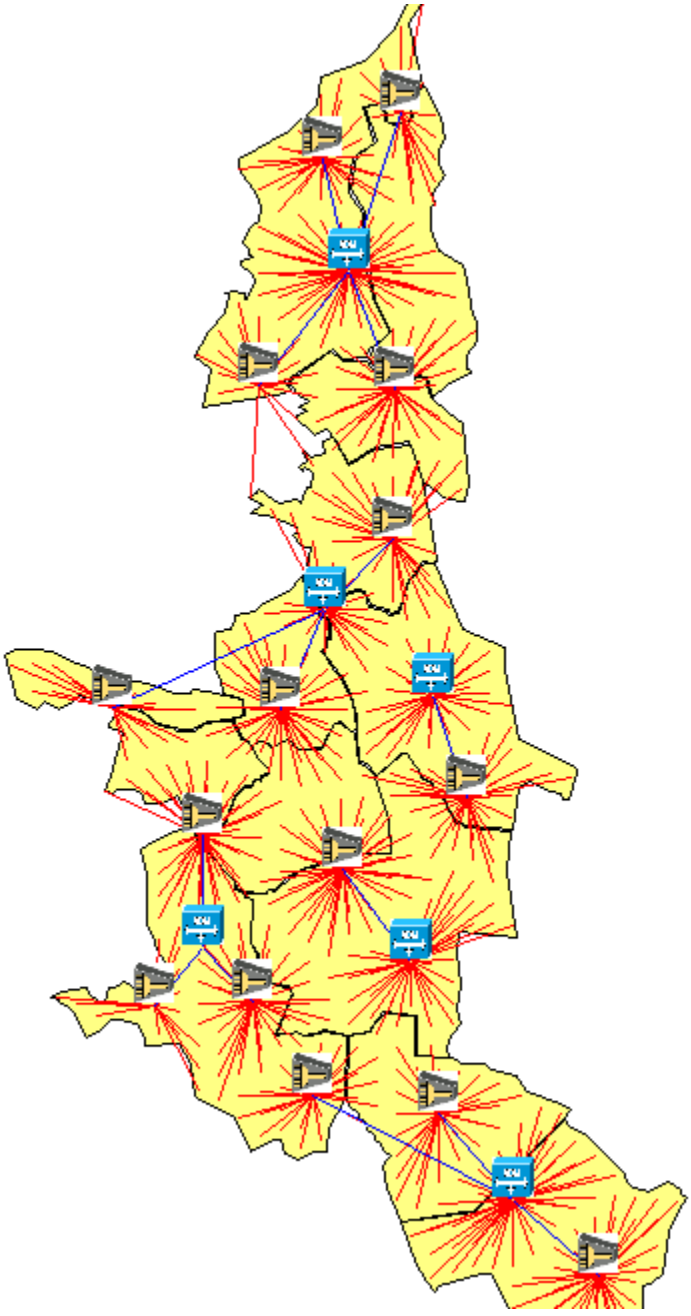

Figure 6 - Network design.

6. View Rollout Example

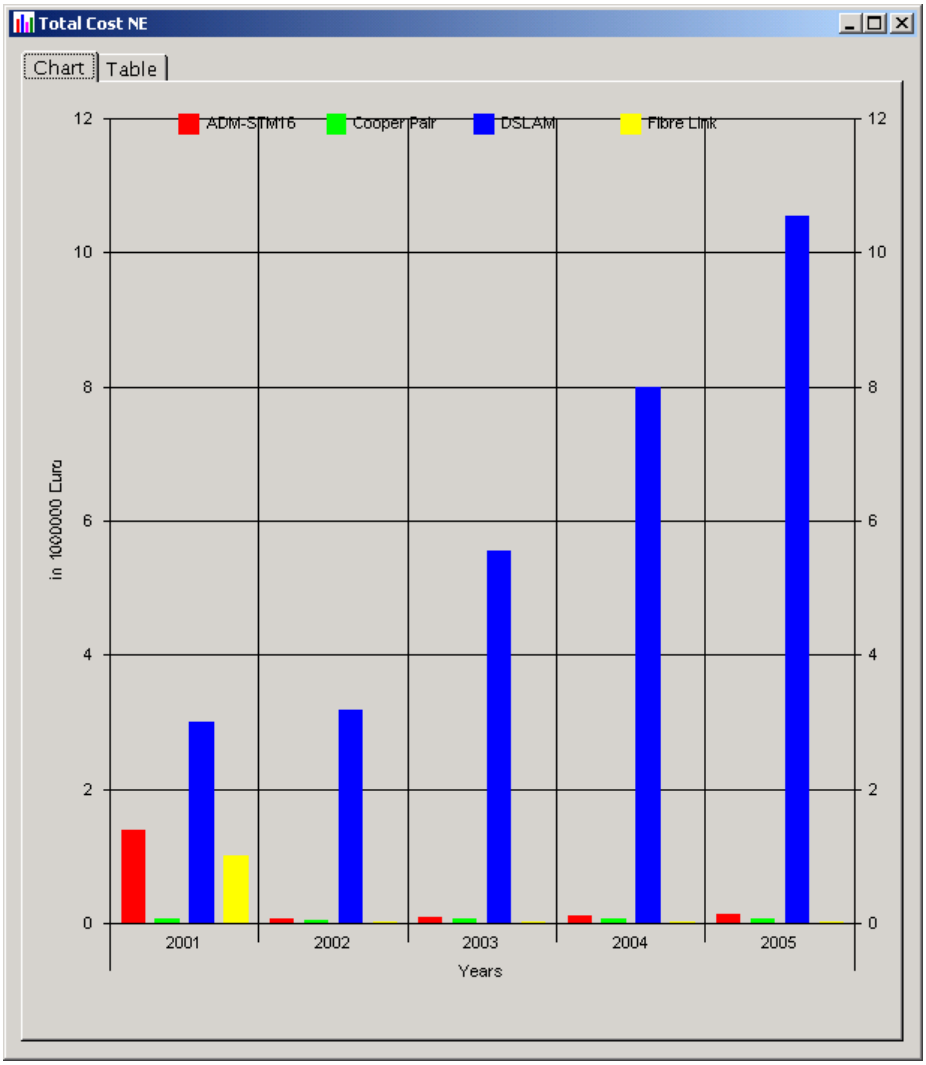

Figure 7 - Cost per network element - Chart.

Economics Results

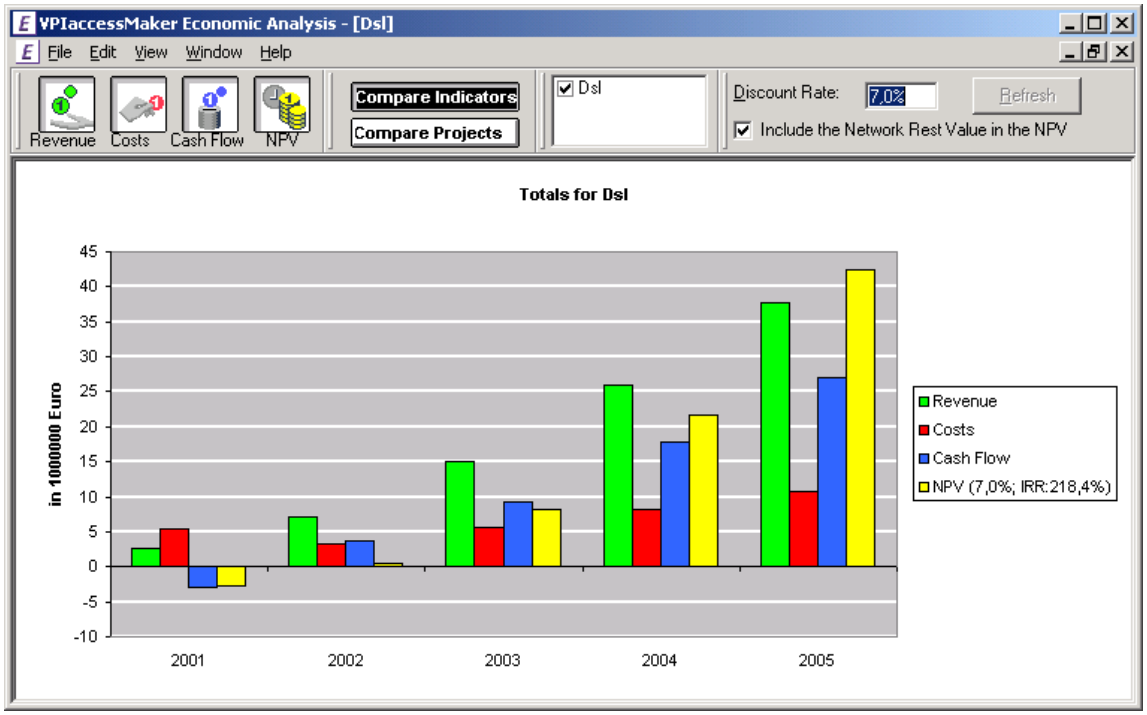

Figure 8 - Overall economic results – Revenues, Cost, Cash-flow and Net Present Value.