Internet Technology : Past, Present and Future

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Question :

Is the Internet Special
(in the history of civilization)?

- Computer communications were inevitable.

- Internet culture is special.

Personal Note :

Accidental Encounter to the Internet at UCLA.

- late 1960s / early 1970s

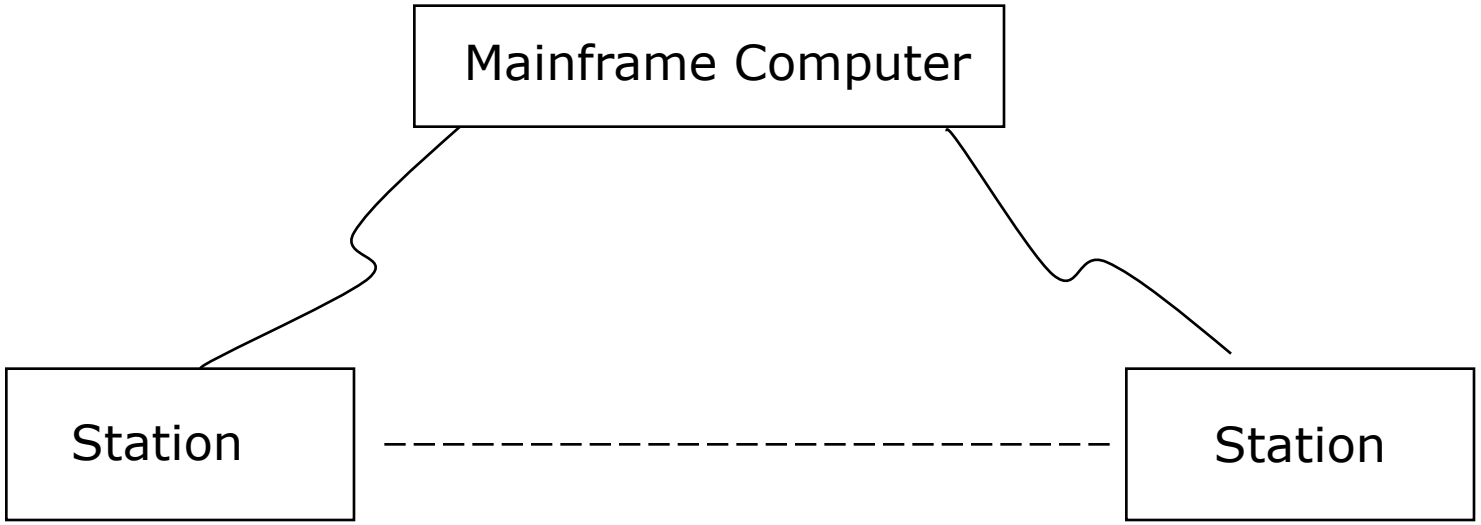
Table of Contents

1. 1940s Birth of Computer

ENIAC,.....

2. 1950s Mainframe Computer

One computer per organization
- remote station for remote job handling



3. 1960s Computer Network Research

UK, USA, France,...

Circuit Switch vs Packet Switch

US DoD/Advanced Research Project Agency – Funding

UCLA : Project Management

BBN : Node Processor (~ Router)

Testbed : UCLA, UCSB, SRI, …..

4. 1970s Computer Networks for Research Community

Arpanet (USA):

To share computer resource

- First Online Culture
- RFC (Request For Comment)
- Email was added later

UK, France, …..

5. 1970s~1980s

2 Clean Slate Approaches beyond Arpanet

- TCP/IP (replacing NCP of Arpanet)
- ISO OSI

6. 1980s Global Prolification of Research and Education Networks

1982 **Korea (SDN) with TCP/IP**

1985 **Global network conference in Korea**
(Pacific Computer Communication Symposium)

1980s ~ **Online Games (MUD)**

7. SDN Proposal, 1981

1981.9.30

Subject: Software Development Network(SDN) --- Preliminary

1. Introduction

Computer networks as a software development tool is needed to carry on the National Project on computer development. The Software Development Network(SDN) will be used for the following purposes;

(1) Memo exchange
(2) Program (source and object codes) exchange
(3) Computer resource sharing
(4) Database access
(5) System testing
(6) Computer system development
(7) Learn working under network environment

We may be able to use our own computers for the network. This network may be similar to CSNet, Computer Science Network for universities. It is developed by NSF, U. of Wisconsin and BBN.

2. System Configuration

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8. 1990s WWW and Prolification of the Internet

WWW at CERN with Browser(Mosaic) at Illinois

Commercialization

P2P

9. 2000s Internet becoming Social Infrastructure

Internet population: 1~2 billion

Broadband Internet

Wireless and Mobile Internet

Personal Website

Convergence (Internet, Telephone, Television, Movie,…)

Negative Side Effects (spam, virus, privacy,...)

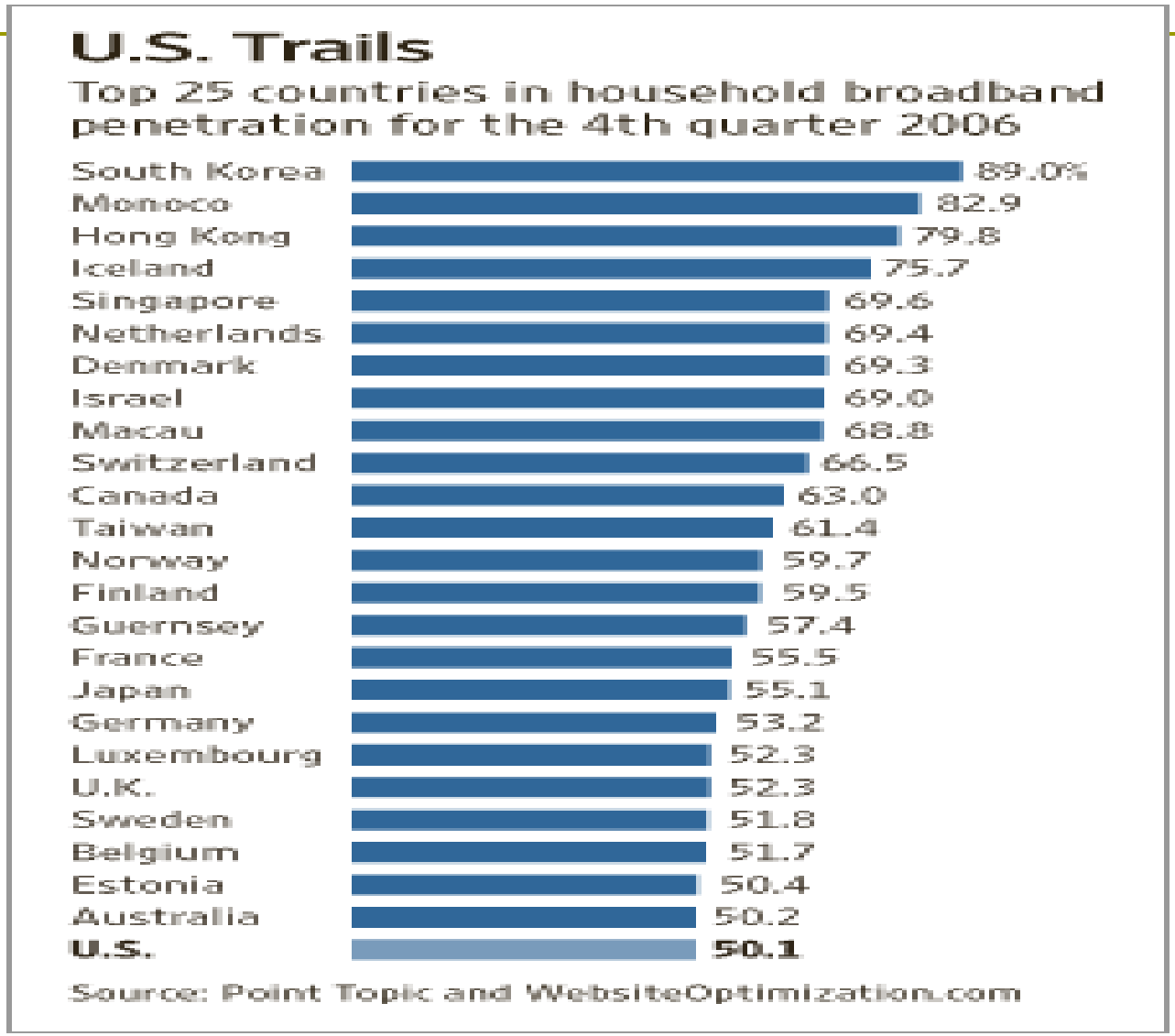
Northeast Asia as one of leading Internet regions

9.1 Internet Population (in million)

Asia	738	43%
Europe	418	24%
North America	252	15%
Latin America	179	10%
Africa	67	4%
Middle East	57	3%
Oceania	20	1%
Total	1,734	

(2009, www.internetworldstats.com)

9.2 Broadband Internet



9.3 Wireless / Mobile Internet

Internet with Computer : 500 millions

Internet with Mobile Phone: 400 millions

Remark : Mobile phones : 4 billions
Internet Users : 1 billion

Remark : In 2010~2020, 80% of Internet usage is mobile phones.

9.4 Personal Website

US (Facebook, MySpace, blog,…)

Korea(CyWorld)

9.5 Convergence

Internet (Data)

Telephone (Voice)

Television (Video)

Movie

Newspaper

9.6 Negative Side Effects/Social Issues

Virus

Spam

Privacy

Intellectual Property

10. Future Internet (~2020)

10.1 Current Status

Internet was created for research community(~1970s).

One~two billion people are using the Internet now.
- One trillion machines are expected in future.
- Five billion more users need to be connected.

Toward critical/social infrastructure
- Water
- Electricity
- Road
- Internet / Phone / Television

10.2 Problems

Scalability (Users, Bandwidth)
Security / Trust/Privacy
Mobile / Wireless
Management
(Semantic Overhead on IP)
(Engineering)

10.3 Future Internet Development

From scratch (~1960s)

10~15 years research

Open research

Remark : Once-in-40 years chance.

The last time was late 1960s~early 1980s.

10.4 Fair Share

Asia to contribute 1/3
(like North America and Europe)

Remark :
Original Internet Development Contribution (1960s~1970s)

North America	80%
Europe	15%
Asia	< 5%

10.5 Future Internet R&D – North America

2000s	Lambda Networking (CANARIE, ..)
	Planet Lab
2005~2006	NSF Workshops
2006~	NSF Projects(NetSE Program)
	GENI (Testbed)
	FIND (Research)
	Network Science
	more (Wireless, Security,…)

10.6 Future Internet R&D – Europe

FP7(Framework Program 7)

- The Network of The Future
- New Paradigm of Experimental Facility

- Future Internet Assembly,…..

10.7 Future Internet R&D – China

CNGI 2004~

10.8 Future Internet R&D – Japan

NWGN-Forum 2007Q4

10.9 Future Internet R&D – Korea

FIF 2006~

CFI

Camp

WGs

- Architecture
- Wireless
- Service
- Policy
- Testbed

10.10 Asia Future Internet Forum(AsiaFI.net)

2008~

- AsiaFI School
- Workshops
- WG (Mobile/Wireless, Architecture)
- Testbed Committee
- Joint Projects(Plan)

11. Internet as Social Infrastructure

Will the Internet be like electricity, road, television, and/or air/water?

Remark : The Internet is global, critical, social infrastructure.

12. Bibliography

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FIF	www.anf.ne.kr/fif
FIND	www.nets-find.net
FIRE	www.panlab.net
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