Data and Detailed Results for "Stochastic RWA and Lightpath Rerouting in WDM Networks"

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This document describes the data files of the paper Daryalal and Bodur (2020). The files contain both the data used in the numerical experiments, as well as the detailed results.

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1. Networks

File: `network` + "`Init`" + `initial_traffic` + "`.txt`":

- `network` is one of the networks given in Table 2 of Section 5.1
- `initial_traffic` is the number of requests already granted on the network

The data given in these text files represents the topology of the network `network`, and the connections that already exist between its node pairs. These files can be read as follows:

```
1  n # a nonnegative integer: number of nodes
2  m # a nonnegative integer: number of links
3  V # a list of size n: node indices
4  L # a two-dimensional list with length (i.e., first dimension) m: list of
       links
5  T # a list of size n by (n-1): number of existing connections for each node
       pair
```

2. Simulation

File: `network` + "`Init`" + `initial_traffic` + "`W`" + `wavelength_num` + "`R`" + `arrival_rate` + "`D`" + `drops_rate` + "`.xlsx`":

- `network` is one of the networks given in Table 2 of Section 5.1

- `initial_traffic` is the number of requests already granted on the network
- `wavelength_num` is the number of available wavelengths $|\Omega|$
- `arrival_rate` is λ^R, the parameter of the Poisson distribution modeling the size of the incoming batches of requests
- `drops_rate` is λ^L, the inverse of the mean of an exponential distribution modeling the service holding times

These Excel files (provided in the folders "`Provisioning`" and "`Defragmentation`" for the problems SmaxRWA and SmaxLR, respectively) contain the data used for the simulations, along with the detailed results. Each Excel file has 5 Sheets, one of which is the arrived traffic as the input data, and the rest are the detailed results.

2.1. Traffic

In each file, the number of arrived connection requests is given in the Excel Sheet "`arrivals`". For a given network topology and an initial existing set of granted requests (as explained in Section 1), we have performed the following:

- For the provisioning problems, we have generated 50 sample paths, each having 52 stages, with the process explained in Section 5.2.2 of the paper and the parameters represented by the name of the file. This is given in the "`arrivals`" Sheet as a matrix of size 50×52.
- For the defragmentation problem, we have generated 100 sample paths, each having 100 stages, with the process explained in Section Section 5.3.2 of the paper and the parameters represented by the name of the file. This is given in the "`arrivals`" Sheet as a matrix of size 100×10.

2.2. Detailed Results

We have reported the detailed results of the simulation for each sample path in the following Excel Sheets:

- The provisioning problem:
  - `GoS-maxRWA`: Grade of service obtained by solving the deterministic maxRWA problem for each sample at each stage, reported as a matrix of size 50×52.
  - `GoS-SmaxRWA`: Grade of service obtained by solving the SmaxRWA problem for each sample at each stage, reported as a matrix of size 50×52.

— `link_usage-maxRWA`: Number of wavelinks used as the result of solving the deterministic maxRWA problem for each sample at each stage, reported as a matrix of size 50×52.

— `link_usage-SmaxRWA`: Number of wavelinks used as the result of solving the SmaxRWA problem for each sample at each stage, reported as a matrix of size 50×52.

- The defragmentation problem:
  — `GoS-minRWA`: Grade of service obtained by solving the deterministic minRWA problem for each sample at each stage, reported as a matrix of size 100×10.

  — `GoS-SmaxLR`: Grade of service obtained by solving the SmaxLR problem for each sample at each stage, reported as a matrix of size 100×10.

  — `link_usage-minRWA`: Number of wavelinks used as the result of solving the deterministic minRWA problem for each sample at each stage, reported as a matrix of size 100×10.

  — `link_usage-SmaxLR`: Number of wavelinks used as the result of solving the SmaxLR problem for each sample at each stage, reported as a matrix of size 100×10.

References

Daryalal M, Bodur M (2020) Stochastic RWA and lightpath rerouting in WDM networks. *arXiv preprint arXiv:2012.10084* .