S-38.3192
ITGuru Excercise (6: Simulating the Dimensioned Network)

Spring 2006

Original version: Johanna Nieminen and Timo Viipuri (2005)
Modified: Johanna Nieminen (2006)

Task Description

In this part of the exercise your task is to dimension the network. It is assumed that no DiffServ mechanisms, such as advanced scheduling schemes or Traffic Engineering are available. Thus, the desired Quality of Service must be achieved by dimensioning the link capacities in the network in a proper way. In general, dimensioning is a very complicated task with multiple goals, such as supporting the users Quality of Service requirements and minimizing the costs incurred by extra capacity. In this exercise the goal for dimensioning is simple and heuristic: your task is to dimension the network so that the utilization in each link is in the range [40…80] % when the offered traffic corresponds to the application and background traffic created in the previous exercise. This should guarantee that no link is heavily overutilized or underutilized.
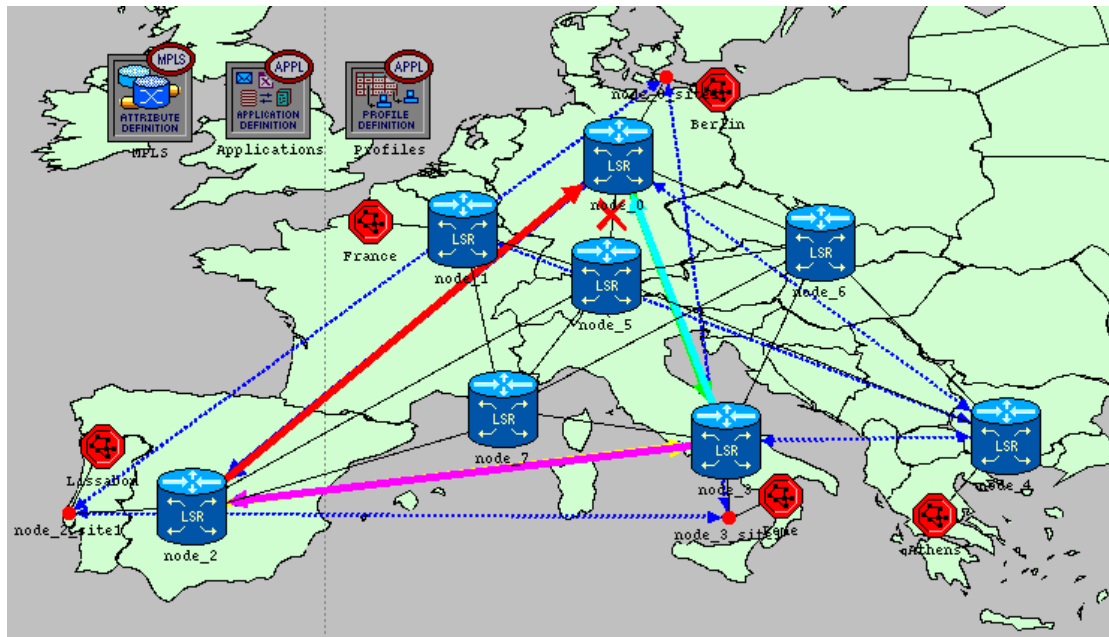
Dimensioning the Network

In the previous exercise you changed all the links in the core network to PPP-E1 (2.048 Mbps). To see if the link capacities have to be updated, record the utilizations of each link by selecting the utilization metrics to both directions from '**Choose Individual DES Statistics**'. Run the simulation for at least 10 minutes and check the utilizations of the links. If it seems that some links are severely congested (utilization is very high), update the link capacity gradually. Then run the simulation again and see if the capacities have to be further increased. When you believe that the capacity allocation for the links is ready, make sure that you have activated the collection of the same statistics as in the previous exercise and run the simulation once again at least for one hour. Check the statistics also from **'DES->Results->Find Top Statistics'**. In this view you can examine also maximum values, standard deviations and the probability density function in each link besides only the average values. Even if the average utilization falls in the specified range but the maximum utilization is extremely high during some periods, it may be wise to further increase the capacities.

Testing dynamic LSPs

After you have simulated the dimensioned network, you should test how the dynamic LSPs work in a case of a link failure. In the core network exercise you were asked to create the topology so that you will also have some alternative paths in case the traffic can not be routed along the primary path.

Select one link along some LSP having alternative routes by right-clicking the link and selecting **'Fail this link'**. Simulate the network with the same applications and settings as in the previous task for one hour. You may also try to define link failure as a function of time in the **Failure/Recovery Object** in the Utilities object palette.

Reporting the results

In the first task, compare the simulation results of the dimensioned network with the results of the non dimensioned network that you generated in the previous exercise.

In the case of a failed link, analyze in particular what happens to the end-to-end delays of the applications compared to the case where all links are working. Is all traffic routed along the alternative path or is some traffic dropped?

Exercise Sessions

The exercise session for this task will be arranged on 15th March at 14 o'clock in computer class Maari-A.

Handout Requirements

The exercise should be returned by 31st March, 14 o'clock. Send the exercise package and your final report as an e-mail attachment to Johanna Nieminen (jmantti3@netlab.tkk.fi) provided that the size of the attachment is reasonable. You have to pack the files with the command:

"tar -cf - -C ~ op_models | gzip > 6_dimensioning.tar.gz"

Remember to include only the relevant files and remember to remove the unnecessary backup files from the op_admin directory.

Grading

The final grade of the exercise depends on the following factors:

- how well your solution meets the target link utilizations
- how well you have justified your technological choices and discuss other possible alternatives
- visual clarity of the presentation

- the quality of the analysis, just showing the graphs is not enough

In the final report you are also supposed to give feedback about the exercise as well as an estimate of the time that you spent on doing it. Describe also how the tasks were divided between the group members and how well your group worked as a whole. Give also three possible times for your group to give an oral presentation of 15-20 minutes about the exercise.