Keynote Talk

Protocol Design for Effective Communication among Silicon or Carbon-based Nodes

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Abstract

In this talk I will discuss some of the lessons I've discovered about network protocol design; how to make protocols self-stabilizing, how to make networks self-configuring, how to provide optional configuration in such a way that misconfiguration does no harm, and how to design within constraints such as backward compatibility and politics. I'll also talk about some of my recent work. It is confusing enough that forwarding is done at both layers 2 and 3. Why am I designing a layer 2 1/2? And having spent most of my life in the world of computer network communication protocol design, I will share my observations about ways in which communication protocols in other areas could be improved.

Categories and Subject Descriptors

C.2.2 [COMPUTER-COMMUNICATION NETWORKS]: Network Protocols

General Terms

Design, Performance, Reliability

Keywords

Protocol Design

Bio

Radia Perlman is a Fellow at Intel Labs, where her research focuses on network and security technologies. She started her career in networking at BBN, designing routing protocols for the packet radio network. Then she moved to Digital, where she was responsible for designing routing for DECnet. Her innovations made link state routing protocols robust and scalable. The specific protocol she designed for DECnet was adopted by ISO and renamed IS-IS, and remains in wide use today, virtually unchanged in the last 20 years. She also designed the spanning tree algorithm which is the heart of modern Ethernet. About 7 years ago she designed a protocol to replace spanning-tree Ethernet with true routing. It is compatible with today's switches and routers, in the sense that any subset of the bridges in a bridged Ethernet can be replaced with the new Rbridges ("routing bridges"). The network still appears as a single flat Ethernet (a single IP subnet), but the more bridges replaced, the more stable the network becomes, and the better the bandwidth utilization. This design is the basis for the TRILL protocol (Transparent Interconnection of Lots of Links), which is being standardized by IETF.

She has also made significant contributions to security, including network designs resilient to malicious trusted components, assured delete, strong password protocols, and authorization models.

She is the author of "Interconnections", and coauthor of "Network Security", both texts widely used in both academia and industry. She has PhD in computer science from MIT, and an honorary doctorate from KTH. She was recently awarded the USENIX lifetime achievement award.