

Internet Ecosystem - Formation

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Chon, Kilnam

전길남

KAIST

We Connected 2 Internet Nodes in South Korea, 1982.

What's Next?

- Internet Ecosystem Formation

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1. Ecosystem Definition - Google Search

- A biological community of interacting organisms and their physical environment
- **A complex network or interconnected system**
- 생태계 saentaegye (in Korean)

1. Ecosystem Definition – Internet Society

“The organizations and communities that help the Internet work and evolve are called the Internet Ecosystem.”

Organizations that make up the Internet Ecosystem include:

Technologists, engineers, architects, creatives, and organizations

Global and local organizations

Operators, engineers, and vendors

Internet users

Educators

Policy and decision-makers”

[Source: Internet Society, Who makes the internet work: Internet Ecosystem, 2014.2.3]

2. Toward Global Internet

2.1 ARPANET (in USA)

ARPA (Advanced Research Project Agency) developed projects on many advanced topics including computer networking and artificial intelligence each of which had its own ecosystem starting from 1960s.

ARPANET ecosystem was formed in USA in 1960s – 1990s.
IETF was formed as the Internet protocol standardization organization with meetings for 3-4 times per year.

2.2 CSNET and NSFNET (with IPv4 networks in many countries)

CSNET (along UUCPNET/USENET and BITNET) expanded users of computer networks beyond ARPANET both in USA and the world in the 1980s.

NSFNET replaced ARPANET as the backbone network in USA, and connected to IPv4 networks in other continents; Asia, Europe and Latin America in late 1980s-1990s.

2.3 Global Internet, 1990s~

NSFNET and computer networks in other countries which are based on Internet Protocol (IPv4 and IPv6) became Internet as we know today.

Various organizations including standardization bodies, conferences, and other domain specific organizations were formed in the 20th and 21st centuries.

Major developments (commercial Internet, broadband, WWW, social media,..) were made in late 1980s~2000s.

3. Technology, Standardization and Conferences

3.1 Technology Research and Development

Universities and Research Institutes

3.2 Standardization

IEEE, IETF, ISO, ITU, W3C, Industry Consortia

3.3 Conferences

International Computer Communication Conference (ICCC), 1970s ~ 1990s

International Academic Networkshop (IANW), 1980s

INET, 1990s

SIGCOMM, 1980s ~ Present

Infocom, 1980s ~ Present

Interop, 1990s ~ Present

4. Activities: National, Regional and Global

Research and Education Networks

Regional Conferences

Network Operators' Groups

Computer Security Organizations; CERT/CSIRT

Commercial Internet Service Providers

WWW and Its Applications

Social Media Services (SMS) and Social Networking Service (SNS)

e-Commerce with e-Payment

Entertainment

Internet Governance

5. Users

5 billion Internet users in the world in 2020.

They form numerous user communities; nationally, regionally and globally.

How do we connect “the Last Billion Users” to the internet?

They are handicapped economically, geographically, and/or physiologically.

Does Low-orbital earth satellite Internet solve the last billion problem?

It may solve the geographically-handicapped case very well, but it may not solve the economically-handicapped case.

6. Public Sector

Governments

State governments play various roles depending on countries in addition to their traditional roles.

Public Institutions

In many countries, public institutions play additional roles to the state governments such as standardization, R&D,...

7. Commercial Sector

Telecommunications Service Providers

They tend to serve many aspects which are related to telecommunications and Internet-related services by now.

Commercial Internet

Additional commercial Internet service providers are increasingly becoming minor service providers.

On the other hand, social media are becoming dominant along the telecommunications service providers.

e-Commerce

e-Commerce along e-payment is becoming dominant commercial service providers around the world.

8. Human Network

How do we develop human networks and sustain them?

- Domestic human networks
- International human networks
- Interdisciplinary human networks
- Hand over human networks to next generations

9. Issues

- A- **What to do if you encounters critical issues before others (router, security,..)?**
 - B- How do we develop the next generation human resource?
 - C- How to handle reviews of ecosystems domestically and/or internationally?
 - D- Multistakeholder process for ecosystems
 - E- **External ecosystem (under Internet), vs Internal ecosystem**
 - F- **Evolution of ecosystem**; hard to change, openness, next generation,..
-
- Can we keep Asia as one of 3 major regions along North America and Europe?
 - How do we archive data, develop data centers, and handle data governance?
 - How do we handle advanced topics such as Internet AI?

10. Concluding Remarks

- Internet ecosystem were formed initially in the 20th century with USA taking the lead with ARPANET Project and NSFNET.
- The Internet grew more than anybody's anticipation.
- Asia, the late comer on the Internet compared with North America, but managed to keep up with North America.
- The Internet ecosystem has distinctive characteristics such as “winners take all”, and “don't fix it if it is working. These characteristics have both advantages and disadvantage. Since the Internet is global, we need to consider how to evolve the Internet ecosystem; globally and nationally.
- **As the digital ecosystems are being formed, the Internet ecosystem as the leading ecosystem needs to take a lead on the digital ecosystems.**

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Appendix Digital Ecosystems

Digital ecosystems are in their early formation stages.

AI ecosystem, security ecosystem and digital service ecosystem of the digital ecosystems may be very important along Internet ecosystem.

Other digital ecosystems such as data ecosystem and IoT ecosystem may be explored on their formations, too.

Multistakeholder models for digital ecosystems may be explored possibly based on the multistakeholder model of the Internet ecosystem.

Appendix South Korea

Research & Education Network - KREONET, KOREN

Domestic Conferences – KRNET, HSN, KCC,...

Network Operators' Group – N/A

Computer Security Organization – KISA

Internet Service Providers – KT, SKT, LG+,...

Web Applications – Naver, Kakao,...

e-commerce - (many)

Entertainment – Nexon, NCSoft, Netmarble,...

Internet Governance

Internet Exchange

Media – News, Video/TV,...

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