

Recursive InterNet Architecture (RINA): Preventing Internet from collapsing under its own weight

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Abstract

Internet has been a world-changing success that the world economy has come to rely on. In that regard, it may be the most significant development of the 20thC, equivalent to the Industrial Revolution. However, from the very beginning some aspects of the Internet architecture were deeply flawed. Although the scientists were aware of most of it at the time, little was done for that to be fixed. Instead, the issues were covered by the continuously increasing processing and storage capacity of the hardware. The Internet became a tribute to how long Moore's Law can keep such flaws at bay, while many analysis have been done on whether the Internet will one day collapse under its own weight. Moreover, the Internet flaws have cost the economy billions of dollars and its increasing fragility has becoming a growing performance and security risk.

We present the fundamental principles of Recursive InterNet Architecture (RINA) which goes back to the beginning and picks up the threads of insight that were lost and carries them forward. We first look at the early development of the Internet and the principle reasons that had contributed to its current state. We analyze how the development of networking was taken out of its normal track, and how an autocratic development of the Internet vs the democratic approaches elsewhere had a very serious and long lasting consequences to its development. We follow that by analysis of main Internet principles and share our findings about minimal requirements for a TCP reliable data transfer, relation between the naming a host and network addressing, scalability of router table sizes, mobility, congestion control mechanism and their implications to QoS and the need for global address space. We show how RINA addresses these issues and provides an efficient, reliable, secure and scalable networking architecture.