

Reading Report #1

Paper: On Distributed Communications Networks

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I would like to **criticize** that the author did not give a lot of weight to the **scalability** of the networks in his paper. In the *Introduction* section, he brought up three types of networks: *Centralized*, *Decentralized* and *Distributed networks*. After briefly describing the drawbacks of centralized and decentralized networks in terms of survivability after nuclear attack, he completely turned into the examination of the distributed networks. It is very understandable that under that specific cold war context, survivability should be the main focus. However, it is not convincing to me that decentralized networks are also vulnerable, the reason “destruction of a small number of nodes in a decentralized network can destroy communications” is not sound enough. It really depends on the scale of the networks. Actually, the decentralized topology looks much like the current Internet. And at the time the paper was written, building a complete distributed network might not be feasible.

I am interested in this question: “*What was the scale of the network the author intended to build in reality?*”. The author seemed being vague about this. He just mentioned a 18×18 -array network was built for simulation, which is definitely not a large-scale network.

I believe that scalability is important for choosing the right structure for networks. Building a large-scale complete distributed network with redundancy level of 3 or 4 might not be feasible. On the other hand, decentralized topology seems appealing to me in the way that it manages a group of computers (all connected to a local switch) in a cloud and let the switch talk to the outside. In doing this, we can build large-scale networks recursively. This is basically how we build Internet today.

Since at the end of the paper, the author briefly envisioned the future complex networks that could span continents, I would like to do the following to follow up his work:

1. Talk about the importance of the scalability for computer networks.
2. Simulate a decentralized network with a relatively large size. I will make the redundancy level very high (5 or 6) between switch nodes. Then simulate a distributed network with the same size with redundancy level of 3 or 4.
3. Evaluate and compare the two types of networks based on the simulation results.
4. Argue that though for small scale networks, decentralized topology is not as reliable as the distributed one, for relatively large scale networks, decentralized topology is good enough to survive after destruction because there are many switch nodes in the network and redundancy level among them is very high.
5. Argue that decentralized networks are much more scalable than complete distributed networks, so it is much more feasible to build large-scale decentralized networks in reality.
6. Argue that the separation of computer nodes and switch nodes makes it easier to provide common services to network users and build logical channels between end users. While in a distributed networks, every node basically is a switch, it needs to take care of message routing itself. The separation of concerns in the decentralized networks provides a better abstraction.