Development Of A Management Flight Simulator To Enable The Strategic Planning And Targeting Of Telecommunications Networks Resources And Services To The Most Profitable Customers

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Abstract

In an increasingly competitive world, it is imperative that telecommunications operators target their resources at those customers most likely to create the greatest return on investment.

Systems Dynamics has been used to develop a Management Flight Simulator which enables Policy Makers to use "What-if" scenarios to explore the implications of various proposed strategies before a commitment to invest is made.

This paper will describe the techniques and methodology used to create the Flight Simulator. The user has the ability to target different types of home, (low-cost, mid-cost, executive), for areas specified with a size range from as small as a new housing estate up to as large as an entire country. Residential customers are then segmented according to their house-type. For each particular house-type, the user can choose the services offered, when they will become available, the corresponding tariffing regimes, and the service usage patterns. From this information, revenue per customer, per market segment, and across the entire market can be calculated. The revenue generation can be further attributed on a per service basis. For different types of network technologies, the capacity and cost per home passed can be ascribed according to the house-type. In this way, different types of technology can be compared according to their cost, profit and the ability to transport services to and from each type of customer.

Thus, this Simulator enables telecommunications companies to develop a resilient strategy to secure profitable customers, use the most appropriate network technologies, minimise network expenditure and maximise profit.

1   Introduction

The telecoms marketplace is experiencing an explosion in the number and diversity of the competitors providing service. In response, customers are churning rapidly to gain better value for money, greater quality of service and an increased range of services.

Consequently, it is important for telecommunications operators, (telcos), to understand the requirements of different segments of their customer market and to target their resources so as to maximise the return on their investment.

Moreover, it is important to respond *quickly* to customer demand. This paper will describe a methodology developed to create a Flight Simulator to enable the rapid understanding of customer demand, (according to customer segmentation), in response to the tariffing regime and the resulting revenue, cost and profit.

Customers are segmented according to the type of home in which they live, as specified by its original purchase price: low-cost, mid-cost or executive. This is because it is assumed that their expenditure on housing is indicative of their potential spend on telecoms.

Firstly, it is assumed that all customers within the area serviced by the telco, (service area), subscribe to ordinary telephony, (PSTN). The telco is then assumed to target certain smaller areas within the service area with the provision of number of new services. For illustration purposes, we shall assume that 2 new services are provided: low-speed data, (LSDS) and high-speed data, (HSDS), which are in addition to PSTN. In this example, the service area is assumed to have 5 million telephony customers and the telco is assumed to target 0.5 million of these customers per year, with the rollout of these two new data services. After 10 years, all customers will have had the opportunity to subscribe to the new services.

2   Methodology

The model is created in Steps 1...12, as shown in Figure 1 and described below.
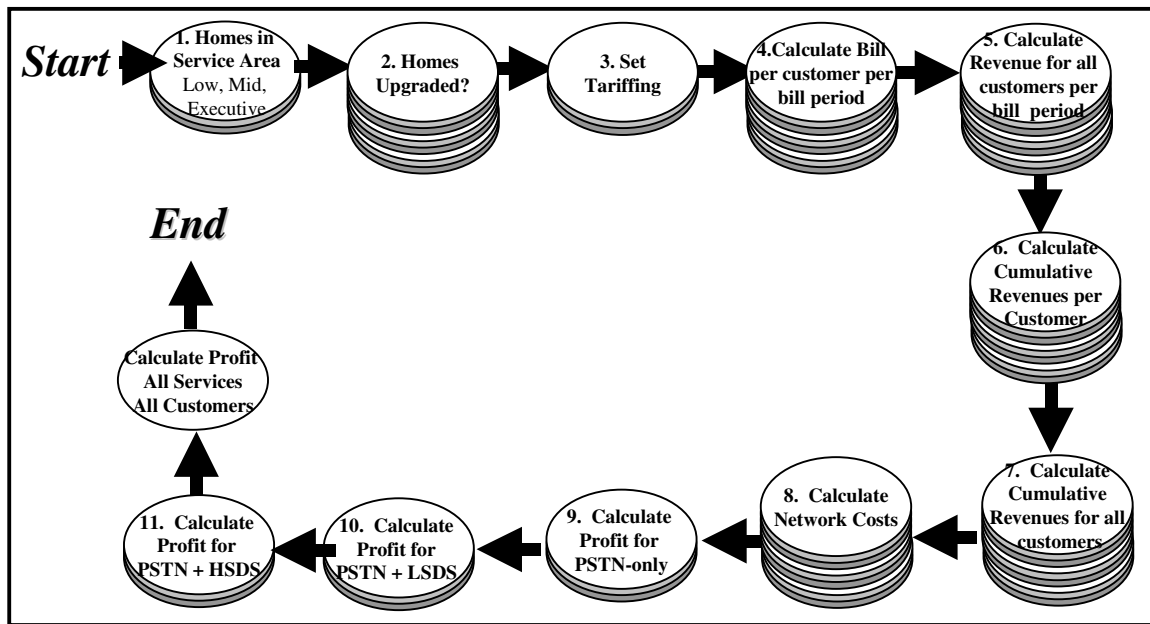
Figure 1 Flow Chart of the Model Methodology

Steps

1.   For a given geographic area in which the telco provides services, (the "service area"), the percentage distribution of low-cost, mid-cost and executive housing can be calculated. The three discs in Step 1 of Figure 1, represent the three calculations that are performed in order to assign numbers to the types of housing to each of the low-cost, mid-cost and executive categories. (Similarly, for Steps 2...12, the number of discs in Figure 1, represent the number of calculations that are performed at that step.)

2.   Multiplying the percentage of homes connecting to the new data services for each of the 3 customer types by the targeted number, (0.5 million), of homes in the service area, gives the number of homes actually connecting. There are 9 calculations determining how many homes in each of 3 housing categories take up which of the 3 service combinations, (PSTN-only, PSTN+LSDS and PSTN+HSDS).

3.   In order to understand how customers will take up and use the 3 services offered, it is imperative to calculate the likely size of their telecoms bill. The model-user can flex the value of the telco's tariffs in terms of the monthly rental and the time-of-day pay-as-you-use charges for each of the 3 service combinations, (3 calculations).

4.   The tariffing information from Step 3 is used together with user profile infomation generated in Step 4.   This user profile information can be

flexed to vary the amount of usage of each service and the time-of-day in which these services are likely to be used. When the information from Step 4 is multiplied by the tariffing information, the value of the customer's telecom bill is generated. 9 calculations are performed to create the bill for each of the 3 customer segments, for each of the 3 service combinations.

5. From Step 2, we know the number of customers connected, multiplying this by the bill size of each customer, gives the revenues generated over the entire service area, for each housing-type for each of the service combinations, (9 calculations).

6. & 7. Accumulating the values in Steps 4 & 5 will give the cumulative revenues per customer and for the whole service area. Again, this is apportioned on a per-house type and per-service type basis, (2x9 calculations).

8. From information about the structure of the network, the cost of each component, the number of homes connected and the services provided to these homes, it is possible to calculate the costs to the telco. These costs can be attributed to each type of home and to each type of service combination, (9 calculations).

9., 10., 11. Deducting the costs in Step 8 from the revenues in Steps 4, 5, 6, and 7, enables the profits to be calculated for each of the 3 service combinations for each of the 3 housing types, (3x3 calculations).

12 Finally, summing the values in Steps 9, 10 and 11 gives the total profit to the telco,
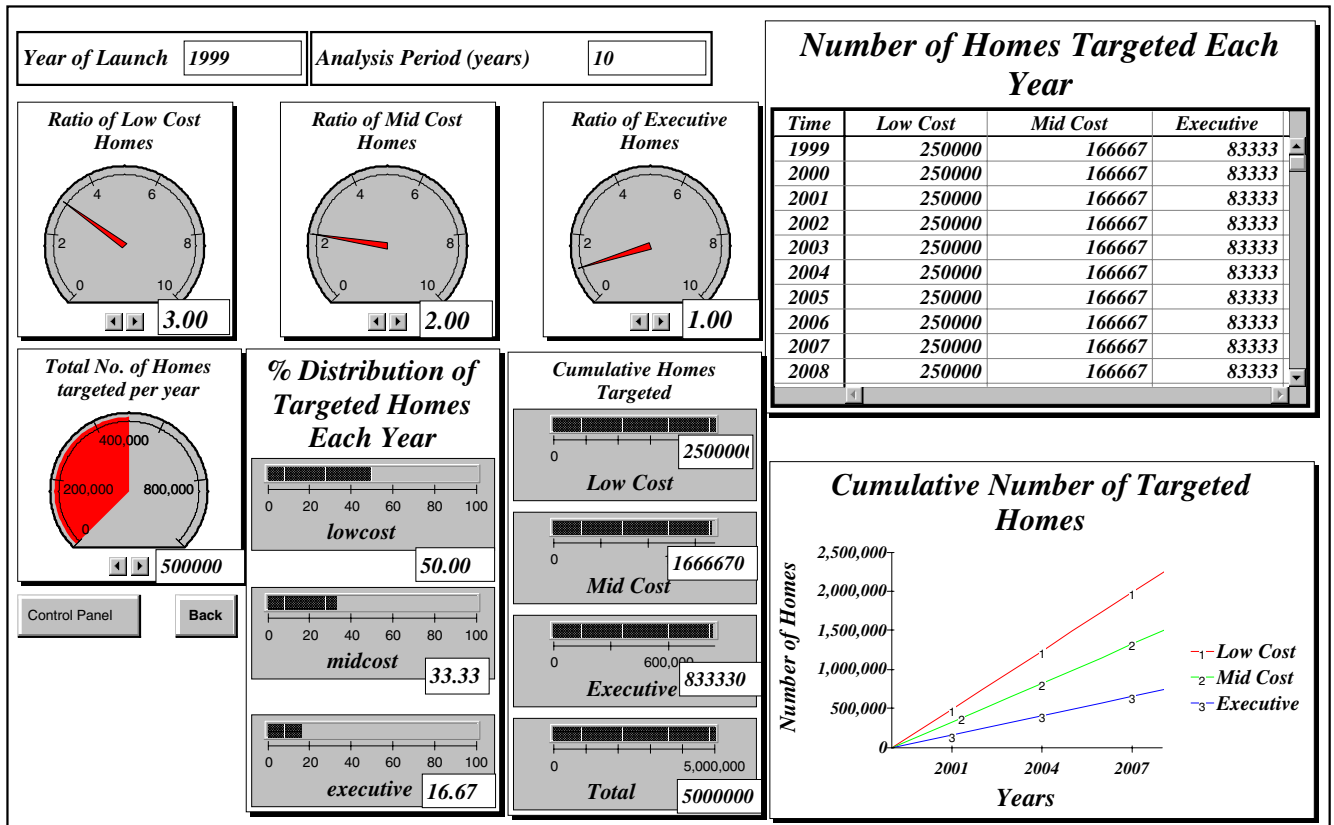   (1 calculation).

3   Appearance Of The Flight Simulator

We shall consider the various aspects of the Flight Simulator in the numerical order corresponding to Steps 1...12.

Step 1
The model is set to run over an analysis period of 10 years. Figure 2 shows the controls used to input the *Total Number of homes targeted per year* with the 2 new data services, and the *Ratio of the different types of home* in the service area.

The altimeters show that 0.5 million homes each year are targeted with the option to upgrade from just telephony to telephony plus a data service. These customers have the option of low- or high-speed data services, (LSDS or HSDS). The altimeters also show that within the service area for every executive home there are 2 mid-cost homes and 3 low cost homes. The sliders show the calculated percentage distribution of the 3 types of housing. The table shows the resultant calculation of the numbers of each type of home, targeted by the telco with the option to upgrade their service. The values from this table are accumulated and displayed in the graph.

| | Year of Launch | 1999 | Analysis Period (years) | 10 |

Number of Homes Targeted Each Year

Time	Low Cost	Mid Cost	Executive
1999	250000	166667	83333
2000	250000	166667	83333
2001	250000	166667	83333
2002	250000	166667	83333
2003	250000	166667	83333
2004	250000	166667	83333
2005	250000	166667	83333
2006	250000	166667	83333
2007	250000	166667	83333
2008	250000	166667	83333

Ratio of Low Cost Homes — 3.00

Ratio of Mid Cost Homes — 2.00

Ratio of Executive Homes — 1.00

Total No. of Homes targeted per year — 500000

% Distribution of Targeted Homes Each Year
- lowcost — 50.00
- midcost — 33.33
- executive — 16.67

Cumulative Homes Targeted
- Low Cost — 2500000
- Mid Cost — 1666670
- Executive — 833330
- Total — 5000000

Control Panel   Back

Cumulative Number of Targeted Homes

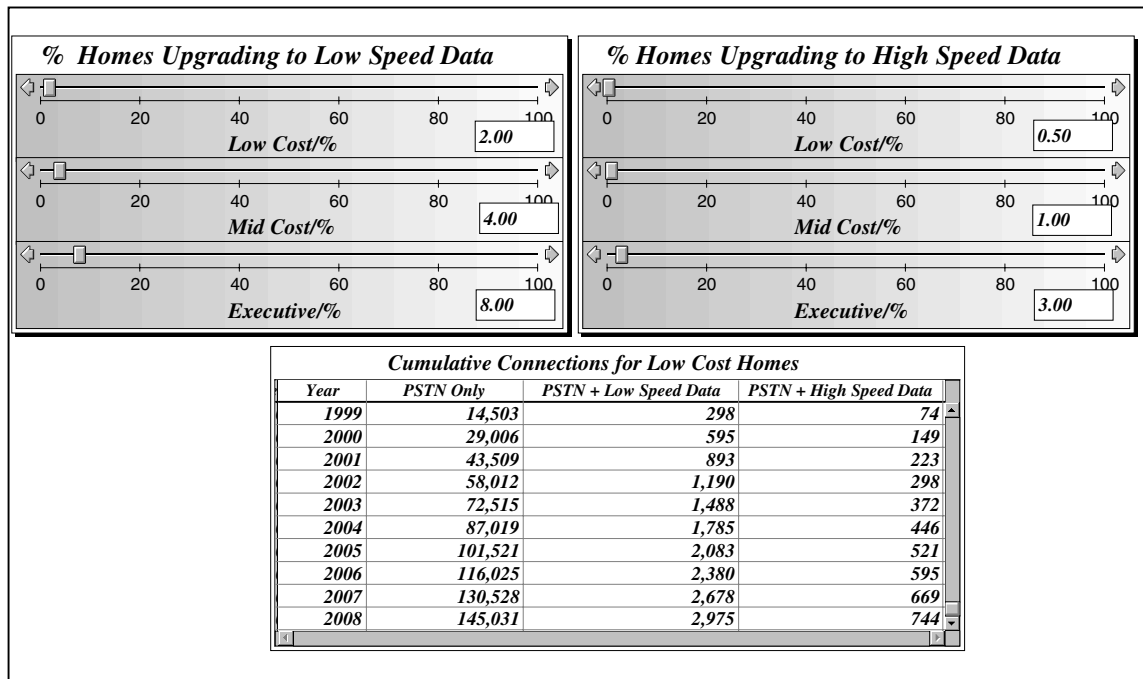Number of Homes / Years
- Low Cost
- Mid Cost
- Executive

Figure 2 Flight Simulator: Targeting Of Homes With LSDS And HSDS

Step 2

The user can vary the slider bars, illustrated in figure 3 below, to change the rate of upgrade of each of the home types to the 2 new data services. Here it is shown that each year, the targeted homes in the low-cost, mid-cost and executive categories connect to LSDS at a rate of 2%, 4% and 8%, respectively. Similarly, the connection rates for HSDS are 0.5%, 1% and 3%, respectively.

Tables indicate the likely cumulative numbers of connections to each of the 2 data services and those customers remaining with telephony-only. As an example, only the table showing the connections for low-cost homes is shown. Similar tables are given, within the model, for the takeup of the data services by customers in the mid-cost homes and executive homes.

% Homes Upgrading to Low Speed Data	% Homes Upgrading to High Speed Data
Low Cost/% **2.00**	Low Cost/% **0.50**
Mid Cost/% **4.00**	Mid Cost/% **1.00**
Executive/% **8.00**	Executive/% **3.00**

Cumulative Connections for Low Cost Homes

Year	PSTN Only	PSTN + Low Speed Data	PSTN + High Speed Data
1999	14,503	298	74
2000	29,006	595	149
2001	43,509	893	223
2002	58,012	1,190	298
2003	72,515	1,488	372
2004	87,019	1,785	446
2005	101,521	2,083	521
2006	116,025	2,380	595
2007	130,528	2,678	669
2008	145,031	2,975	744

Figure 3 Flight Simulator: Calculating the Cumulative connections to PSTN, LSDS & HSDS

Steps 3, 4 & 5

Understanding the size of a customer's bill is crucial. Cost is a primary driver for customers in the residential sector. Steps 3, 4 and 5 allow the model-user to flex all the parameters in the telco's tariffing regime, (eg monthly rental, pay-as-you-use charges, and the potential service usage patterns by the customer), for each of PSTN, LSDS and HSDS. In particular, it is important to flex the time during the day, when the customer will use their services, as typically, large time-of-day differentials will be applied by the telco to its tariffing scheme. Figure 4 shows, on the left-hand side, the section of the simulator used to flex the tariffs for PSTN. Values given are in the European currency, the ECU. The right hand-side shows the minutes usage of telephony per month for the 3 different customer-types during each of the peak- and off-peak tariffing periods.

Similar panels have been created for the Low- and High-Speed Data Services.
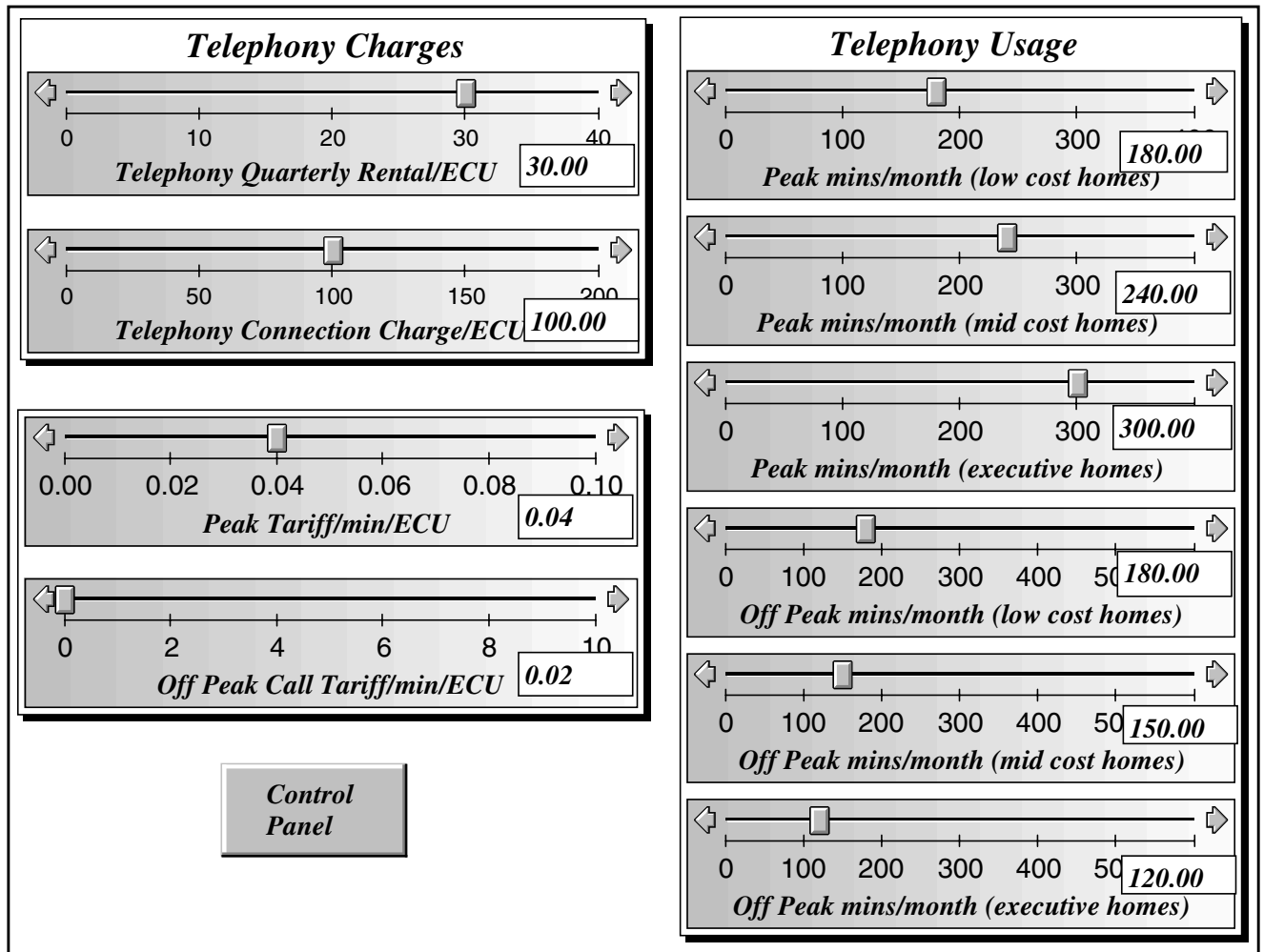
Figure 4 Flight Simulator: Inputs to calculating the customer's telephony bill

Figure 5, below, shows as an example, the typical bill for individual customers taking the combination of PSTN+LSDS, in each of the 3 housing types. The revenue generated is sub-divided so as to be attributable to Telephony-only (voice), and to LSDS (data).
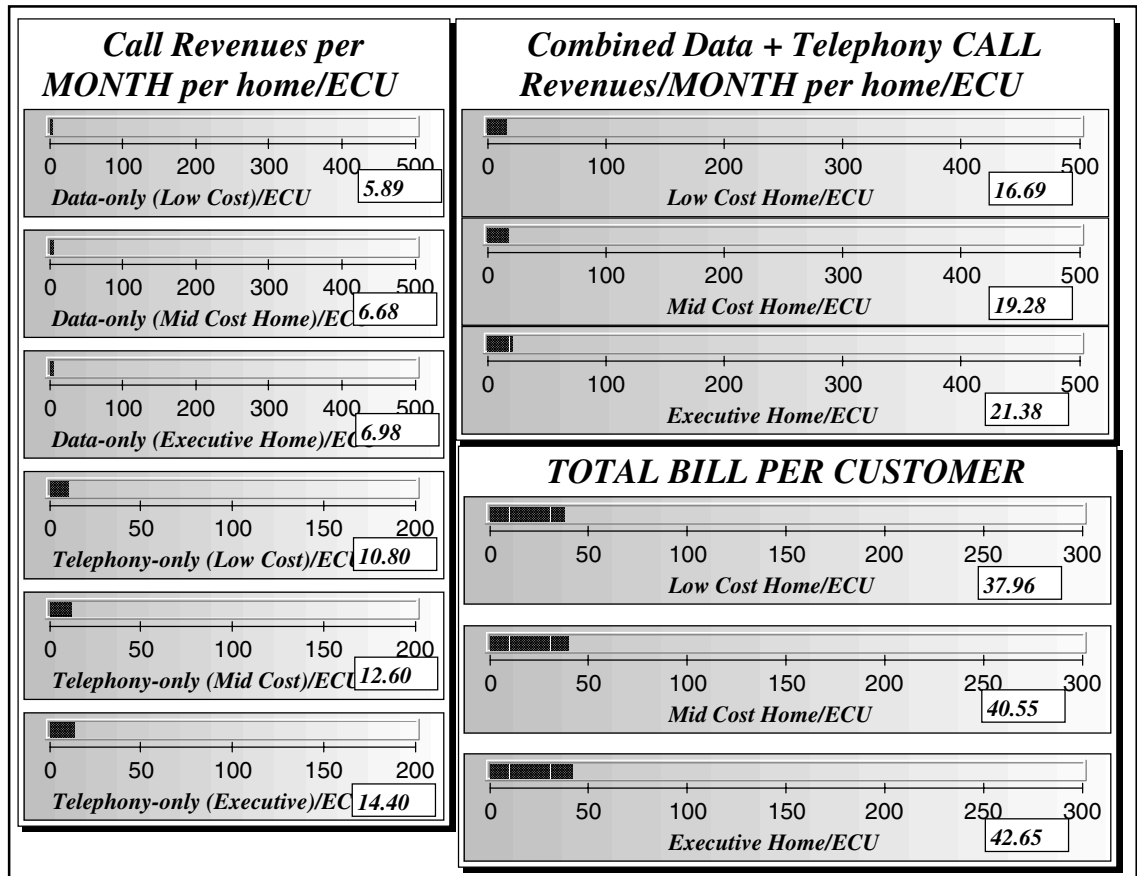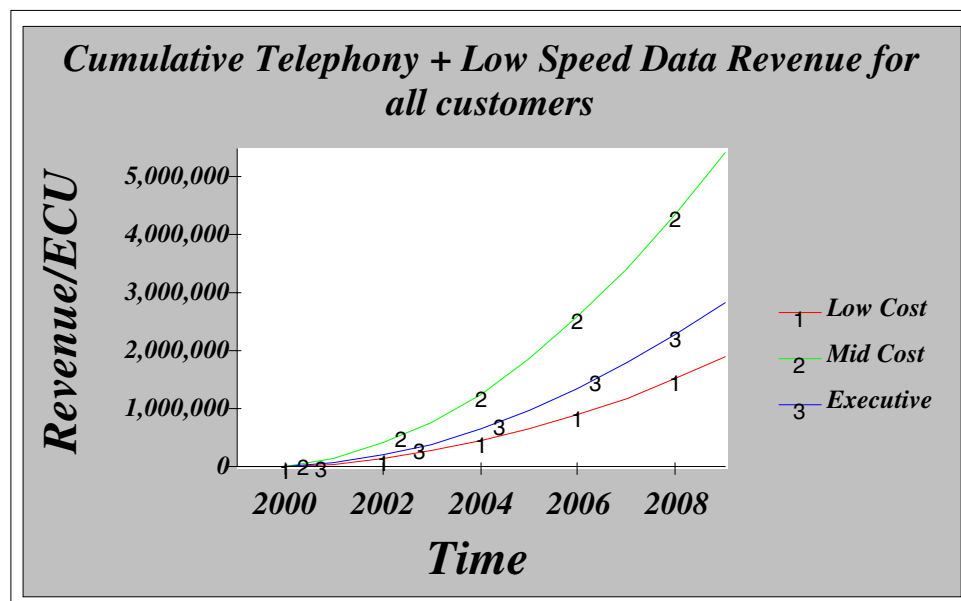
Figure 5 Flight Simulator: Contributions to the Monthly Bill per Customer for Telephony + LSDS

Steps 6 & 7

By accumulating the revenues from Steps 4 and 5, the cumulative revenue can be calculated. Figure 6 shows an example graph comparing the revenues from the 3 types of housing.

Figure 6 Cumulative Revenues generated by customers with Telephony + LSDS

This particular scenario suggests that the telco would be wisest targeting LSDS services at customers living in mid-cost homes, followed by targeting of those customers in executive homes. Although customers from low cost homes generate the lowest level of revenue, (inspite of accounting for the most homes), their revenue is still significant. Thus, the telco should still target these customers, even though they have a lower targeting priority for LSDS than the customers in mid-cost and executive homes.

Step 8 Costs
Just as the model-user was able to flex the tariffing scheme in Step 3, so they can vary the unit capital costs of the components within the network, and the running costs, so as to ascertain the overall costs to the network operator. These costs are attributable on a per-service basis for each of the individual home types.

Steps 9, 10 & 11   Profit Per Home-Type Per Service
By knowing the revenues and costs associated with each home type for each service, the profit can be calculated from

Profit = Revenue - Costs

Again, profit will be attributable on a per service per home-type basis. An example of the profits from Telephony + HSDS is given below in figure 7. As in the case of the revenues for Telephony + LSDS, we see that the telco should target customers in mid-cost homes first, followed by customers in executive housing. Finally, they should target those customers in low-cost housing. Again, although the profit from customers in low-cost housing is relatively small, it is still significant enough for telcos to (eventually) target these customers with HSDS.
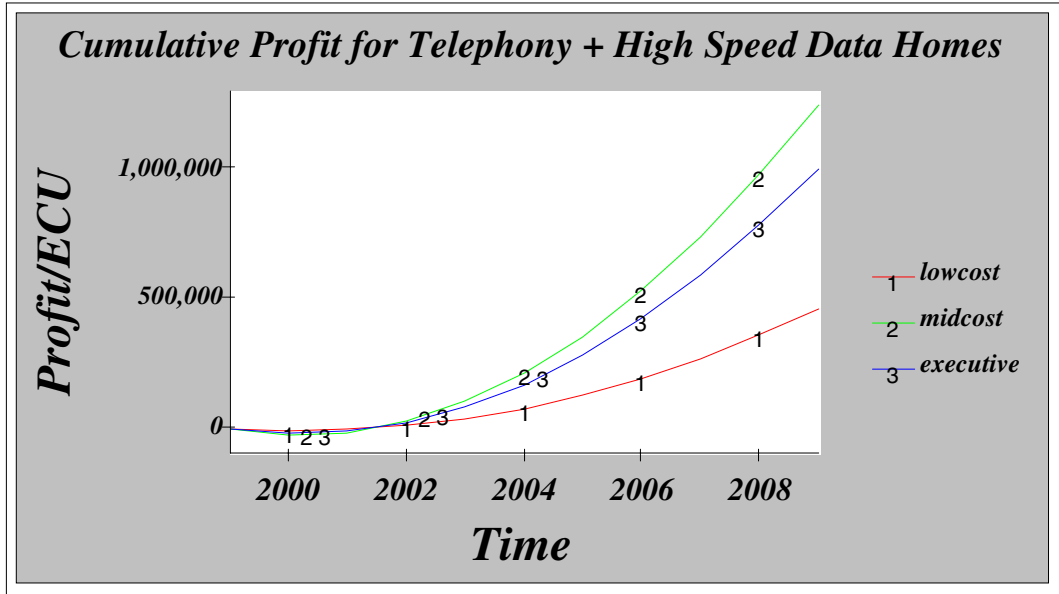
Figure 7 Cumulative Profits generated by customers with Telephony + HSDS

Step 12   Total Profit
Finally, adding each of the individual profits, the overall profitability can be
ascertained, an example is given in figure 8, below.
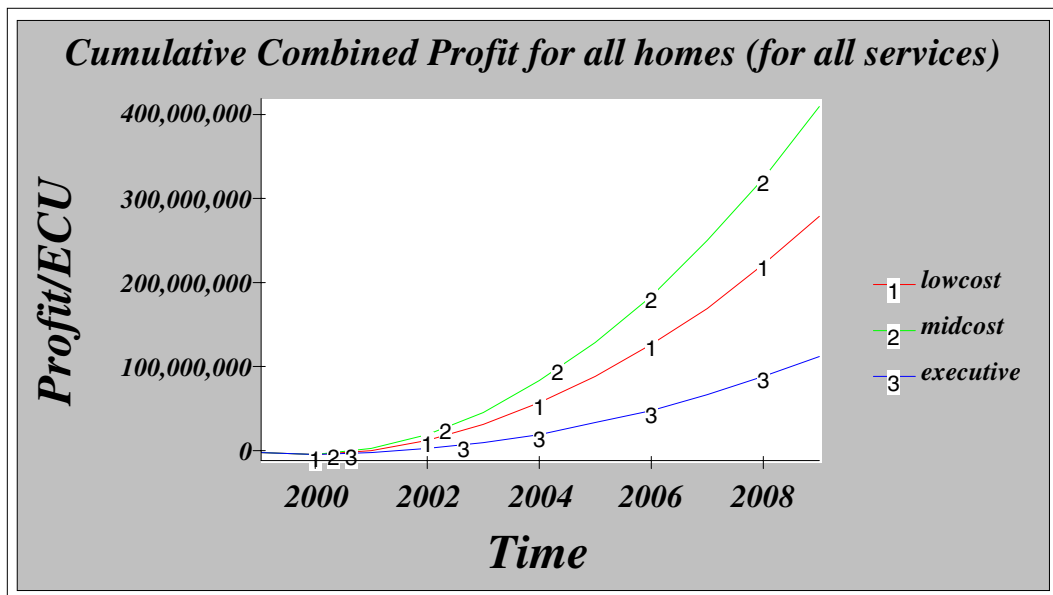
Here, the mid cost housing customers still account for the greatest profit for all the
services (PSTN-only, PSTN+LSDS and PSTN+HSDS). At first sight, it might seem
surprising that customers from low-cost housing give greater overall profit than those
customers from executive housing. However, it must be remembered that in the

earlier graphs, only a sub-section of the services offered were displayed. Low-cost housing accounts for the greatest numbers of customers and it is their PSTN usage in particular, which increases their overall profitability.

Summary
A Flight Simulator has been developed to aid the very rapid running of scenarios for the take-up of new services, customer numbers, service usage, revenues, costs and profitability. For each of these quantities, their values can be ascribed according to the customer segmentation, (set by their type-of-accommodation), and according to the service(s) to which they subscribe. This ability to ascribe values, especially profitability, enables telcos to target those customers most likely to maximise the return on the telco's investment.

Acknowledgements

Glossary

HSDS	-	High Speed Data Service
LSDS	-	Low Speed Data Service
PSTN	-	Ordinary telephony
Telco	-	telecommunications operator