Reflections on the Evolution of Internet Threats: The Growing Imperative for a Cyber Secure Society

Farnam Jahanian
Directorate for Computer and Information Science and Engineering
National Science Foundation
Arlington, VA, USA
fjahania@nsf.gov

Abstract

Critical infrastructure, including the Internet, plays a vital role in the economic, political, and social fabric of society. This interdependency leaves society vulnerable to a wide range of threats that impact the security, reliability, availability, and overall trustworthiness of information technology resources. Assuring these properties in the face of adversarial behavior and an Internet that has changed dramatically in size, complexity, and diversity over the last decade has proven to be a critical challenge.

In this talk, I will reflect on the evolution of Internet threats – from early threats, such as viruses and worms, to modern botnets. I will explore how changing attacker's technological means (e.g., resilient infrastructure, covert communication) have intertwined with attacker's changing social, behavioral, and economic motives (e.g., vandalism, crime, activism) to create today's large, complex, and diverse ecosystem of threats. I will also touch on how future innovation in the threat landscape will likely be driven by Internet adoption patterns such as the explosive growth of on-line data, the proliferation of mobile devices, and the emergence of the "cloud" computing paradigm.

In response to these challenges, I will discuss the need for sustained, long-term research investments in a spectrum of scientific and technical areas with particular emphasis on calls to develop the scientific foundations of cyber-security and to accelerate the transition of knowledge into practice. I will articulate a vision in which a cyber secure society is necessary if we are to achieve the promise of computing to address a wide range of national priorities including health, energy, transportation, education and life-long learning, and public safety/emergency preparedness.

Categories & Subject Descriptors: K.6.5

[Management of Computing and Information Systems]: Security and Protection; K.4.0 [Computers and Society]: General

General Terms: Security, Reliability, Algorithms, Experimentation, Human Factors

Bio

Farnam Jahanian serves as the National Science Foundation Assistant Director for the Computer and Information Science and Engineering (CISE) Directorate. He is on leave from the University of Michigan, where he holds the Edward S. Davidson Collegiate Professorship and served as Chair for Computer Science and Engineering from 2007 – 2011 and as Director of the Software Systems Laboratory from 1997 – 2000. His research on Internet infrastructure security formed the basis for the Internet security company Arbor Networks, which he co-founded in 2001. He served as Chairman until its acquisition by Tektronix Communication in 2010.

Dr. Jahanian guides CISE, with a budget of over $600 million, in its mission to uphold the nation's leadership in computer and information science and engineering through its support for fundamental and transformative advances. Dr. Jahanian is also co-chair of the Networking and Information Technology Research and Development (NITRD) Subcommittee of the National Science and Technology Council Committee on Technology, providing overall coordination for the activities of 14 government agencies.

Dr. Jahanian holds a master's degree and a Ph.D. in Computer Science from the University of Texas at Austin. He is a Fellow of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronic Engineers (IEEE), and the American Association for the Advancement of Science (AAAS).

CCS'11, October 17-21, 2011, Chicago, Illinois, USA.
ACM 978-1-4503-0948-6/11/10.