Economic Period of Provisioning

Planning of Fiber Optics Cable

Case Study

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The problem

Between two large towns which are considered as “transit exchanges”, there is a demand for trunk circuits. The demand is generated by two groups of towns which are served by their transit exchanges. The layout of towns is shown in Figure 1. For the next three years, the demand growth is shown in Table 1. By assuming the linear demand growth between the long distance exchanges, we wish to determine the optimum size of the fiber optics cable which should be placed between the transit exchanges. The fiber optics cable was found to be the most economical transmission media.

We also wish to determine:

- the present worth of expenditures at optimal size cable;
- the present worth of expenditures at double size;
- the percentage variation of present worth between double and optimal size cable;
- he annual charges.

The following data are provided:

The PCM systems, which are going to be superimposed on the fiber optics cable, are of fourth order. One fully equipped system provides 1920 ch.

Cost of fiber optics cable

- Basic cost *600 MU / km*
- Incremental cost *720 MU / km / pair*
- Taxes on purchasing cost *20 %*
- Digging cost *750 MU / km*
- Placement of cable *80 MU / km*
- Splicing and testing *15 MU / km / pair*
- Operating plus maintenance cost *3.5 %*
- Service life *18 years*
- Interest rate *10 %*
- Distance between transit exchanges *170 km*

For references, see the relevant document.

	DE BROGLIE	ZEEMAN	HEISENBERG	LANDAU	BLANCK	BOHR	COMPTON	STERN	EINSTEIN
DE BROGLIE					50	20	25	26	25
ZEEMAN					50	75	26	25	35
HEISENBERG					72	25	25	36	25
LANDAU					95	27	75	60	80
BLANCK	45	25	75	92					
BOHR	25	25	46	25					
COMPTON	25	25	60	100					
STERN	30	25	35	50					
EINSTEIN	28	30	32	90					

Table 1: Trunks needed for the next three years

LAYOUT OF CITIES