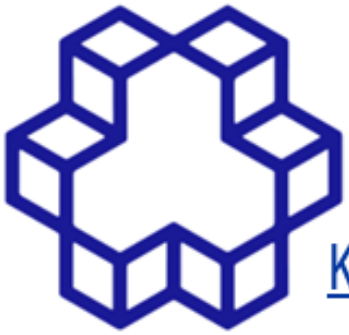


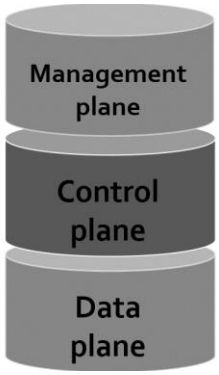
K. N. Toosi University of Technology

Assignment 1

Optical Networking

1) Define the following terms:

   a. Span
   b. AWG
   c. Optical Amplifier
   d. ROADM
   e. Data plane
   f. Control plane
   g. Nodal degree
   h. Transceiver



2) Determine the following statements as true or false with <u>enough reasons</u>:
   a. Optical amplifiers are especially located in metro and access networks.
   b. The problem of Network Engineering treated as semi-static compared with Traffic Engineering which is considered as dynamic.

3) Summarize the benefits and costs of ROADM as opposed to OADM.

4) Is conversion between client-side and network-side signals per-formed transparently? Why or why not?

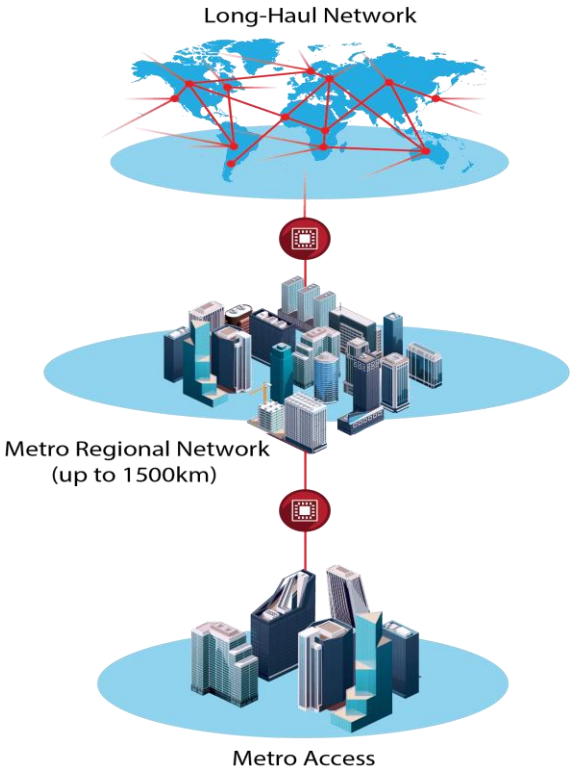
5) What are the advantages and shortcomings of using Wavelength-Selective Switch (WSS) in place of Array Wave-guide Grating (AWG)?

6) What is the difference between directionless and directional transceiver?

7) What are the drawbacks of FOADM architecture and how have they been addressed?

8) In order to build an M*N WSS, we connect an M*1 WSS to a 1*N WSS. Is the new M*N WSS contentionless? Why or why not?

9) Mention some different technology implementations in the following tiers of an optical network and explain your answer.



10) Consider a 3 × 5 grid network where every link is 500 km in length. Assume that all nodes support optical bypass and that the optical reach is 1500 km. Assume that there is one wavelength of traffic in both directions between every pair of nodes. What is the average nodal drop ratio in this network, assuming all connections are routed over the shortest distance path? The average nodal drop ratio is defined as:

$$\frac{\sum_i Number\ of\ wavelenght\ Drop\ at\ Node\ i}{\sum_i Number\ of\ wavelenght\ Enter\ Node\ i}$$