Ottawa Carleton Institute for Electrical and Computer Engineering

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ELG-5383

Survivable Optical Networks

Assignment #4 Due April 13th, 2015

1) For the network given below; assume dedicated mesh protection. Demand *r* requires *b*=1 unit of bandwidth. The working path for demand *r* is already computed by Dijkstra algorithm, *SrW* = {1, 2}. The backup bandwidth reserved on every link (*Bj*) is given by the last row in the table given below. *Bj* is also shown in the figure below. Assume that all links have large available capacity. Determine what path will be chosen by Dijkstra algorithm to be the backup path for demand *r*? Is this path the shortest path, why?

B3=11

B8=17

B5=6

B6=15

B7=2

B4=10

B9=10

B1=7

B2=9

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Link | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | 0 | **9** | **11** | 6 | **6** | 7 | 0 | 0 | **10** |
| 2 | 3 | 0 | 5 | 4 | **6** | 1 | **2** | 4 | 6 |
| 3 | 2 | 2 | 0 | **10** | 3 | 9 | 1 | 9 | 8 |
| 4 | 0 | 0 | 7 | 0 | 0 | **15** | 0 | 8 | 10 |
| 5 | 1 | **9** | 6 | 7 | 0 | 4 | 0 | 5 | 3 |
| 6 | **7** | 5 | 9 | 8 | 2 | 0 | 0 | 13 | 3 |
| 7 | 4 | 7 | 0 | 1 | 1 | 7 | 0 | 15 | 0 |
| 8 | 5 | 8 | 2 | **10** | 4 | 8 | 1 | 0 | 9 |
| 9 | 2 | 3 | 3 | 4 | 4 | 11 | 1 | **17** | 0 |
| **Bj** | 7 | 9 | 11 | 10 | 6 | 15 | 2 | 17 | 10 |

1. If problem 1 assume pool sharing with the same working and backup paths computed for demand *r (assume that the value of vwf is ignored)*:
   * Determine the set of troublesome links (*Sr, jD*) for demand *r* on backup links *j =* 4, 6, and 8
   * Determine *lr, jD* and ***gr, jD*** for each *j* above
   * Assume, threshold *G* is given as 0, 0.5, or 1
   * Using Enhanced Pool Sharing algorithm, and for each G, determine if extra backup bandwidth is needed on link *j*

*Let lo be 500 (failures per mile per 109 hours) and let the lengths of links be given below:*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Link* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* |
| *Distances in miles* | *450* | *400* | *650* | *300* | *250* | *270* | *290* | *150* | *650* |