Shortest Path Problem

Optimization of Transmission Systems

Case Study

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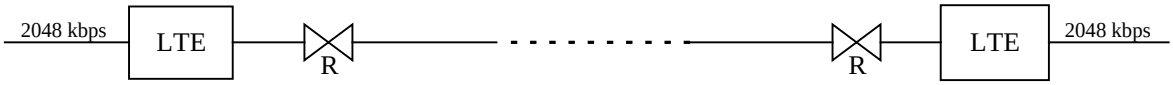
Optimization of Transmission Systems

We need to determine the PCM systems in every cable run of Figure 2.

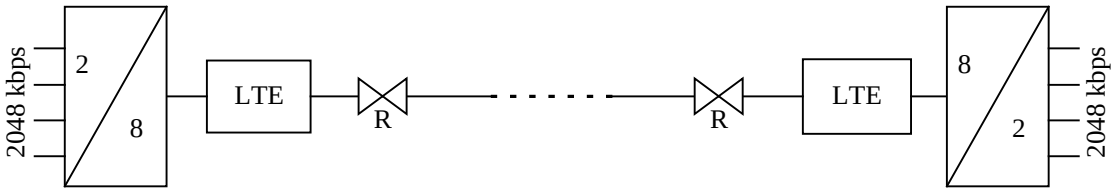
The necessary circuits between nodes are given in Table 1, and the cost of PCM systems shown in Figure 1.

Cost of PCM Systems as a Function of Distance

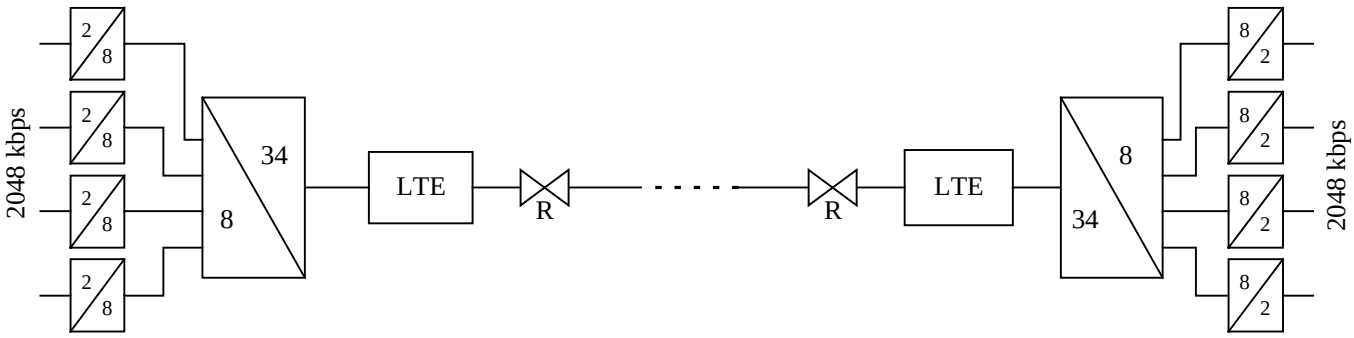
First order: $C_1 = (400 + 50\lambda)$ *Monetary Units*



Second order: $C_2 = (1160 + 150\lambda)$ *Monetary Units*



Third order: $C_3 = (4400 + 500\lambda)$ *Monetary Units*



Legend:

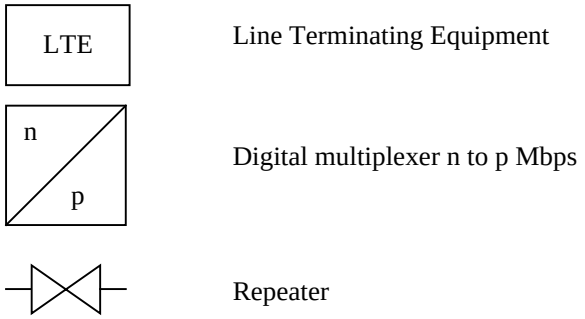


Figure 1

		1	2	3	4	5	6	7	8	9	10
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
1	**A**		87	250	180	225	95	50	120	120	130
2	**B**			140	90	120	70	110	100	80	90
3	**C**				90	200	140	80	130	120	70
4	**D**					130	110	112	140	90	290
5	**E**						70	100	160	140	90
6	**F**							50	220	140	110
7	**G**								150	120	100
8	**H**									80	135
9	**I**										140
10	**J**										

Table 1 : Circuit Matrix (Incoming + Outgoing)

Use Table 2 and Figure 3 as worksheets.

No.	Cable Run	Length	Iteration 1					Iteration 2					Total Cost
			Circuits	PCM			Cost of circuit	Circuits	PCM			Cost of circuit	
				1	2	3			1	2	3		
1	AB	8											
2	AC	10											
3	BD	12.5											
4	BE	7											
5	CD	10											
6	CE	7											
7	CF	5											
8	DG	16.5											
9	Dh	8											
10	EH	4											
11	EI	7											
12	FH	9											
13	FI	6											
14	GJ	9											
15	HJ	7											
16	IJ	3											
TOTALS							X					X	

Table 2 : Optimization Results

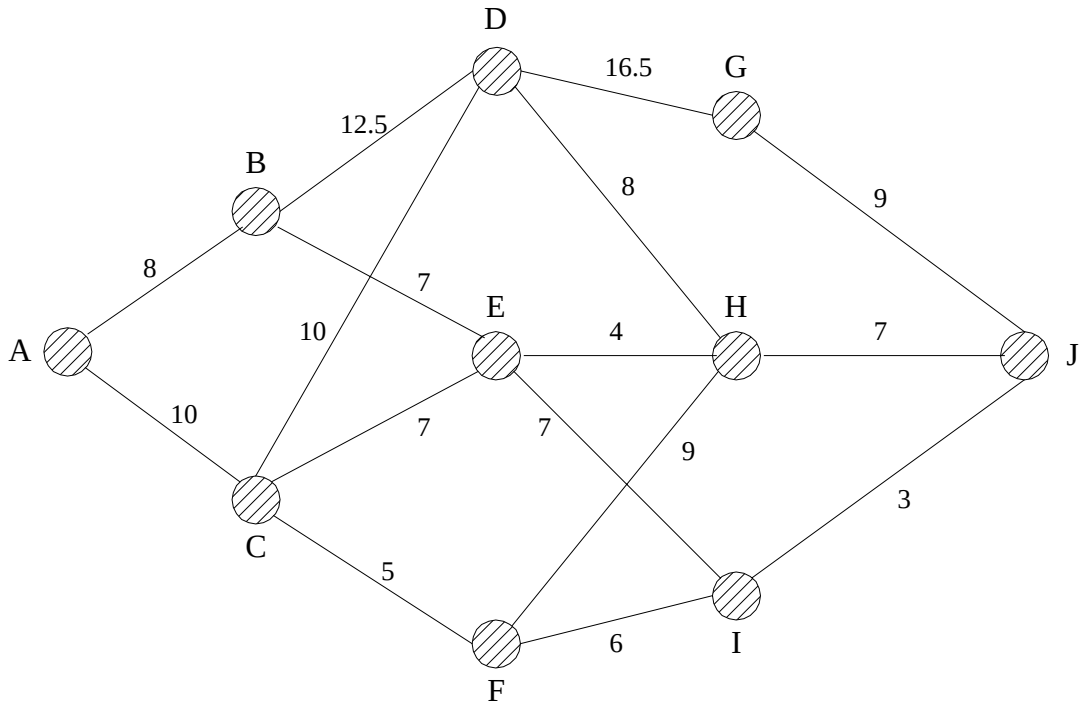


Figure 2

DUCT. NETWORK

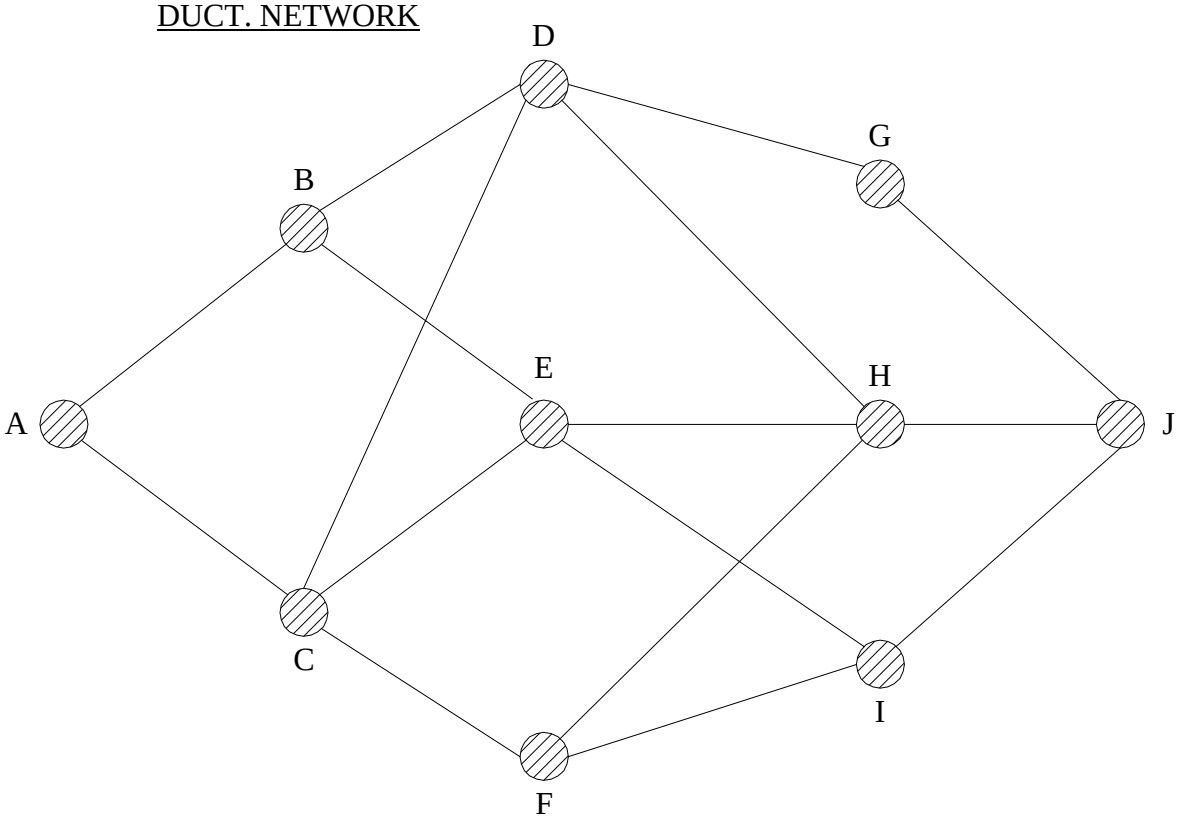


Figure 3