

Internet and the Challenges that Lie Ahead

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The Internet has expanded from its experimental beginnings in the 1970s to become a worldwide telecommunications infrastructure with a far broader range of capability than the traditional telephone system. Of course, the same underlying optical fiber capacity that provides global telephony is also supporting the Internet. The two systems use different technology at the network layer (routing, switching) to accomplish their objectives.

As the Internet continues to expand beyond the approximately 1 billion users of today, it will have to scale substantially to support on the order of 3 billion users by 2010 and also many more Internet-enabled appliances and consumer devices than are online today. Because it is becoming a critical infrastructure for so much of our day to day activity, its resilience, security and integrity are also of essential concern for all users and service providers. Many of the problems arising in networked environments are a consequence of history. Many PCs and consumer electronics devices were designed for non-network use and consequently did not have built-in protections against the side-effects of being linked in a global system. The Internet itself did not have a built-in requirement that all endpoints be able to authenticate their identities to all other end points. Some of these features are going to be needed in further evolutions of the Internet.

Political and economic forces are also shaping the destiny of the Internet. The World Summit on the Information Society led to a four year debate on the meaning of Internet Governance and who should be responsible for it. In the end, the debate remains unsettled and an Internet Governance Forum is slated to begin in mid-2006 in Athens. In my vocabulary, 'Internet Governance' spans a very wide spectrum of concepts from abusive behavior on the network (spam, denial of service attacks, viruses, worms, phishing/pharming, etc) to questions of online contracts, dispute resolution processes, online legal and medical practice, regulatory frameworks and a variety of additional topics. The narrow focus on the tasks of the Internet Corporation for Assigned Names and Numbers (ICANN) does disservice to the users of the Internet and to those who seek to improve its operational stability.

On the economic side, costs for equipment and communications are falling, functionality of edge devices is skyrocketing and flexibility increases for the many new systems coming online. Access to and distribution of intellectual property over the network is a topic of widespread discussion and the technology is changing the game. One can imagine dramatically different ways of experiencing television by way of IPTV—which is NOT MERELY a way of delivering streaming audio and video. It is a whole new way of accessing and experiencing entertainment. The morphing of mobile phones into personal, programmable digital assistants is another sign of this rapidly evolving universe.

Programmable appliances that are online and able to accept control from network-based sources will change again our models of entertainment.

If there is time, I would like to offer a brief summary of another project, the design of an interplanetary extension of the Internet, to illustrate another form of challenge.