

Broadband Networks in Asia

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Kilnam Chon
KAIST

<http://cosmos.kaist.ac.kr>

***Broadband Internet is Asian Phenomenon
(So is Wireless Internet)***

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1. Broadband Networks

Broadband Backbone Network
Broadband Access
Broadband Application

2. Current Status of Internet

2.1 Population (in million)

North America	181
Europe	171
Asia	157
Latin America	25
Middle East	5
Africa	4

[Total 544]

(Feb. 2002. www.nua.ie)

2.2 Wireless Internet Population (in million)

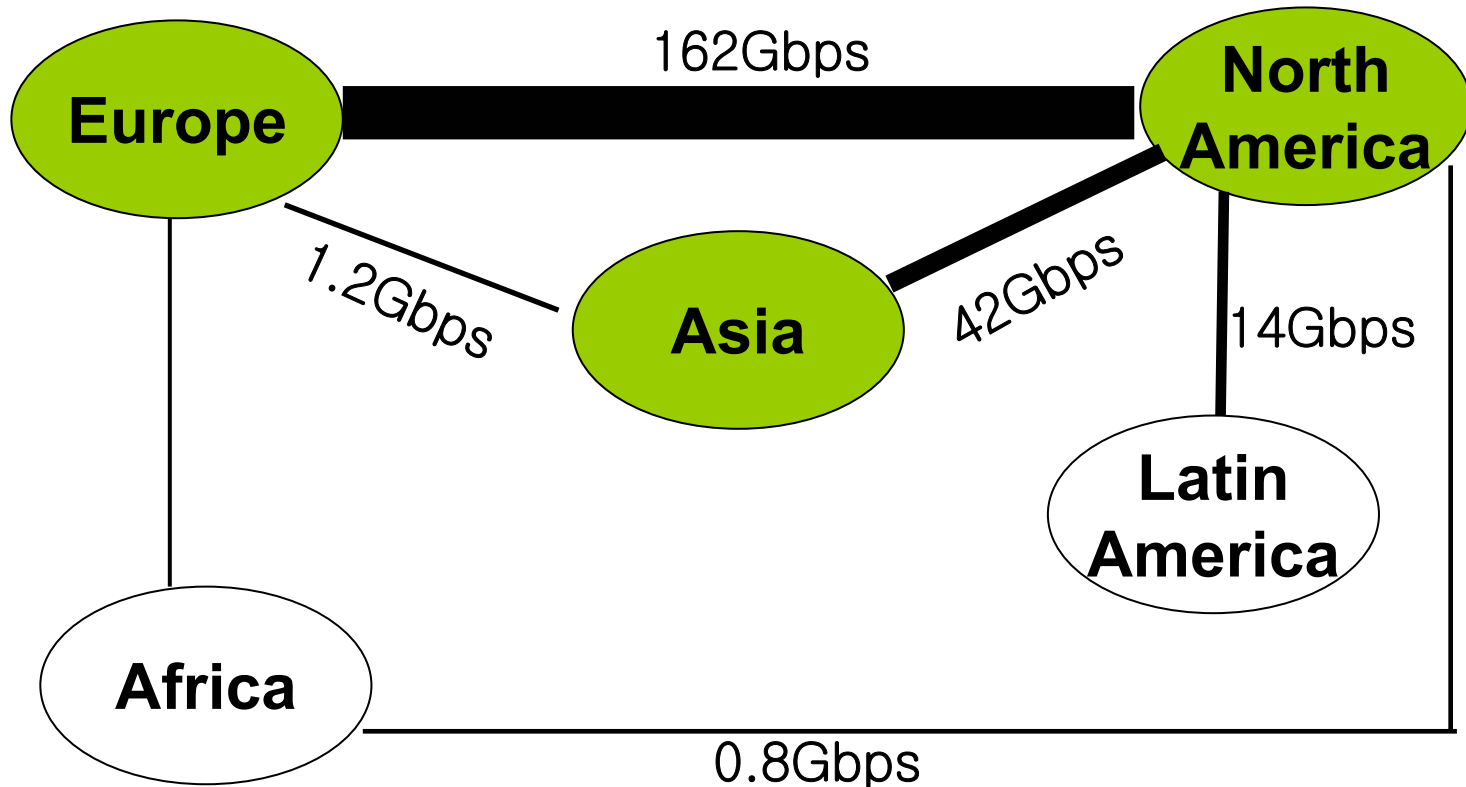
Asia	30
Europe	7
North America	2
Latin America	0.1

[Total 39]

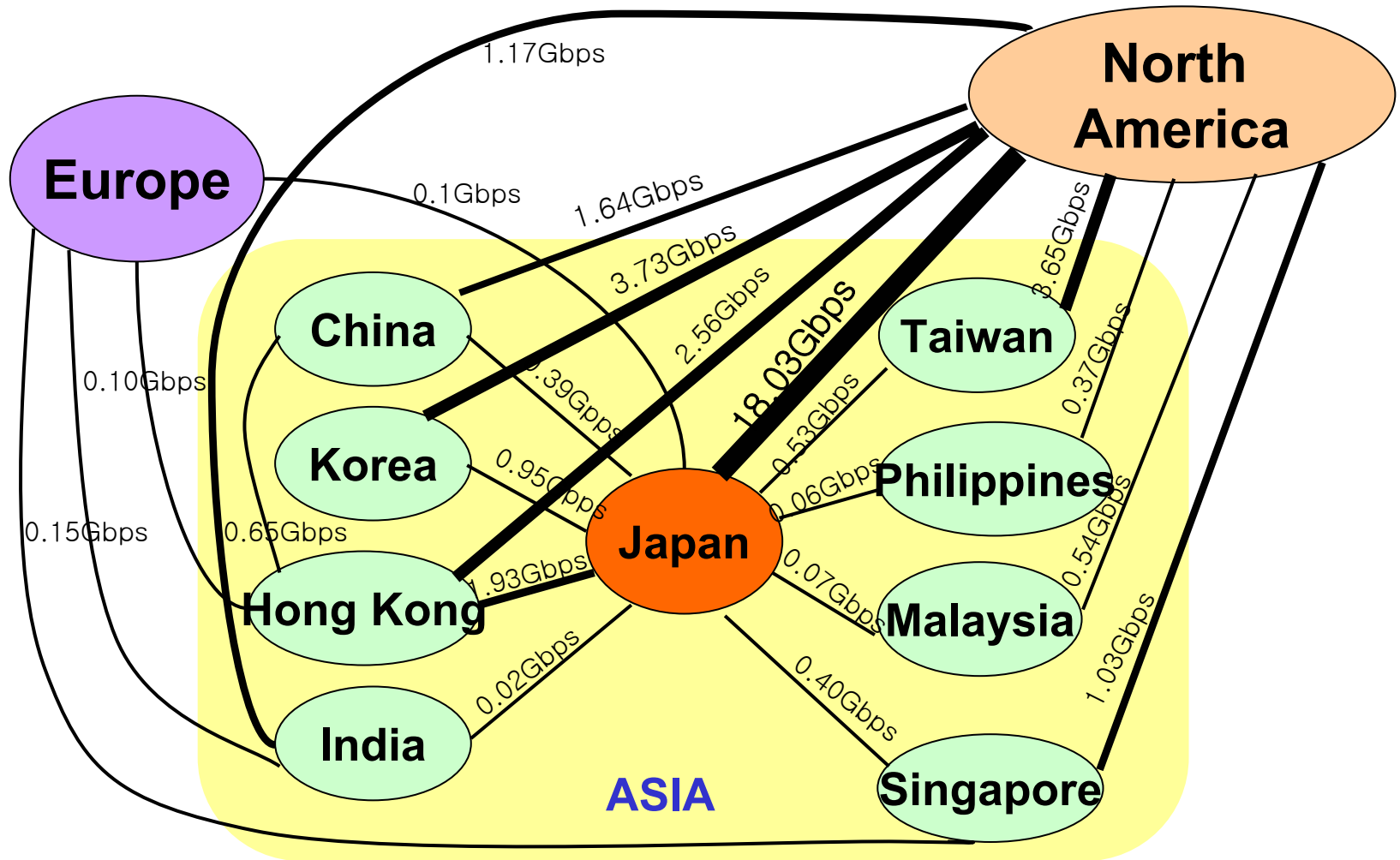
(Dec. 2000. www.nua.ie)

3. International Internet Bandwidth

3.1 Intercontinental Internet Bandwidth



3.2 International Bandwidth for Asian Countries



Telegeography 2001

4. Broadband Backbone Network

4.1 Bandwidth

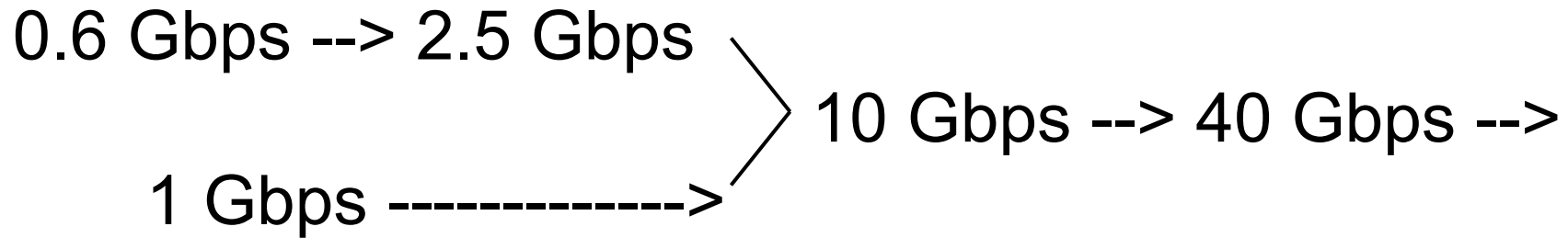
4.2 Global Research & Education Network

4.3 Asia-Pacific Advanced Network(APAN)

4.4 China/CERNET

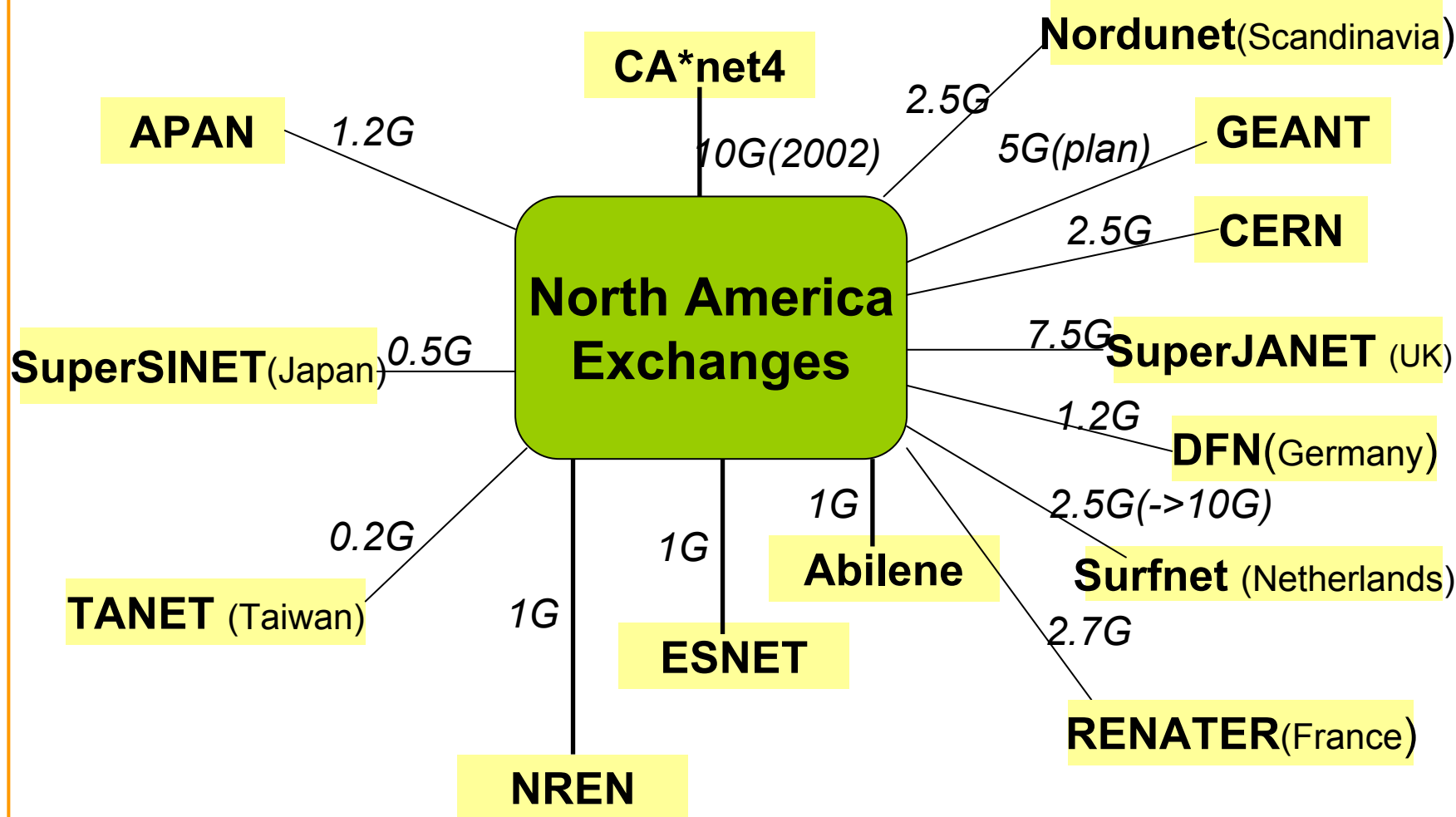
4.5 Japan/SuperSINET

4.1 Bandwidth

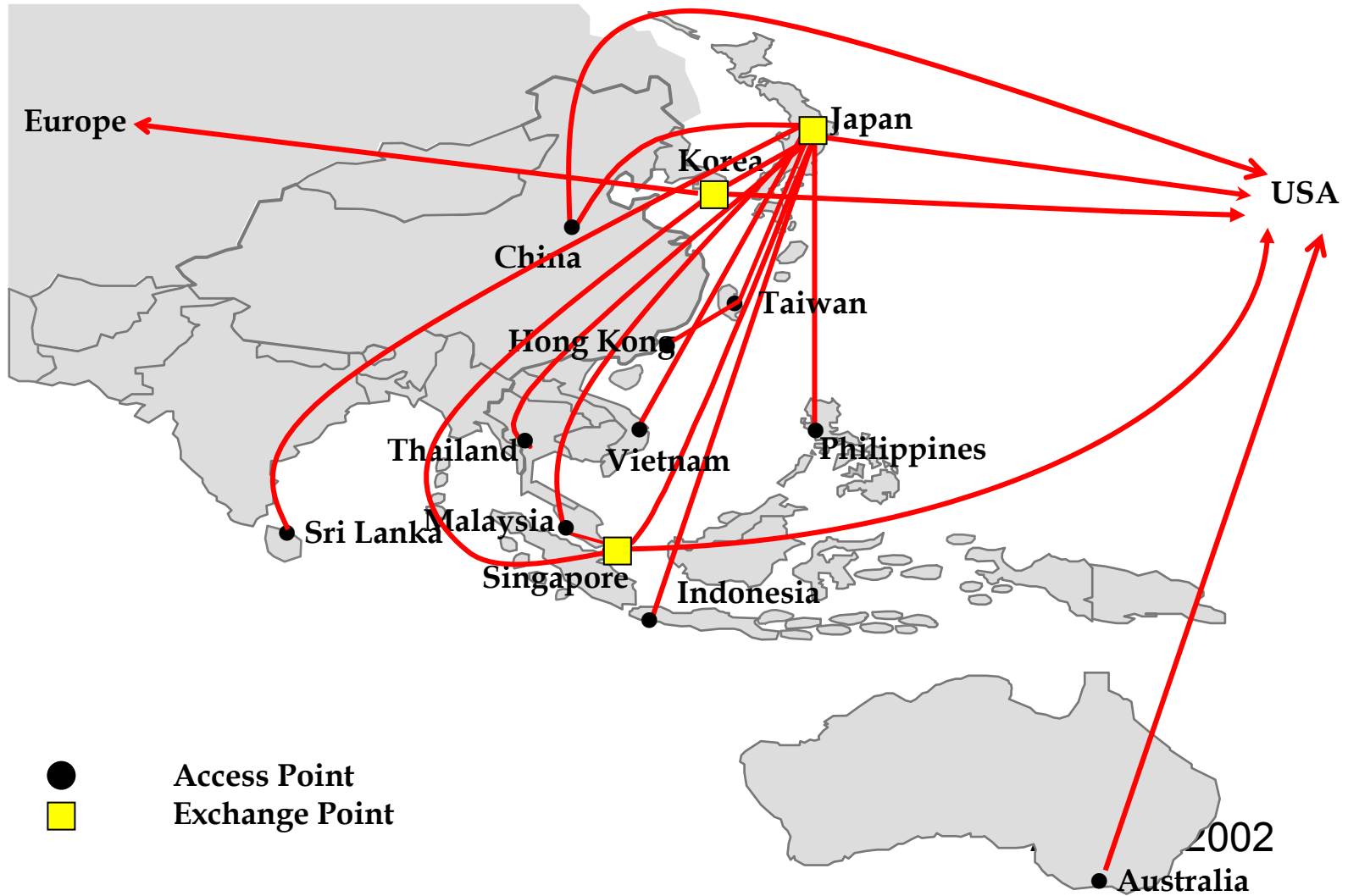


Remark: Lambda Networking
Optical Internet

4.2 Global Research and Education Network Interconnection

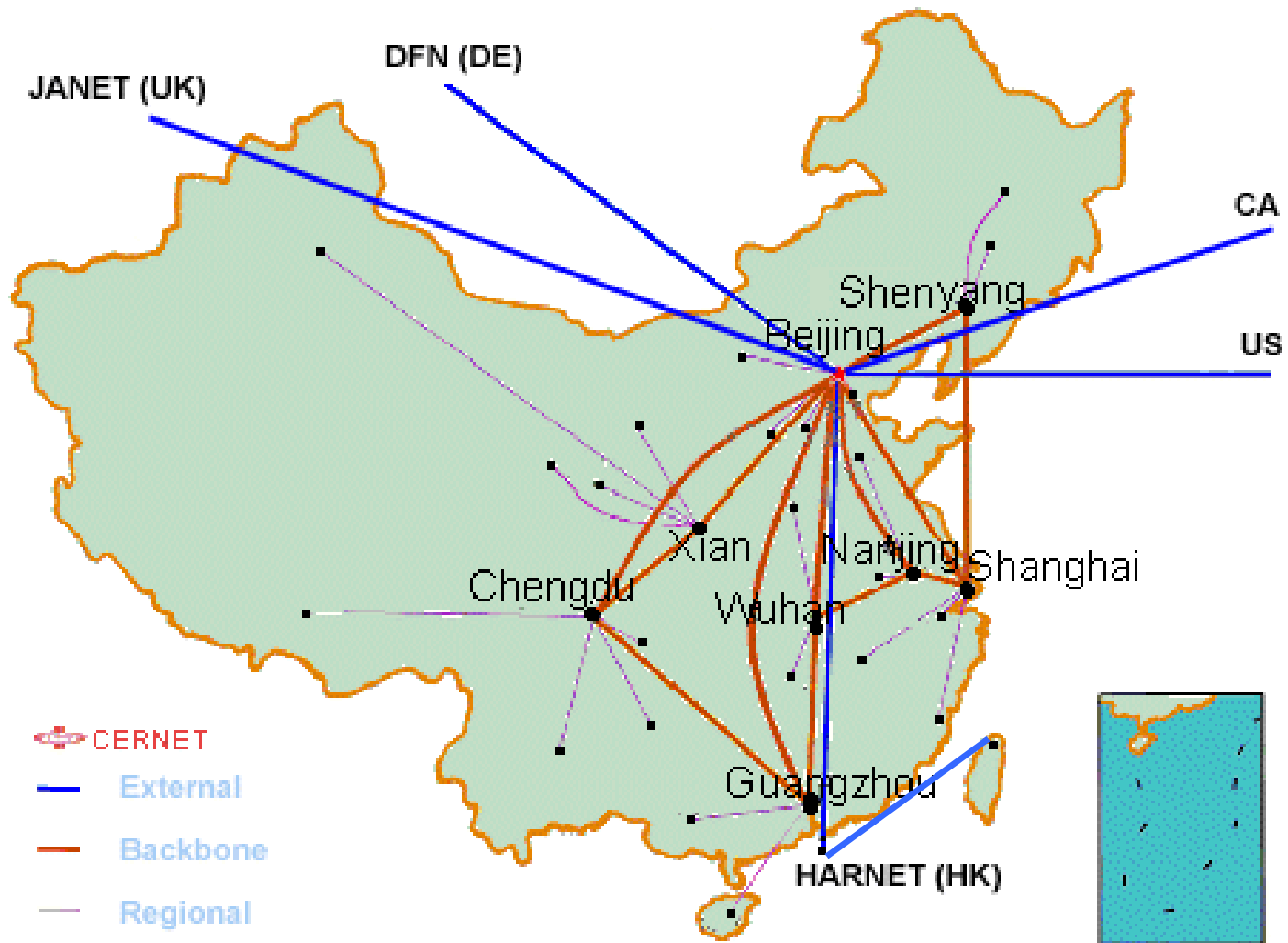


4.3 Asia-Pacific Advanced



● Access Point
■ Exchange Point

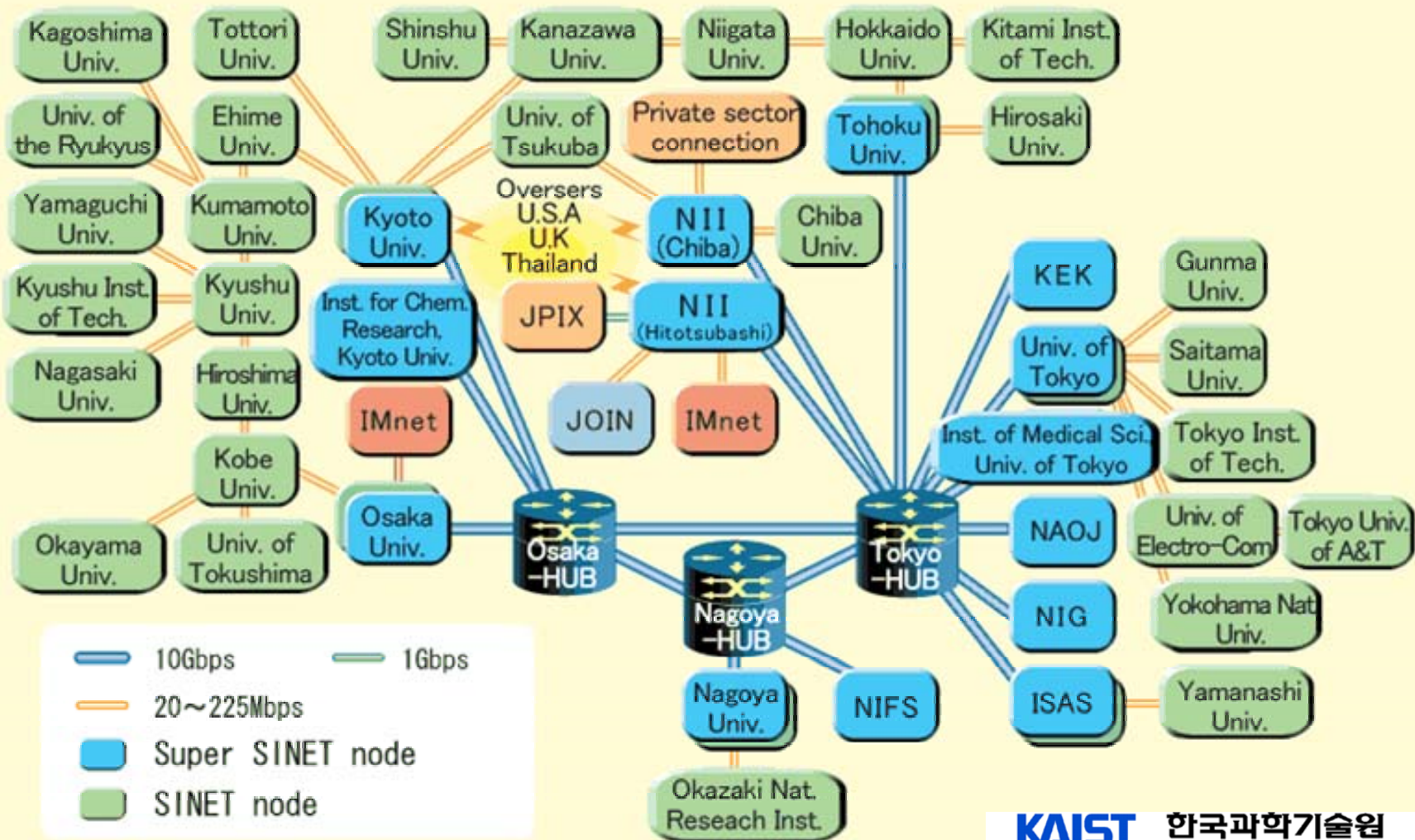
4.4 CERNET/China



4.5 SuperSINET/Japan

2002/04

Science Information Network circuit composition figure (Super SINET/SINET)



5. Broadband Access

5.1 Wireline

5.2 Wireless

5.3 Broadband Access(2001)

5.4 Broadband Access(2002 Projection)

5.5 Top 30 Hub Cities

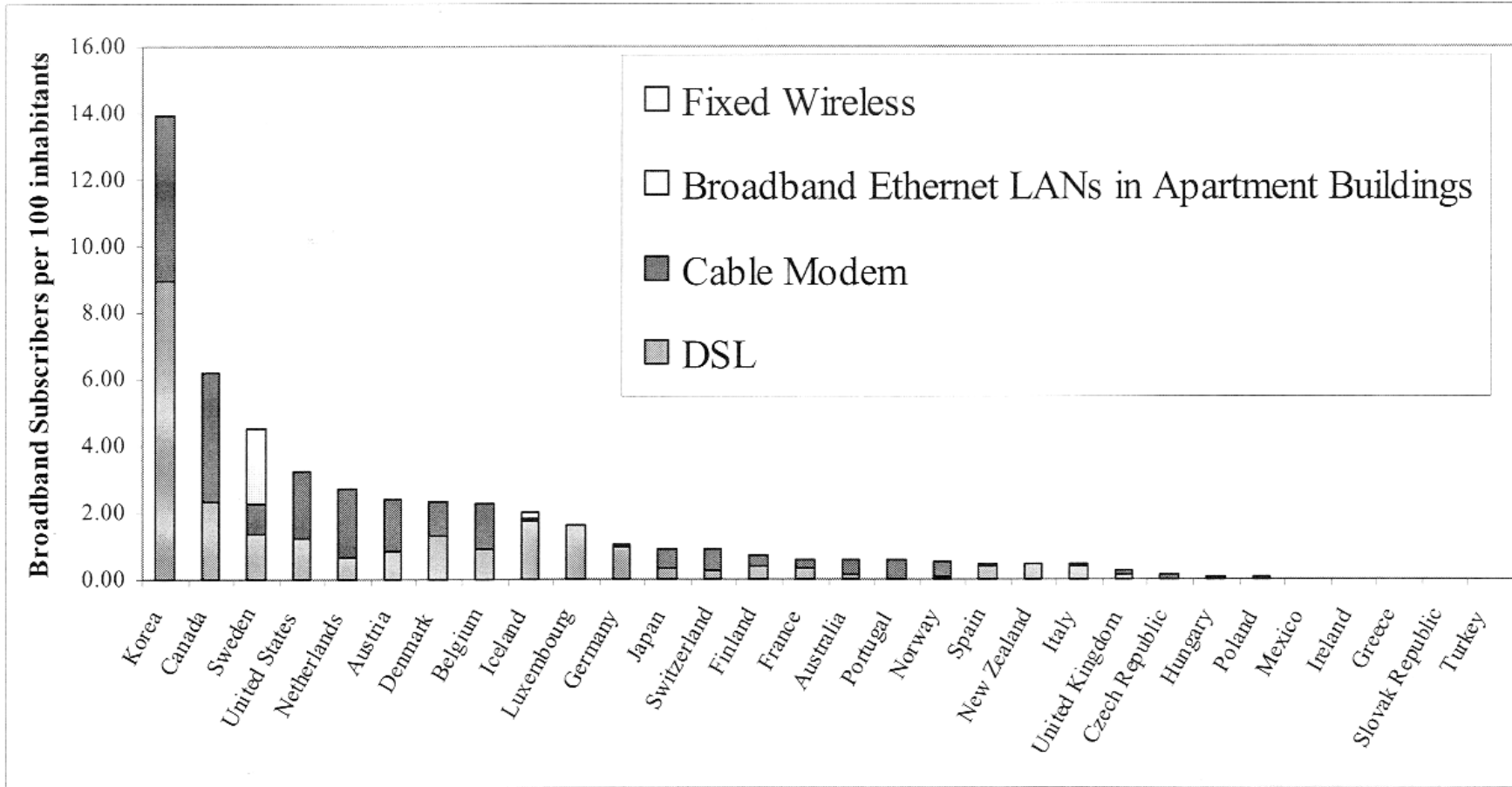
5.1 Wireline

- (1) Dialup ~ 64 Kbps
- (2) DSL/Cable 0.1 ~ 40 Mbps
 - Cable 1~10 Mbps(shared)
 - ADSL 1~8 Mbps(dedicated)
 - VDSL 10~40 Mbps(dedicated)
- (3) Ethernet 100 Mbps ~ 10 Gbps(dedicated)

5.2 Wireless

(1) Wireless LAN	11 Mbps(shared) 54 Mbps(shared)
(2) 2.5~3G Mobile Phone	0.1~2 Mbps
4G Mobile Phone	20~50 Mbps

5.3 Broadband Access:



Source: OECD

5.4 Broadband Access: Population (December 2002 Projection)

Country		Penetration
Korea	10 million	22%
Hong Kong	0.8 milion	11%
Singapore	0.8 milion	11%
Taiwan	2.5 million	11%
Japan	10 million	8%
Canada	2.5 million	8%
USA	15 million	6%

Remark:

China is catching up, in particular among big cities.

Korea, Canada and Sweden are leading in LAN(100 Mbps).

Sweden and Denmark are similar to Canada.

5.5 Top 30 Hub Cities in Internet Bandwidth

	City	International Bandwidth(Mbps)		City	International Bandwidth(Mbps)
1	New York	149,834.5	16	Seoul	3,734.1
2	London	85,518.7	17	Hong Kong	2,694.8
3	Amsterdam	24,479.6	18	Madrid	2,488.0
4	Paris	22,551.8	19	Buenos Aires	2,285.7
5	San Francisco	20,813.6	20	Mexico City	2,166.0
6	Tokyo	16,745.6	21	Dallas	1,546.0
7	Washington D.C	13,261.2	22	Sacrament	1,409.0
8	Miami	11,912.4	23	Stockholm	1,397.0
9	Los Angeles	11,227.0	24	Osaka	1,395.0
10	Copenhagen	10,417.0	25	Milan	1,293.5
11	Frankfurt	9,351.5	26	Singapore	1,276.0
12	Seattle	5,891.7	27	Perth	1,092.0
13	Sydney	4,389.0	28	Monterey	1,077.0
14	San Paulo	4,316.5	29	Auckland	1,020.0
15	Taipei	3,738.4	30	Rio de janeiro	981.0

Source: TeleGeography;Packet Geography2002

6. Broadband Applications

6.1 Classification

6.2 "Killer Application"

6.3 Case Study - Korea

6.4 Next Generation Broadband Applications

6.1 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

6.2 "Killer Application"

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

Television

Movie

Video Conference

6.3 Case Study - Korea

(1) Killer Applications - First Wave

- Heavy Internet users(always on)
- Adult content
- Stock exchange(Day Trader)
- Online game

(2) Killer Applications - Second Wave

- Broadband Portal
- Education
- Music
- Movie
- Television Program

6.4 Next Generation Broadband Applications

(or Why do we need **Gigabit Ethernet?**)

- Higher Definition video
Streaming
Down loading
- High Definition Video Conferencing and Class
- High Definition Online Game
- Bulk File Transfer
- (more to come)

7. Current Status of Broadband Access

- Broadband access with always-on capability becomes social infrastructure in Korea with other Asian countries following.
(like telephone, and television)
- Virus and intrusion become serious social problems since general users with always-on connection are not ready for these problems.

8. Country Report

8.1 Korea

8.2 Japan

8.3 Greater China

8.4 Singapore

8.1 Korea

(1) Broadband Is Fully Deployed

- 60% of household
- Dialup has become "horse carriage"
- Broadband become social infrastructure like telephone or automobile or television

(2) Looking for Next Generation Broadband

- VDSL(40 Mbps) vs FTTH(100 Mbps~)
- LAN(~FTTH) deployment at 15%

(3) Side Effects

- Intrusion
- Virus

(4) Mobile and Wireless

- Mobile Internet is taking off
- Major deployment of wireless LAN

8.2 Japan

- (1) Fastest Growth in 2002
3 millions --> 10 millions
Tough price competition

- (2) Looking for Killer Applications
VoIP
Video

- (3) Mobile Internet
50% penetration
2.5G/3G are taking off

8.3 Greater China

(1) Internet is Taking Off in China

57 millions in 2002(2nd after USA)

Expected to take over USA in 2005

Beijing and Shanghai are similar to Korea and Japan

(2) Hong Kong and Taiwan Are Following Korean Pattern

~10% penetration and taking off

8.4 Singapore

(1) Internet Is Fully Deployed

(2) Broadband Penetration Is Around 10%

9. What's Next?

9.1 Next Generation Broadband Access

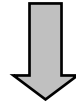
VDSL (~ 40Mbps)

FTTH (100Mbps ~ 1 Gbps)

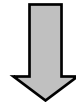
Remark : Looking for “killer applications”
Digital Video, Interactive Video, ...

9.2 Ubiquitous

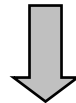
“Broadbandization” of wireline and wireless networks



Integration of wireline and wireless networks



Networking everything



Ubiquitous Network

9.3 Wireless Network: Integration or Natural Selection

Mobile Phone
Wireless LAN
Bluetooth

9.4 Lambda Networking

For backbone networks first,
then broadband access.

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