

*Stanford*

# Asia-Pacific Advanced Network Consortium (APAN)

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<http://www.apan.net>

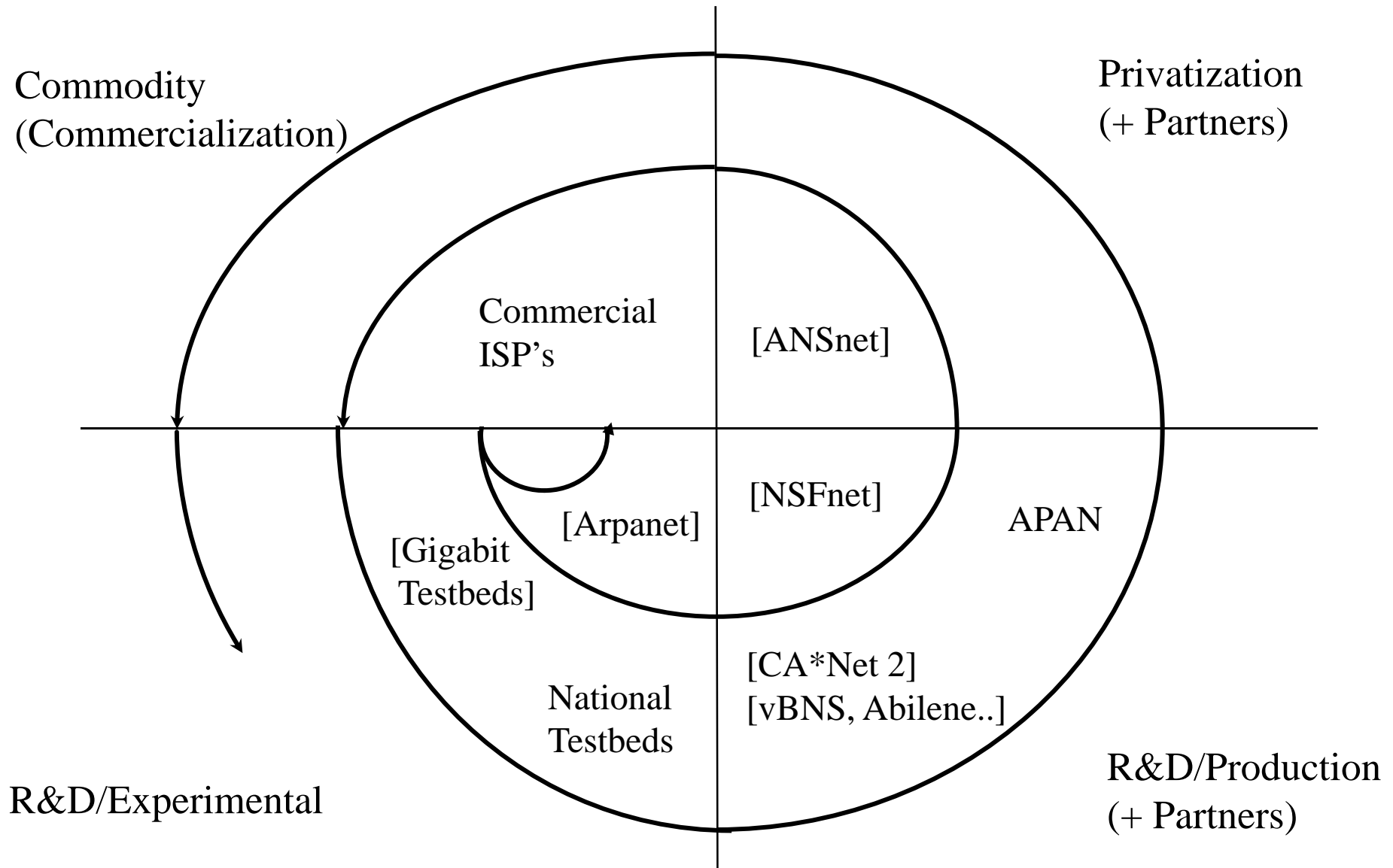
# 1. Objective

Advanced Networking for Asia-Pacific

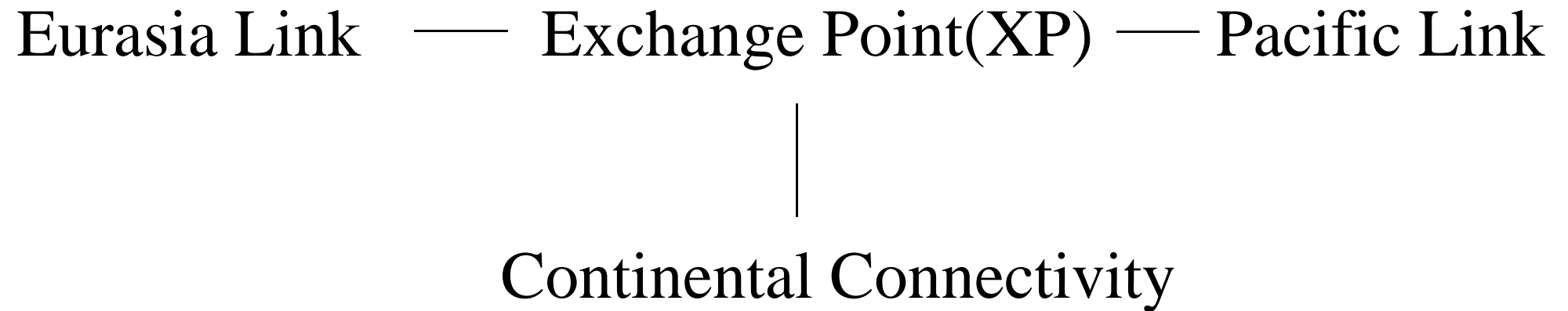
Research & Development for Advanced Applications and  
Services

Advanced Networking Environment for Research Community  
International Collaboration

## 2. Network Evolution : Spiral



### 3. Topology



## **4. Usage**

Interconnection of Testbeds and Advanced Networks

Networking for Research Community

## 5. Bandwidth

Phase 0: 1996

Preparation

Phase 1: 1997 - 1999

45 Mbps or more for primary links

Phase 2: 2000 - 2002

Higher speeds

(155 Mbps or more for primary links)

## 6. Activities

Application	User Community	
Middle ware	Video, Archive, QoS, ....	
Network	Advanced Internet	Commodity Internet

(Int'l Link, Domestic Network, Campus Network)

# **6.1 High Speed Networking**

Exchange Point(XP) Improvement

Exchange Point(XP) Interconnect

GigaPoP Development



## **6.2 Intercontinental Link**

High speed connections

Performance tuning

delay/throughput

caching/replication

## **6.3 Continental Connectivity**

Exchange Point(XP) Interconnection

Connectivity Program

APII, AI3, ...

# 6.4 Technology & Engineering Collaboration

Network Engineering - Operation

Measurement, Multicasting, IPv6, QoS, ....

Network Technology - R&D

IPv6, Measurement, Multicast, QoS, Satellite

Middleware Technology - R&D

Cache, Multimedia, Security, Television

## **6.5 Virtual User Community Development**

Agriculture

BioInformatics

Digital Library

Education

Grid

Manufacturing

Medical Informatics

Monitoring

## **6.6 Human Resource Development**

2 Meetings Per Year

Workshop

Working Group Meetings

Committee Meetings

## 7. Schedule

1996. 3.28	Tsukuba	Ad hoc Meeting(during APEC Symposium)
1996. 5.23-24		7 Preliminary Meetings and Workshops
1997. 3.13-21		North American Network Visits
6.2-3	Tokyo	First APAN Committee & WG Meetings
8.14-19		European Network Visits
10.20-21	Singapore	Second APAN Meetings
1998. 3.2-5	Tsukuba	Third APAN Meetings
7.1-3	Seoul	Fourth APAN Meetings
1999. 2.19-21	Osaka	Fifth APAN Meetings
9.21-24	Canberra	Sixth APAN Meetings
2000. 2.15-17	Tsukuba	Seventh APAN Meetings
8.2?-26	Beijing	Eighth APAN Meetings
2001. 2	Kuala Lumpur	Ninth APAN Meetings

## 8. Finance

Link: paid by link owners

Exchange/Access Points : supported by relevant organizations

Meetings : supported by host organizations

## 9. Members

Primary Member : Network with International high performance link

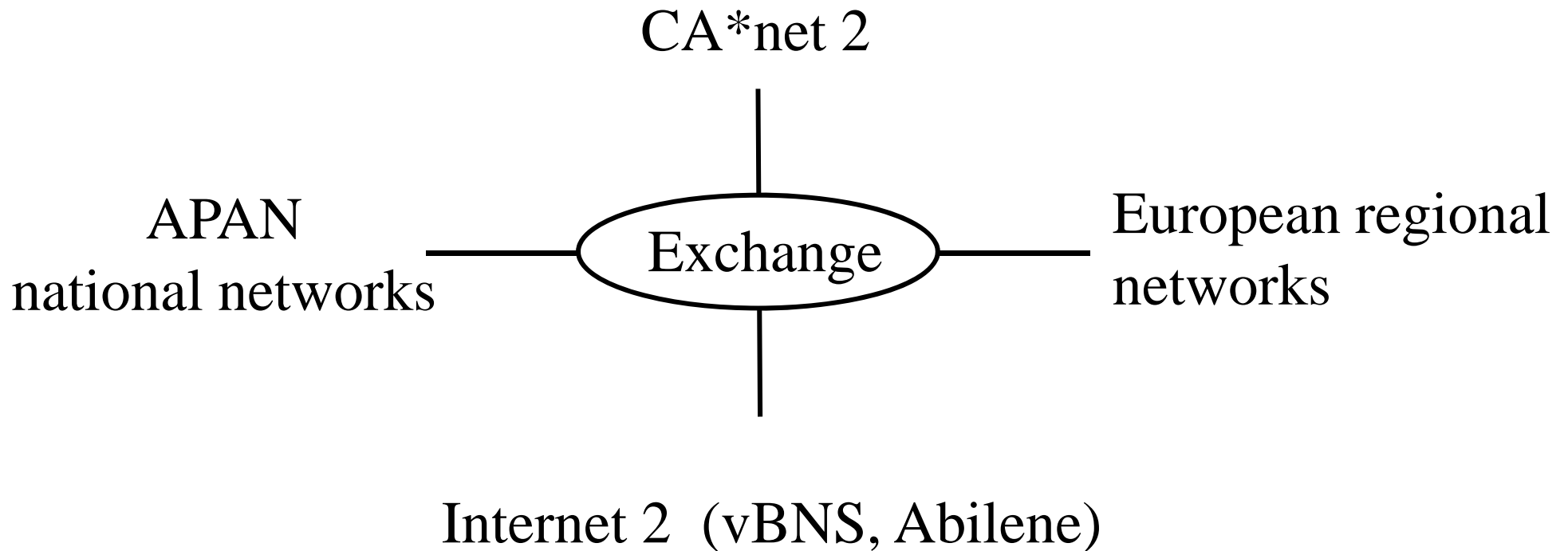
Associate Member : Network without International high performance link

Liaison Member : Regional Advanced Network

Affiliate Member : User Organizations



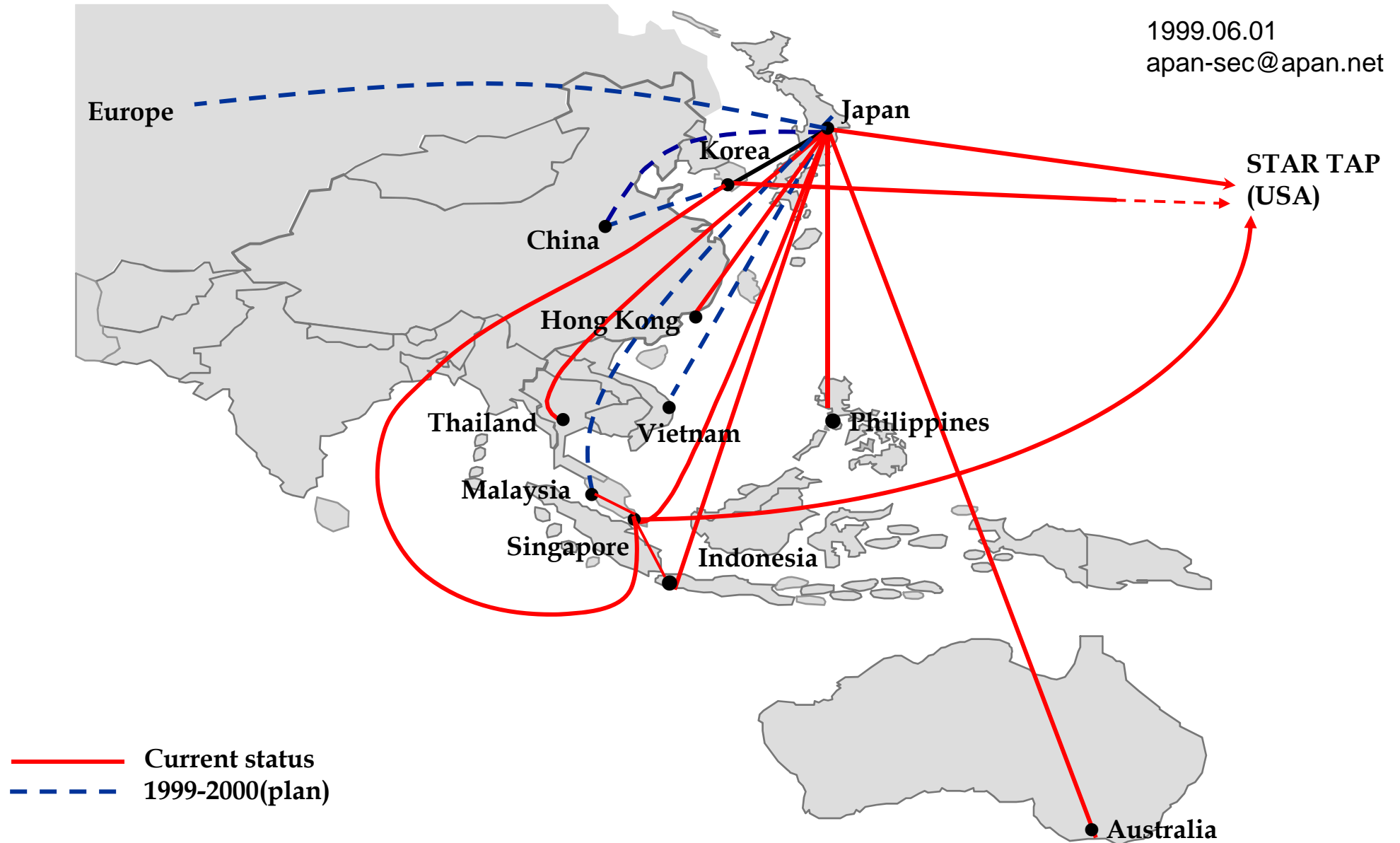
# 10. Global Advanced Research Networks



# Appendix A: Bibliography

AI3	<a href="http://www.ai3.net">www.ai3.net</a>
APAN	<a href="http://www.apan.net">www.apan.net</a>
APNG	<a href="http://www.apng.org">www.apng.org</a>
CA*Net2	<a href="http://www.canarie.ca/c2">www.canarie.ca/c2</a>
DANTE(TEN-155)	<a href="http://www.dante.net">www.dante.net</a>
GIBN	<a href="http://homer.ic.gc.ca/G7">homer.ic.gc.ca/G7</a>
Internet2	<a href="http://www.internet2.edu">www.internet2.edu</a>
Next Generation Internet	<a href="http://www.ngi.gov">www.ngi.gov</a> , <a href="http://www.ccic.gov">www.ccic.gov</a>
STAR TAP	<a href="http://www.startap.net">www.startap.net</a>
vBNS	<a href="http://www.vbns.net">www.vbns.net</a>
Abilene	<a href="http://www.ucaid.edu/abilene">www.ucaid.edu/abilene</a>

# Appendix B APAN Network Topology



# Appendix B1 : APAN Link Information

1999.10.1  
apan-sec

<i>Countries</i>	<i>Network</i>	<i>Bandwidth(Mbps)</i>	<i>Availability</i>	<i>AUP</i>
JP-AU	RWCP-ACSys	1.5	Now	Research & Education
JP-CN	AI3(CSTNET)	1.5	1999-2000	Research & Education
	SINET(CERNET)	1.5	1999-2000	Research & Education
JP-HK	AI3(HKUST)	1.5	Now	Research & Education
JP-ID	AI3(ITB)	1.5	Now	Research & Education
JP-KR	APII	8	Now	APII Project
JP-MY	AI3(USM)	1.5	1999-2000	Research & Education
JP-LK	AI3(UC)	1.5	2000(?)	Research & Education
JP-PH	MAFFIN(PHNET)	0.75	Now	Research & Education
	AI3(SICU)	1.5	2000(?)	Research & Education
JP-SG	APII	2	Now	APII Project
	AI3	1.5	1999-2000	Research & Education
JP-TH	AI3(AIT)	1.5	Now	Research & Education
	SINET(NECTEC)	2	Now	Research & Education
JP-VN	AI3(IIT)	1.5	2000(?)	Research & Education
JP-US	IMNet-HPIIS	73	Now	High Performance Research
KR-SG	APII	2	1999	APII Project
KR-US	Kornet	2	Now	Cache
	Pubnet	20	Now	Non-commercial
MY-SG	TEMAN (SingaREN)	2	Now	Research
SG-US	SingaREN	14	Now	Research & Education

# Appendix C: Working Groups

## Technology

Cache

IPv6

Network Storage

Multicast

Measurement

Multimedia

Satellite Internet

Television

QoS

## User Community

Agriculture

BioInformatics

Digital Library

Earth Monitoring

Education

Grid

Medical Informatics

Manufacturing

# Appendix D: Committees and Centers

APAN Member Committee

Network Operation Center

Tokyo XP

Seoul XP

Singapore XP

Engineering Teams

IPv6

Measurement

Multicast

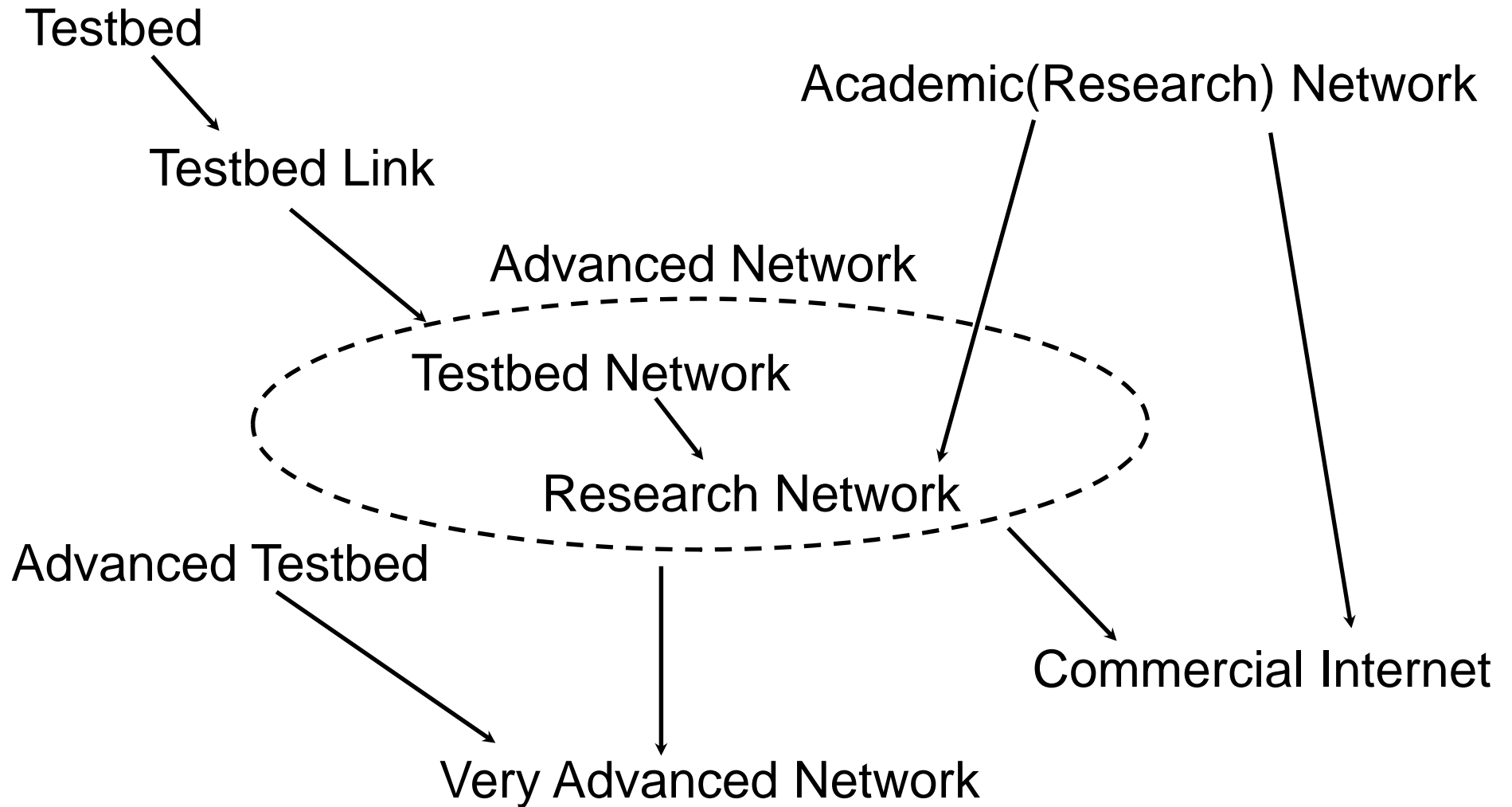
QBone

Resource Allocation/User Support Committee

Archive Coordination Committee

Travel Support Committee

# Appendix E: Relationship between APAN, Testbed and the Internet



# Appendix F: Members

1999.08.01  
apan-sec

## Primary Member

Australia: ACSys

Japan: APAN-JP Consortium

APII/CRL, IMNet/JST, KDD, MAFFIN/MAFF  
RWCP/ETL, SINET/NACISIS  
AI3/WIDE

Korea: APAN-KR Consortium

Singapore: SINGAREN

USA: Indiana University/HPIIS

## Liaison Member

Canada: CANARIE

Europe: DANTE

## Associate Member

Malaysia: TEMAN

China: CERNET

## Affiliate Member

CIGRA



# Appendix G: APAN Organization and People

APAN Committee Chair	Kilnam Chon (kr)
Deputy Chair	Shigeki Goto(jp)
APAN Secretariat Director	Yong Jin Park(kr)
Network Operation Center Director (including Engineering Teams)	Kazunori Konishi (jp)
Technology Area Director	Shigeki Goto (jp)
Deputy Director	Chul-Hee Kang (kr)
User Community Area Director	Markus Buchhorn(au)
Deputy Director	Jianping Wu(cn)
	Akria Mizushima(jp)

# **Appendix H: Sample Applications**

Agriculture / Earth Monitoring

Bioinformatics

High Energy Physics

Space Science

Television

# **Appendix H1: Agriculture/Earth Monitoring**

Agriculture Database Access

Weather Data Access / Exchange

Earth Monitoring (Wild Fire, .... )

## **Appendix H2 : BioInformatics**

Collaboration among BioInformatics community.

Use APAN and commodity Internet .

Formed APBioNet with cooperation of counterparts in USA and Europe.

# Appendix H3 : High Energy physics

APAN ——— STAR TAP ——— ESNET

Collaboration among high energy physics community

Typical usage of

video conferencing

exchange of image and other data

remote access of computers

Sample collaboration projects:

KAIST - Princeton University

Tokyo University - Princeton University

May expand to include Europe

# Appendix H4 : Space Science



Collaboration among space science community.

Typical project members are

NASA and its project partners in USA.

Space projects in Japan.

# **Appendix H5 : Television**

Digital Video (45 Mbps)

MPEG 2 (6 Mbps)

MPEG 1 (1.5 Mbps)

# **Appendix I :**

## **Internet for Science and Technology Community in Korea**



# I1. History

1982 SDN, First Internet in Korea

1987 First IP Connection to the Internet

1990s 3 Non-Commercial Networks

KREN by Ministry of Education

KREONET by Ministry of Science and Technology

Pubnet by Ministry of Information and Communications

1995~ Advanced Testbed Network

Around 35 universities and research laboratories

155 Mbps access bandwidth

## **I2. APAN-KR Network(KORAN)**

1997~ KORAN, part of Advanced Testbed Network

8 universities and research laboratories

KAIST, ICU, ETRI, Chungnam U.

SNU, Hanyang, Korea U., Korea Telecomm

International links to Japan, Singapore and USA

Coordinated by KRIA, the academic-industrial consortium

# I3. User Community

University

Access to KREN

Public Research Laboratories

Access to Pubnet and KREONET

Other Non-Profit Organizations

Access to Pubnet

Private Research Laboratories

Access to commercial Internet and/or KREONET

K12

Access to Pubnet

Remark: All non-profit organizations are eligible for discount on the access link.

# **I4. Government Policy for Science and Technology Community Networking**

"Information Superhighway Program", 1994 ~

Non-commercial backbone network development(Pubnet)

Discount on the access link for non-profit organizations

Subsidy to education community

Advance technology development including Advanced

Testbed Network