Some Factors in Selection of a Network Architecture

1. **Frequency of use of Global Data** – if primary use is “local” data, choice of architecture (ring/star/hierarchical) is not as big an issue. However, there is heavy use of “global” data, choice of architecture (and method for storage of global data) is much more significant.

2. **Is global data static or dynamic?** If global data is dynamic (heavily updated, e.g., and ATM network), redundancy of data causes combinatorial update problems and data integrity problems. If global data is static, redundancy of data would not be a problem; and “replicated” global data would be appropriate.

3. **Is the pattern of organizational communication regional/clustered or random?** If clustered, ring may be reasonable. If randomized, then ring or hierarchical star could be a problem. Note that the way that we handle global data (partitioning), may determine the organizational pattern of communication.

4. **Likelihood and severity of disruptions.** If applications are “mission-critical”, then disruptions of the network are problematic. A network isolation scenario (e.g., a failure of the central switcher in the “star”, or failure of the “token” in the “ring”) would have major consequences. If there were low mission-criticality, these disruptions would be less significant. Likelihood of disruptions – very hard to predict. We are generally risk-averse in mission-critical applications.

5. **Time-Criticality of Response** - e.g., how significant is response time? The discussion of network efficiency across these models is more relevant where there is strong need for fast response time [e.g., programming trading, arbitrage, etc.] Batch update applications – [e.g., end-of-month reporting to central headquarters] would have less concern with the network architecture’s relative efficiency.

6. **Relative size of networks.** The size of the organization [the number of “application nodes”] will suggest a proper architecture – [e.g., a large wide area network will consider a “hierarchical star”].

7. **Budgetary Factors** – The issue of initial and incremental development cost assumes budgetary limitations. Clearly, more funds allow more fault-tolerant architectures.

8. **Anticipated Growth of Data, Need for Flexibility** – Reiterates the need for program / physical data independence. The scheme used for storage of global data may have to change over time, and likewise, the way that global data may be partitioned may change on a regular basis.