

# Broadband Networks

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# 1. Broadband Networks

Broadband Backbone Network  
Broadband Access  
Broadband Application

## 2. Current Status of Internet

### Internet Population (in million)

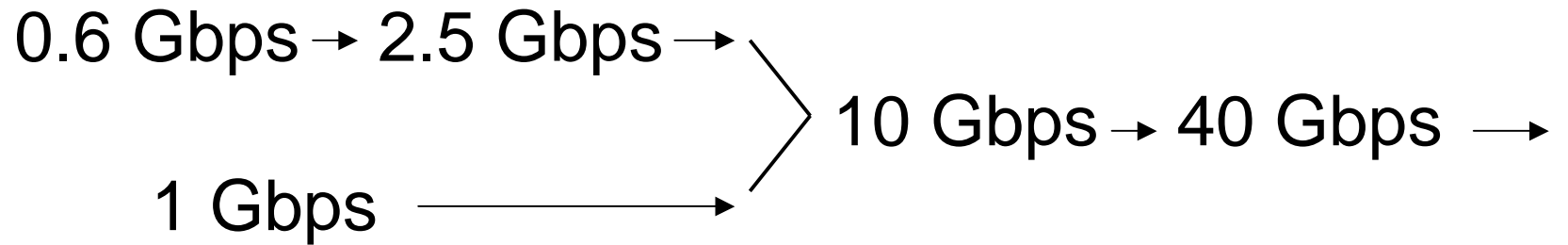
Asia	258
Europe	231
Canada & USA	222
Latin America	56
Middle East	17
Oceania	16
Africa	13

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Total	813
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(Oct. 2004, [www.internetworldstats.com](http://www.internetworldstats.com) )

### 3. Broadband Backbone Network- Bandwidth



# 4. Broadband Access

4.1 Wireline

4.2 Wireless

4.3 Broadband Subscribers per  
100 inhabitants

## 4.1 Wireline

- (1) Dialup ~ 64 Kbps
- (2) DSL/Cable 0.1 ~ 50 Mbps
  - Cable 1~10 Mbps(shared)
  - ADSL 1~10 Mbps(dedicated)
  - VDSL 20~50 Mbps or more(dedicated)
- (3) Ethernet 100 Mbps ~ 10 Gbps(dedicated)

## 4.2 Wireless

### (1) Wireless LAN

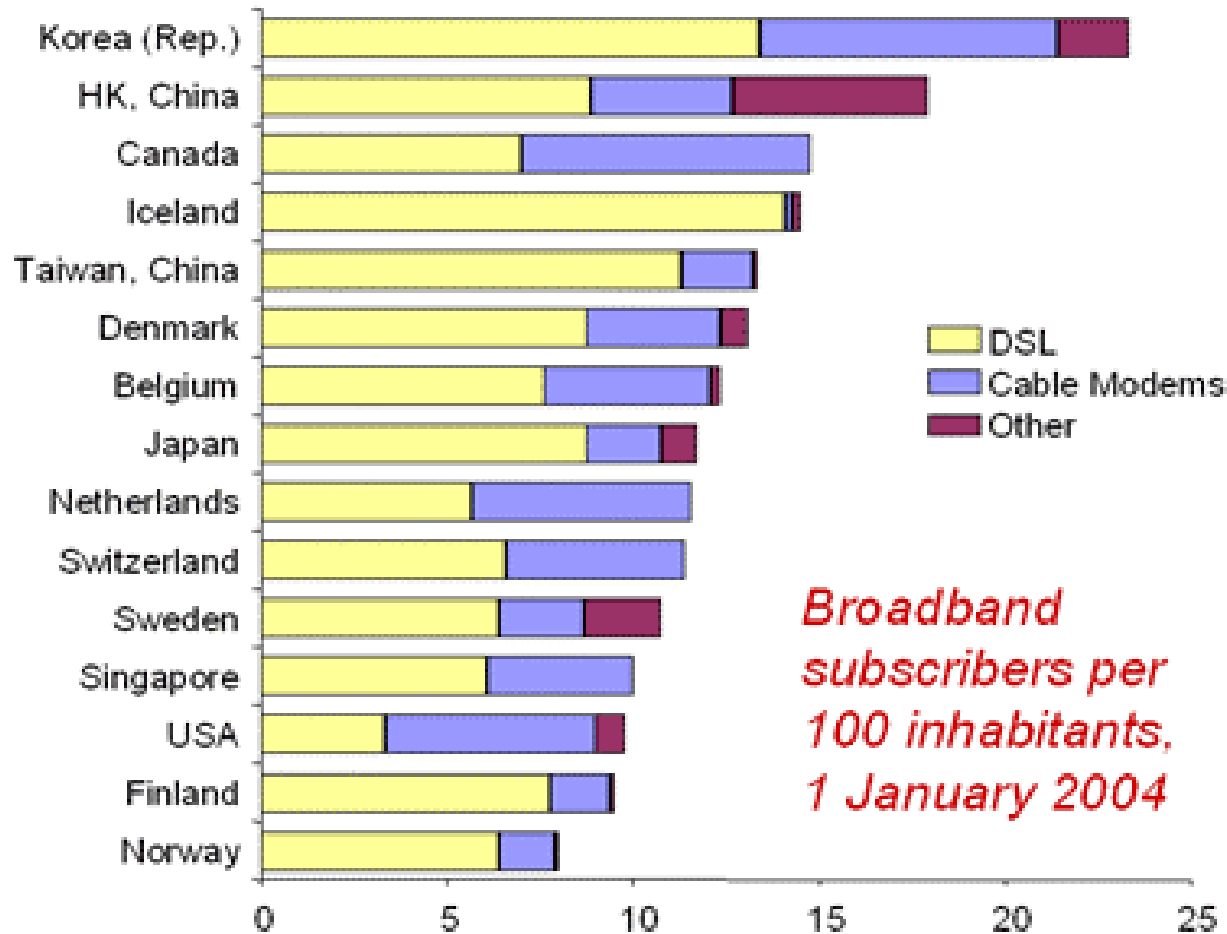
802.11b	11 Mbps(shared)
802.11a	54 Mbps(shared)
802.11g	54 Mbps(shared)
802.16	50 Mbps(shared)
802.20	2 Mbps with mobility(shared)

### (2) Mobile Phone

2.5~3G	0.1~2 Mbps (dedicated)
4G	20~50 Mbps (dedicated)



## 4.3 Broadband Subscribers per 100 inhabitants



*Broadband subscribers per 100 inhabitants, 1 January 2004*

Source : ITU Internet Report 2004

# 5. Broadband Applications

5.1 Classification

5.2 "Killer Application"

5.3 Case Study - Korea

5.4 Next Generation Broadband Applications

# 5.1 Classification

## (1) General Internet Access

- Browsing
- Messaging
- File Downloading
- Games

## (2) Audio and Video

- Audio Delivery
- Internet Telephony
- Video Delivery
- Video Conference

## (3) New Applications

- Peer-to-Peer Applications
- Distributed Work
- Distance Learning
- Home Content

## 5.2 "Killer Application"

All countries are looking for "KILLER APPLICATIONS" now.  
General consensus is multimedia, in particular video such as

Television

Movie

Video Conference

VoIP

## 5.3 Case Study - Korea

- (1) Killer Applications - First Wave
  - Heavy Internet users(always on)
  
- (2) Killer Applications – Second Wave
  - Adult content
  - Stock exchange(Day Trader)
  - Online game
  
- (3) Killer Applications - Third Wave
  - Broadband Portal
  - Education
  - Music
  - Movie
  - Television Program

## 5.4 Next Generation Broadband Applications

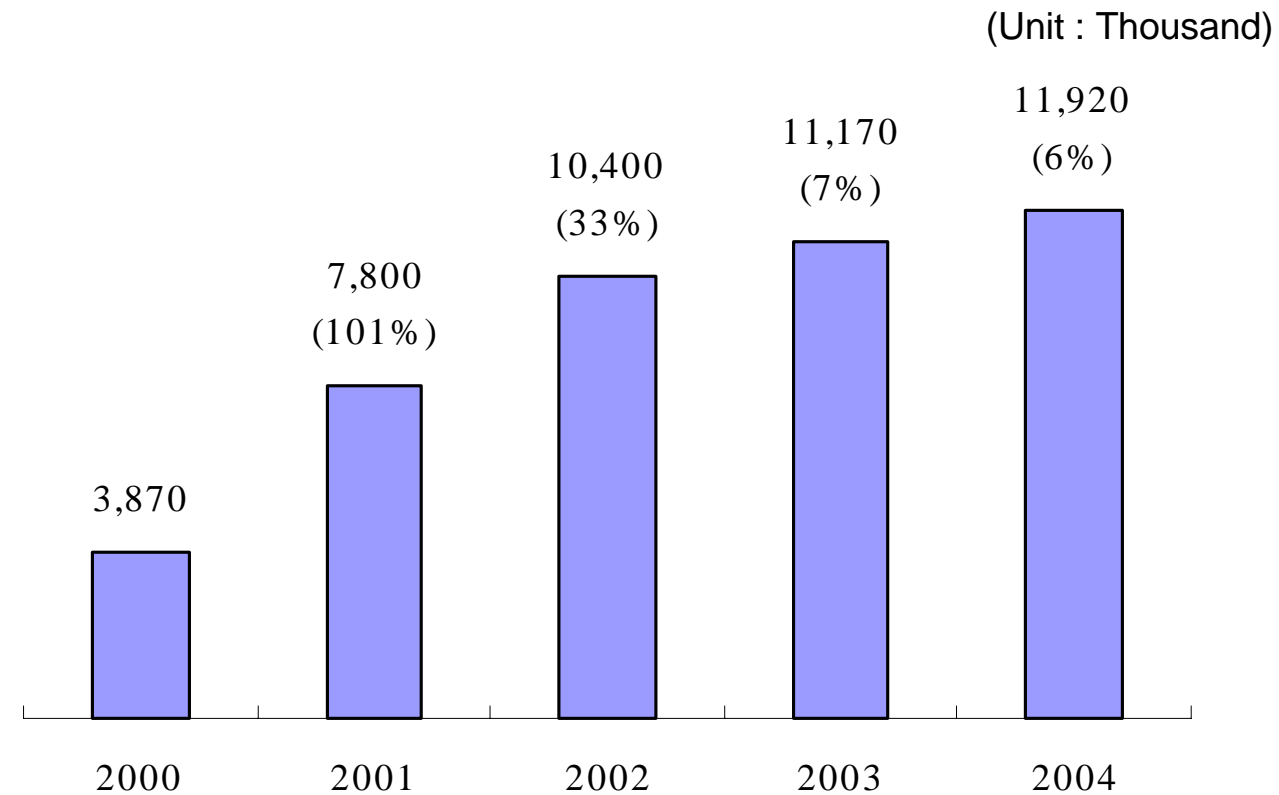
( or Why do we need **100~1,000 Mbps?** )

- (1) Higher Definition Video (HDV, HDTV)  
    Streaming  
    Down loading
  - (2) High Definition Video Conferencing and Class
  - (3) High Definition Video Education
  - (4) High Definition Online Game
  - (5) Bulk File Transfer
  - (6) P2P
- (more to come)

# 6. Country Report

## 6.1 Korea

### Broadband Subscription – Growth Rate



\* ( ): Growth Rate

# 6.1 Korea - continue

## (1) Broadband Is Fully Deployed

- 80% of household
- Dialup has become "horse carriage"
- Broadband is social infrastructure like telephone or automobile or television

## (2) Looking for Next Generation Broadband

- VDSL vs FTTH/FTTB(100 Mbps~)
- LAN(~FTTB) deployment at 10~15%

## (3) Side Effects

- Intrusion
- Virus

## (4) Mobile and Wireless

- Mobile Internet is taking off (2.5G)
- Major deployment of wireless LAN (802.11)
- Major deployment plan of wireless MAN (802.16 "Wi-Bro")



## 6.2 Japan

- (1) Fast Growth in 2002~2004.  
3 millions --> 8 millions (--> 15 millions in 2004)  
Tough price competition (~ \$20/month)
  
- (2) Looking for Killer Applications  
VoIP  
Video
  
- (3) Mobile Internet  
50% penetration  
2.5G/3G are taking off
  
- (4) FTTH in taking off  
2004 : 1 million  
2005 : 5 million (estimate)

## 6.3 Greater China

- (1) Internet is taking off in China  
90 millions in 2003(2nd after USA)  
Expected to take over USA in 2005~2006
- (2) Broadband is taking off in major cities.
- (3) Hong Kong and Taiwan are following Korean pattern  
with 10~20% penetration and taking off.

## 6.4 Singapore

- (1) Internet is well deployed.
- (2) Broadband penetration is around 10%.

## 6.5 South East Asia

DSL and/or Cable Modem are becoming popular.

# 7. What's Next?

## 7.1 Next Generation Broadband Access

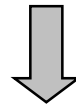
VDSL ( 50~100 Mbps)

FTTH/FTTB ( 100Mbps ~ 1 Gbps )

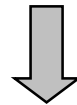
- Remark :
- Looking for “killer applications”  
Digital Video, Interactive Video, ...
  - Replacing wired telephone  
(and television ?)

## 7.2 Ubiquitous Network

“Broadbandization” of wireline and wireless networks



Integration of wireline and wireless networks



Networking everything

## 7.3 Wireless Network

### Integration or Natural Selection

Mobile Phone

Wireless LAN

Bluetooth

RFID

## 7.4 Universal Service

Is Broadband Access Universal Service?



## 8. Remark

- 1) Once a system is extensively developed such as dialup in USA and DSL in Korea. we may need very big inertia to migrate to another system.
- 2) Is the broadband Internet (Northeast) Asian phenomenon?
- 3) What is the role of Wireless Broadband Access such as Wi-Fi and Wi-Max?

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# Appendix : Average Peak Traffic

Japan ~0.5 Tbps

Korea ~1 Tbps

USA ~1 Tbps

Remark: Average peak traffic is typically measured as the average of peak traffic of 10~60 minutes.

Remark: The peak traffic could be observed at ISP as in the case of Japan, which includes the end-user traffic and ISP-ISP traffic.

Remark: Residential broadband traffic is 2/3 in Japan and Korea, but 1/2 in USA.

Remark: Growth rates in Japan and Korea are 100% per year.  
Growth rate in USA is 50~60% per year.

Remark: The total traffic(day, week, or month) may be better indication.  
This could be done at the end-users or at ISPs.

Remark: The total traffic per capita per month is

4~5 GBytes in Hong Kong and Korea

1 GBytes in USA