Junction Network

Solution of Case Study 2

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Solution of Case Study 2 : Optimisation and Dimensioning of Junction Network

Case 1 : *All traffic on low-loss routes*

Circuit matrix :

	1	2	3	4	5	6
1	-	18	24	11	7	30
2	17	-	36	13	15	18
3	30	34	-	28	30	42
4	13	13	30	-	18	20
5	8	14	32	18	-	19
6	24	20	53	18	22	-

Total cost = **85,420**

Case 2 : *All traffic through a transit exchange, T*

Selected tandem : **3**

Traffics and circuits :

	To Tandem T Traffic	To Tandem T Circuits		From Tandem T Traffic	From Tandem T Circuits
1	52	69	1	53	70
2	58	75	2	58	75
3	-	-	3	-	-
4	54	71	4	49	65
5	53	70	5	53	70
6	90	110	6	83	103

Total cost = **93,900**

Comparison of tandem choices:

Tandem	Cost	Cost increase compared with T=3
1	127,590	36 %
2	103,270	10 %
3	93,900	-
4	104,530	11 %
5	110,550	18 %
6	123,720	32 %

Case 3 : *Optimization of Alternative Routing Network*

Selected tandem :

| 3 |

Calculate cost relations :

$$\varepsilon = C_D / C_T$$

Calculate improvement factors :

$$F_N(A) = \varepsilon \times (0.7 + 0.3 \times \varepsilon^2)$$

	1	2	3	4	5	6
1	-	0.38	-	0.44	0.50	0.71
2	0.48	-	-	0.44	0.52	0.65
3	-	-	-	-	-	-
4	0.42	0.41	-	-	0.45	0.54
5	0.50	0.45	-	0.52	-	0.63
6	0.69	0.63	-	0.52	0.63	-

	1	2	3	4	5	6
1	-	0.28	-	0.33	0.39	0.60
2	0.37	-	-	0.34	0.41	0.54
3	-	-	-	-	-	-
4	0.32	0.31	-	-	0.34	0.43
5	0.39	0.34	-	0.41	-	0.52
6	0.58	0.52	-	0.41	0.52	-

Optimize circuits on High-usage routes :

Use attached diagrams to determine circuits and overflow traffics!

	1	2	3	4	5	6
1	-	13	*	7	2	20
2	11	-	*	8	10	10
3	*	*	-	*	*	*
4	8	8	*	-	13	14
5	4	9	*	12	-	11
6	15	13	*	12	14	-

Overflow Traffic Mean :

Overflow Traffic Variance :

	1	2	3	4	5	6
1	-	0.8	-	0.6	0.8	3.2
2	1.1	-	-	0.7	1.0	2.2
3	-	-	-	-	-	-
4	0.7	0.7	-	-	0.8	1.4
5	0.6	0.8	-	1.2	-	2.3
6	2.7	1.9	-	1.2	2.0	-

	1	2	3	4	5	6
1	-	1.9	-	1.1	1.1	8.3
2	2.3	-	-	1.4	2.2	4.3
3	-	-	-	-	-	-
4	1.4	1.4	-	-	1.0	3.3
5	0.9	1.7	-	2.6	-	4.8
6	6.3	4.1	-	2.6	4.5	-

Calculate traffics (mean and variance) offered to tandem routes, and find required number of circuits :

    Traffics and circuits :

	To Tandem					From Tandem			
	Mean	Variance	V/M	Circuits		Mean	Variance	V/M	Circuits
1	20.4	27.4	1.3	**32**	1	25.1	30.9	1.2	**37**
2	30.0	35.0	1.2	**43**	2	27.2	32.1	1.2	**40**
3	-	-	-	**-**	3	-	-	-	**-**
4	23.6	28.0	1.2	**36**	4	21.7	25.7	1.2	**32**
5	26.9	32.0	1.2	**39**	5	24.6	29.5	1.2	**37**
6	47.8	57.5	1.2	**62**	6	39.1	50.7	1.3	**54**

    Total cost =   77,980

<u>Comparison of tandem choices:</u> (please note that these results have been obtained by a computer program using more exact methods than the diagrams provided for manual use)

Tandem	Cost	Cost increase compared with T=3
1	81,610	5 %
2	77,990	1 %
3	77,380	-
4	78,150	1 %
5	79,540	3 %
6	81,790	6 %

Observe that the cost penalty for not choosing the "best" tandem exchange is in the range of 1 - 6%; compare this with Case 2, where the penalty range was 10 - 36%.