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**INDONESIA RESEARCH EDUCATION
NETWORK - PAST, PRESENT, & THE FUTURE**

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RESEARCH EDUCATION
NETWORK IN INDONESIA

PAST & PRESENT

RESEARCH EDUCATION NETWORK AS INTERNET PIONEER IN INDONESIA

- ▶ Indonesia research/education community abroad is using the Internet as collaboration platform
- ▶ They need Internet to collaborate with community in Indonesia
- ▶ But at that time, communication channel is expensive
 - ▶ ISP Dial to the international number is very expensive
 - ▶ So they try to find the technology to enable Indonesian to connect to the Internet
 - ▶ Amateur Radio community has TCP/IP connection over AX.25

AMATEUR PACKET RADIO NETWORK - 1994

- ▶ PC-AT 286/386 w/ 40MB Harddisk
- ▶ DOS 5.0 w/ KA9Q NOS TCP/IP stack
- ▶ TCP/IP over AX.25
- ▶ 1200 bps AFSK & PSK, 9600 bps FSK
- ▶ Mostly email

BERBASIS JARINGAN KOMPUTER DAN
Kolompok Bidang Keahlian Jaringan Komputer

- SPESIFIKASI TEKNIS PC
 - ▶ IBM PC AT 286/386 Hardisk min. 40MB
- SISTEM OPERASI
 - ▶ DOS 5.0
 - ▶ NOS (TCP/IP)
- WILAYAH OPERASI
 - ▶ Jakarta
 - ▶ Jawa Barat (Bandung, 62 Nodes)
 - ▶ Jawa Tengah
 - ▶ Yogyakarta
 - ▶ Indonesia Bagian Timur
(UNRAM, UNHAS, UNCEN, UNPATTI)
- KECEPATAN
 - ▶ 1200 bps AFSK & PSK
 - ▶ 9600 bps FSK
 - ▶ 56 Kbps s/d 250 Kbps
- FASILITAS LAYANAN
 - ▶ Surat Elektronik (E – Mail)
 - ▶ Pengiriman/Transfer File
 - ▶ Diskusi Elektronik (News Group)
 - ▶ Remote Login
 - ▶ Basis Data Terdistribusi
 - ▶ Multimedia Mail
- PROTOKOL
 - ▶ Link AX.25
 - ▶ Network TCP/IP
- HUBUNGAN INTERNATIONAL
 - ▶ BPPT – TCP/IP 64 Kbps ke Sprint Net USA
 - ▶ UI – UUCP 19.2 Kbps ke UUNET USA
 - ▶ ITB – TCP/IP 38.4 Kbps via Satelit ETS-V ke Jepang



ITB NOC circa 1997



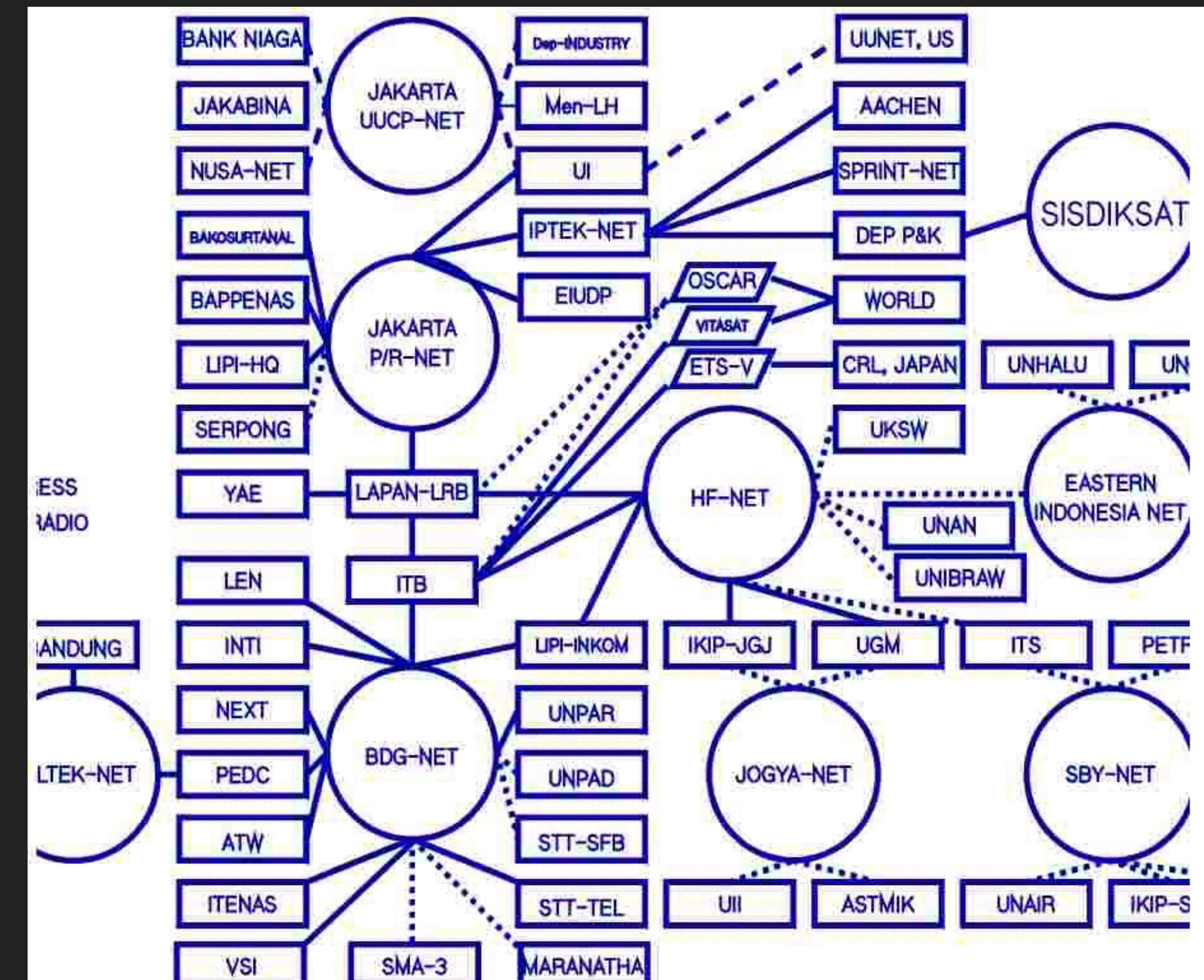
HF Transceiver & PSK Radio Packet TNC



ITB Packet Radio Gateway w/ VHF Transceiver

PACKET RADIO NET - 1994

- ▶ Circa 1994
- ▶ 1200 bps Packet Radio intracity
- ▶ Bandung - Jakarta connection via Radio Repeater
- ▶ 64 kbps Internet Gateway to IPTEK-NET (BPPT)



AI³ AND SATELLITE INTERNET - 1996

- ▶ AI³(Asian Internet Interconnection Initiatives)
- ▶ Partnership w/ Japan, Hong Kong & Thailand
- ▶ 2 Mbps Ku-Band satellite link (from JCSAT-3)
- ▶ Ku-Band:1996 to 2006, C-Band: 2003 to 2009
- ▶ This Internet connection is distributed to Universities/Institution in Indonesia via leased line 64kbps
- ▶ UNILA, UNSYIAH, UMM, UNSOED, UKSW, UKDW, UNTAN, IKIP Manado, etc.



WIRELESS LAN BACKHAUL - 1997

- ▶ Pre-802.11 standard, 1-2 Mbps, in 900MHz
- ▶ ISDN was limited & expensive for intracity link
- ▶ One of the first tech is from WaveLAN from KarlNet as wireless bridge, expensive
- ▶ Use Wireless LAN ISA card into the PC router
- ▶ Connect ITB to University/Institution in Bandung
 - ▶ IPTN (now PTDI), UNISBA, UNPAR, ITENAS, IKIP Bandung (now UPI), etc.



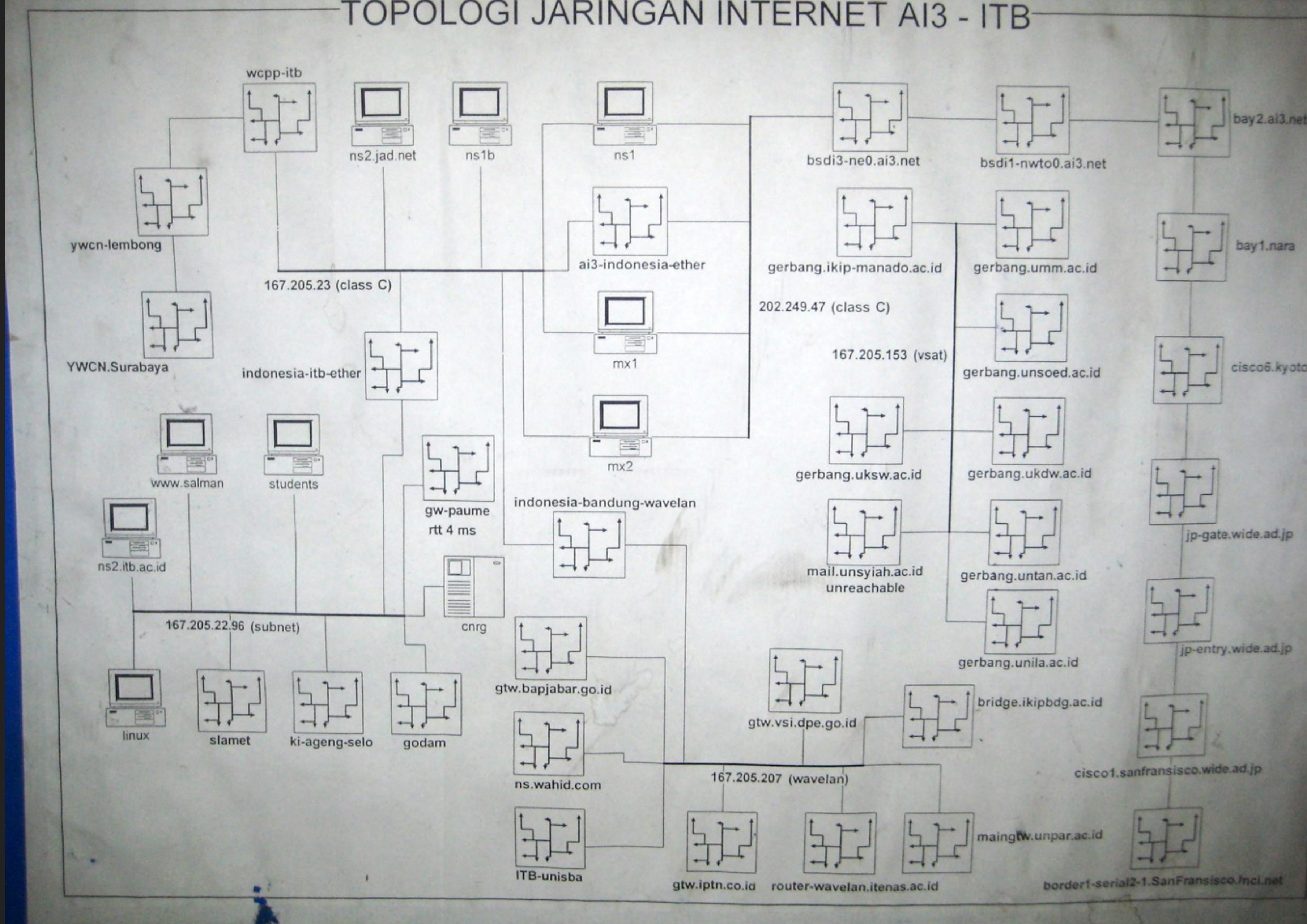


Bandung Wireless Backhaul 10m Tower - PAU Building, ITB Bandung



Wireless Backhaul PC Router

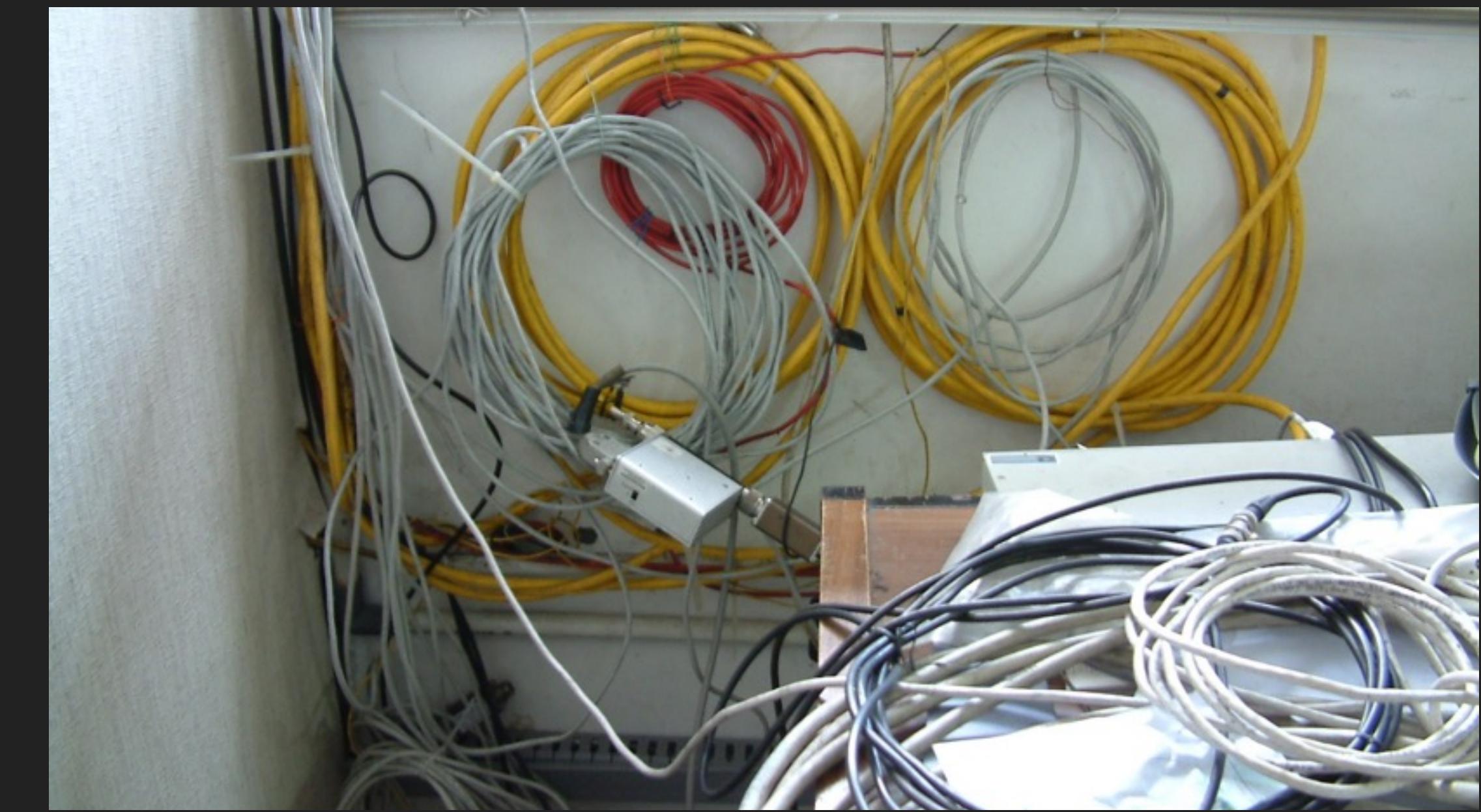
TOPOLOGI JARINGAN INTERNET AI3 - ITB



AI3 - ITB Internet Network Topology - ITB Backbone, ITB NOC & Internet, Leased Line Backbone, and Bandung WaveLAN Backbone



ITB NOC circa 2003



Thick Ethernet Backbone Cable



ITB Internet Gateway PC Router, w/ FreeBSD and Quagga

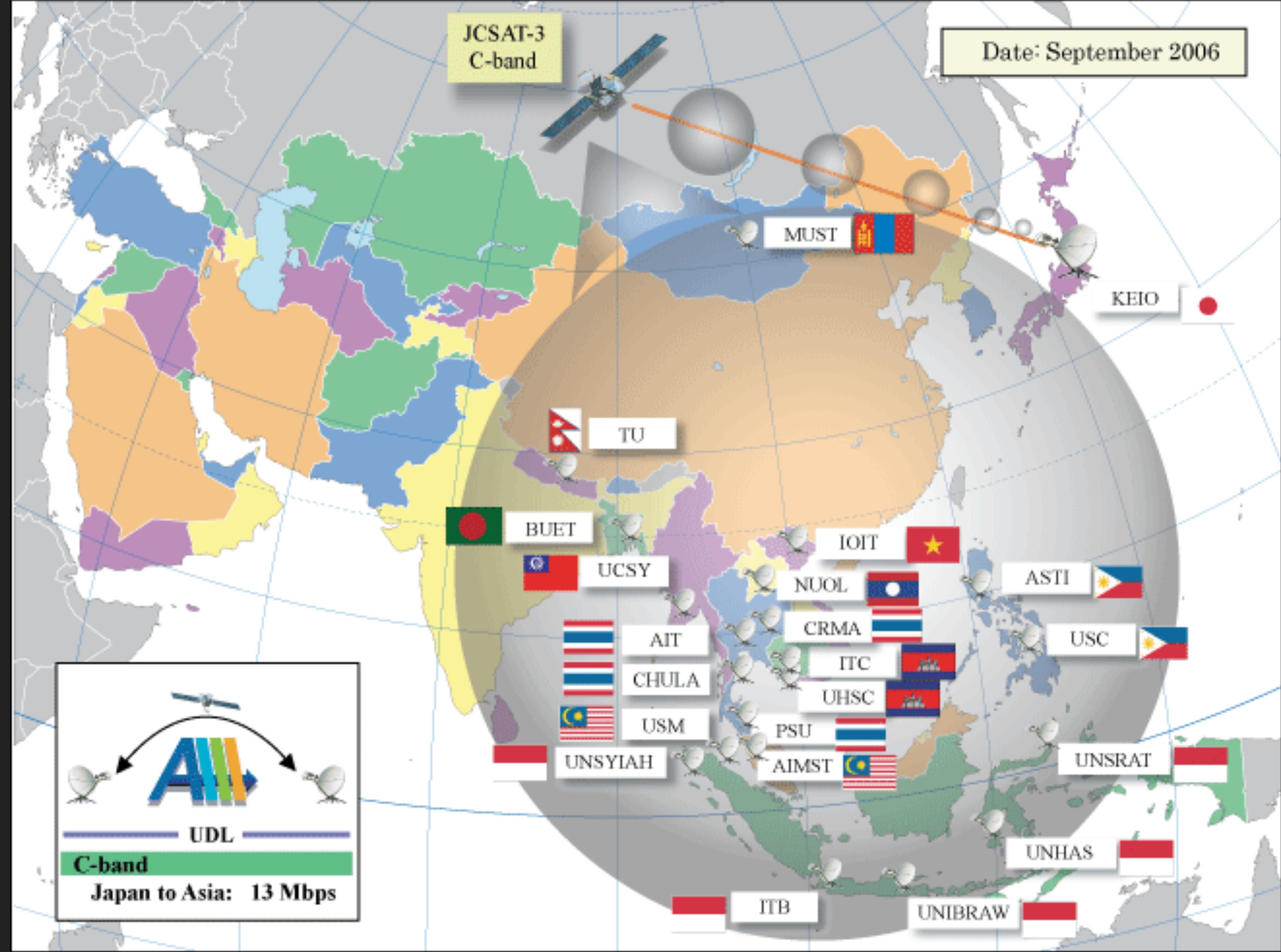
SOI-ASIA - 2001

- ▶ School of Internet - Asia, distance learning program
- ▶ C-band satellite
 - ▶ Unidirectional Satellite Link (UDL)
 - ▶ IPv6 Multicast Video Conference
 - ▶ IPv6 Multicast Routing with PIM-SM with XORP
 - ▶ vic (video) and rat (audio) application on FreeBSD



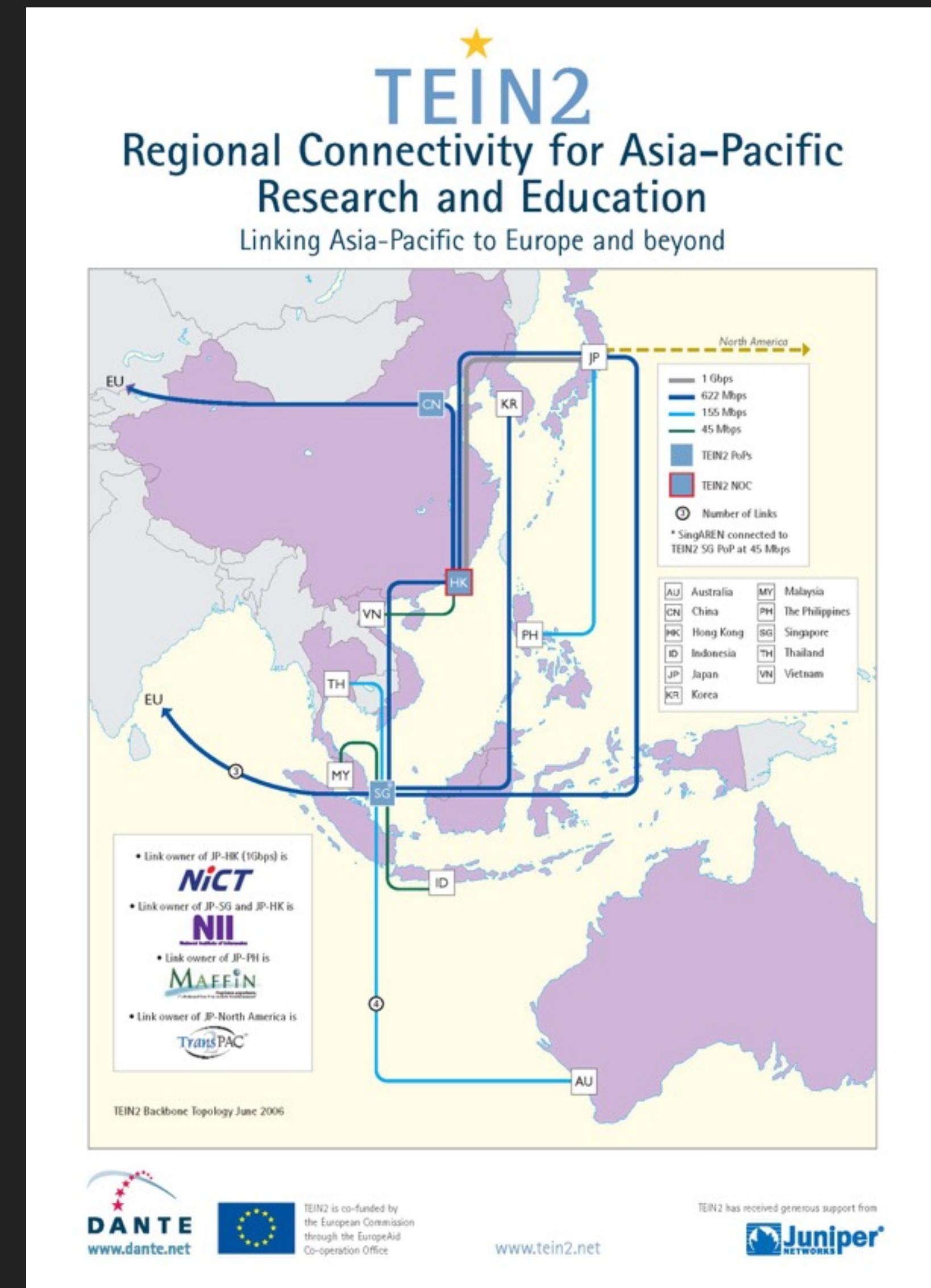
<http://www.soi.wide.ad.jp/soi-asia/publications/20030702/>





TEIN PROJECT - 2006

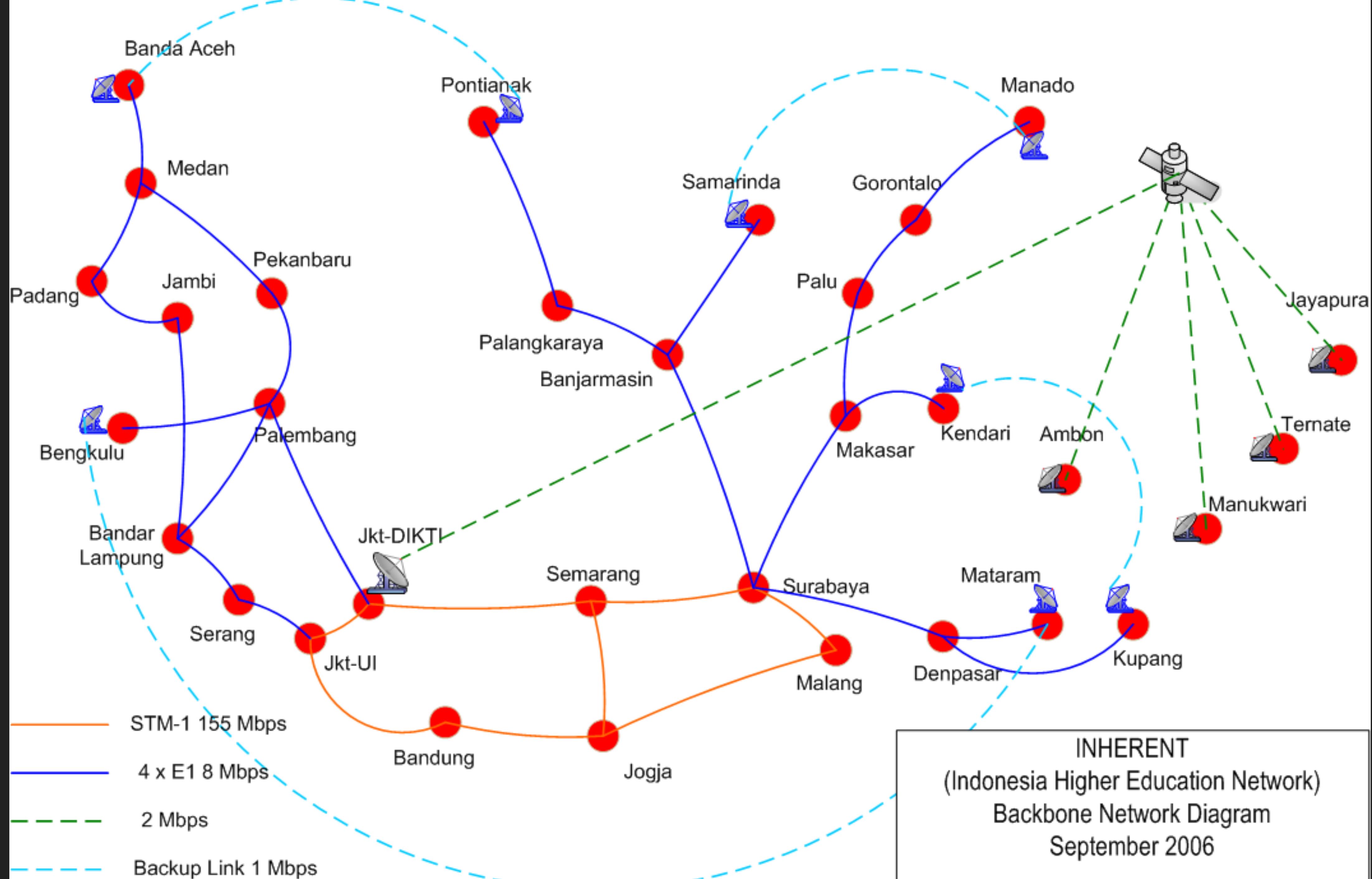
- ▶ Trans-Eurasia Interconnection Network, European Commission (EC) Project, connecting NREN in Europe & US
- ▶ TEIN1: 45 Mbps, TEIN2: 155 Mbps (STM-1), Continuous development with TEIN3 & TEIN4
- ▶ Beneficiary Partner: Indonesia, Malaysia, Philippines, Thailand and Vietnam
- ▶ Non-beneficiary Partner: Australia (AARNET), China (CERNET), Japan (NICT), Korea (KOREN) and Singapore (SINGAREN)
- ▶ Collaboration with APAN (Asia Pacific Advanced Network)



INHERENT - 2006

- ▶ Indonesia Higher Education Network
- ▶ 32 State University in Indonesia
- ▶ 155 Mbps link between campus in Java, 8 Mbps link between campus in Sumatera, Kalimantan, Sulawesi, Bali & Nusa Tenggara, 2 Mbps VSAT between campus in East Indonesia
- ▶ Network as collaboration platform
 - ▶ Video conferencing, opensource repo







INDONESIA RESEARCH
EDUCATION NETWORK

FUTURE: IDREN

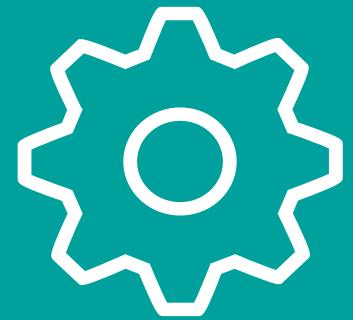


Indonesian Research and Education Network (IdREN) is a specialized network dedicated to interconnect research and education institutions in Indonesia.



IdREN is NOT INTERNET

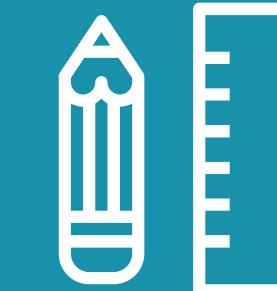
Background &
Objective



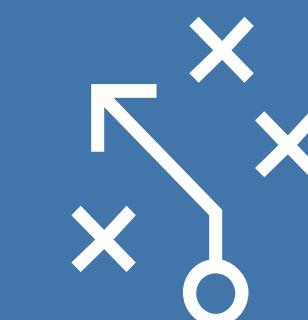
01

02

Approach
Infrastructure, Application,
Organization



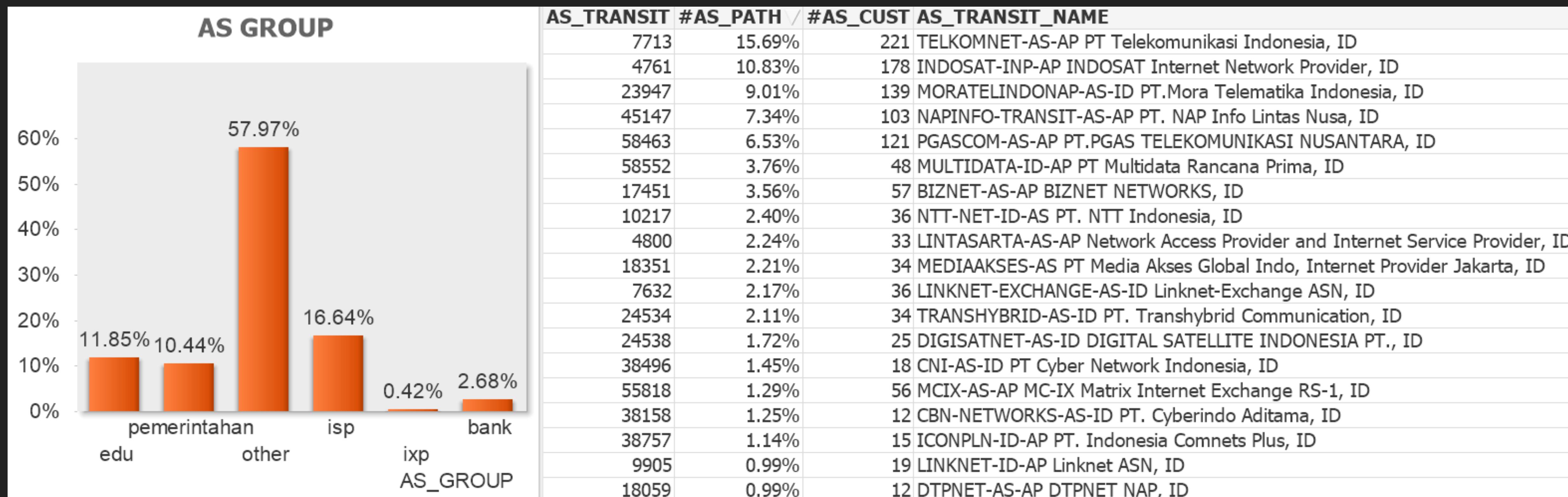
03 Milestone



BACKGROUND & OBJECTIVES

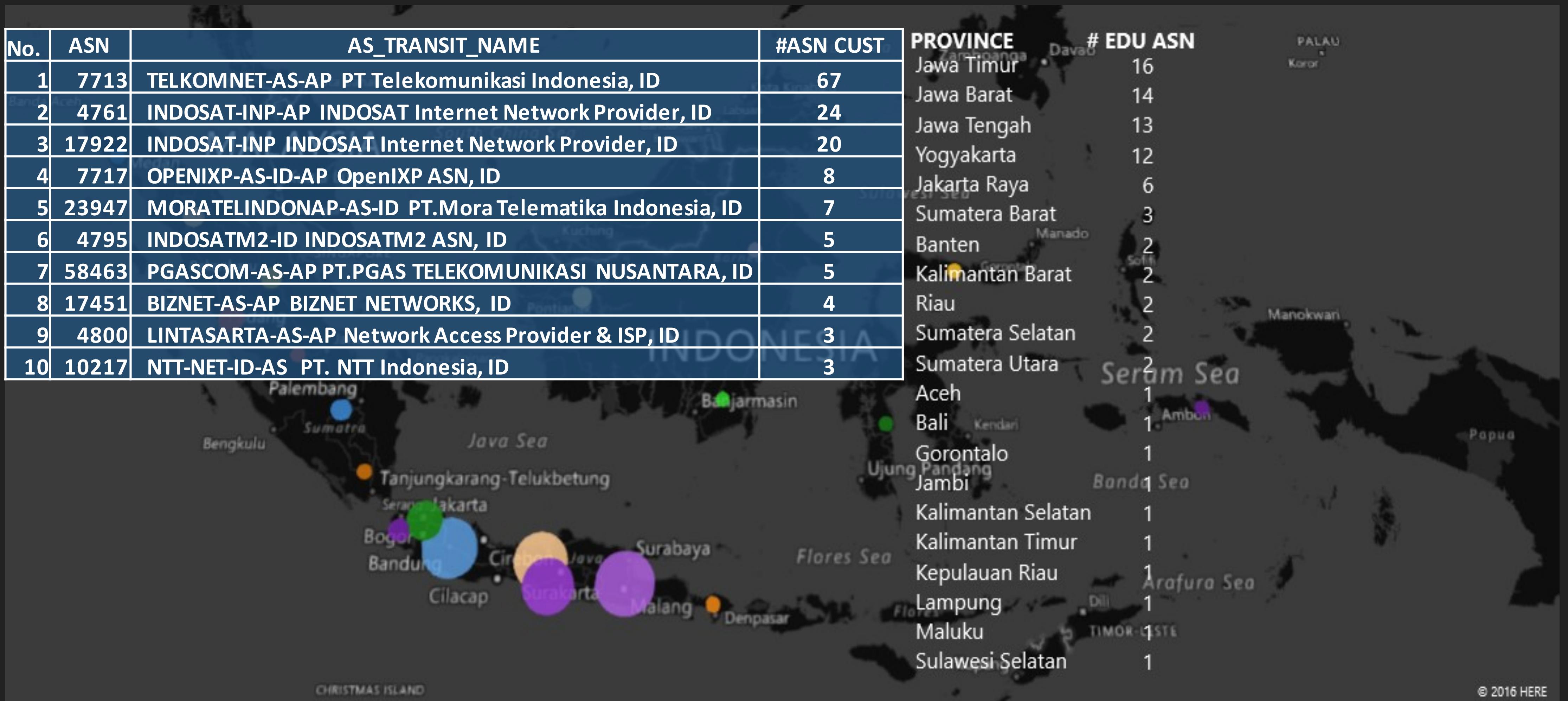
- ▶ 2006 - 2012 INHERENT
 - ▶ Dedicated Infrastructure supported by Government
 - ▶ Interconnecting among 35 Universities
- ▶ 2013 -(not active)
- ▶ UU no. 12 Tahun 2012 Pendidikan Tinggi
 - ▶ Pasal 79
 - ▶ (5) Pemerintah mengembangkan jejaring antar perguruan tinggi dengan memanfaatkan teknologi Informasi
- ▶ Developing interconnected networks amongst Universities/Research Institutions
- ▶ Collaborating in Research & Education
- ▶ Facilitating the development of Open Learning Resources and Information System amongst members
- ▶ Bridging the gaps by connecting islands of knowledge

GROUP ASN BY PROVIDER

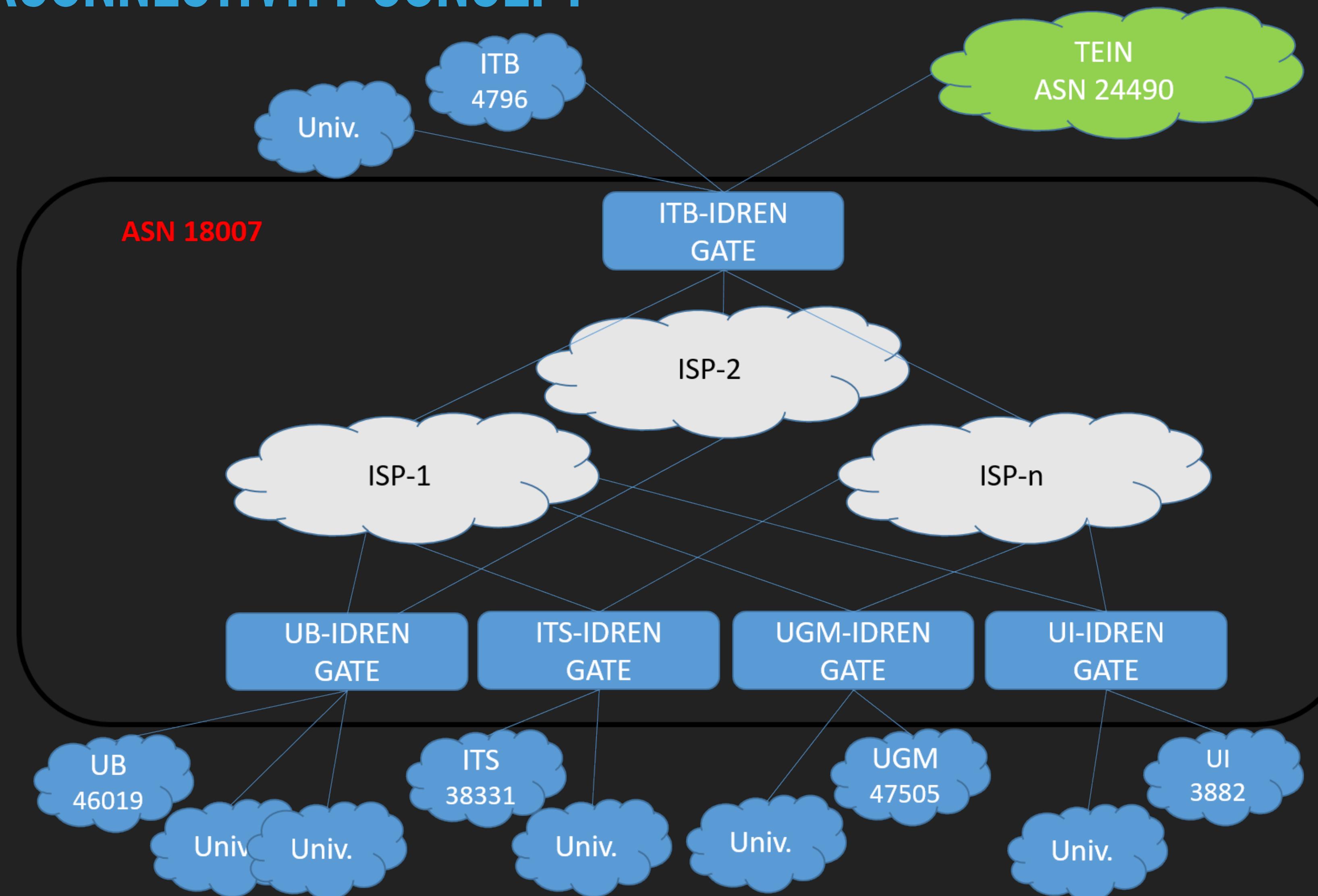


EDU ASN IN INDONESIA

No.	ASN	AS_TRANSIT_NAME	#ASN CUST	PROVINCE	# EDU ASN
1	7713	TELKOMNET-AS-AP PT Telekomunikasi Indonesia, ID	67	Jawa Timur	16
2	4761	INDOSAT-INP-AP INDOSAT Internet Network Provider, ID	24	Jawa Barat	14
3	17922	INDOSAT-INP INDOSAT Internet Network Provider, ID	20	Jawa Tengah	13
4	7717	OPENIXP-AS-ID-AP OpenIXP ASN, ID	8	Yogyakarta	12
5	23947	MORATELINDONAP-AS-ID PT.Mora Telematika Indonesia, ID	7	Jakarta Raya	6
6	4795	INDOSATM2-ID INDOSATM2 ASN, ID	5	Sumatera Barat	3
7	58463	PGASCOM-AS-AP PT.PGAS TELEKOMUNIKASI NUSANTARA, ID	5	Banten	2
8	17451	BIZNET-AS-AP BIZNET NETWORKS, ID	4	Kalimantan Barat	2
9	4800	LINTASARTA-AS-AP Network Access Provider & ISP, ID	3	Riau	2
10	10217	NTT-NET-ID-AS PT. NTT Indonesia, ID	3	Sumatera Selatan	2
				Sumatera Utara	2



IDREN INTERCONNECTIVITY CONCEPT



IDREN CONNECTIVITY CONCEPT

- ▶ IDREN != INTERNET
 - ▶ No transit to Internet
 - ▶ Give transit to other RENs:
 - ▶ Currently via TEIN (ASN 24490)
- ▶ IDREN-GATE
 - ▶ ASN using IDREN ASN
 - ▶ Distribution Node
 - ▶ Transit AS
- ▶ IDREN-NODE
 - ▶ Univ. or Institution ASN
 - ▶ Access Node
 - ▶ Stub AS, never be a transit
- ▶ IDREN CLOUD
 - ▶ ISP/Government Provide L2 Connectivity
 - ▶ R&E Institutions manage & operate L3 Connectivity

OF CONNECTED ASN

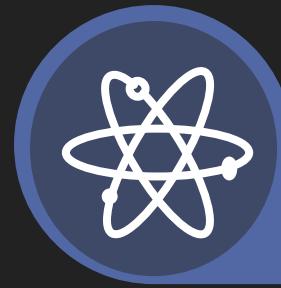
- ▶ As of June 2016
 - ▶ Visible from other AS

No	Node (ASN)	Lokasi Node	Gate							
			UI-IDREN	ITB-IDREN	UGM-IDREN	ITS-IDREN	UB-IDREN	01-IDREN	UNY	ITB
1	UNY (55674)	Yogyakarta						1		
2	POLSRI (46047)	Sumatera Selatan						1		1
3	UNSRI (132676)	Sumatera Selatan						1		
4	UNEJ (132678)	Jawa Timur					1			
5	UI (3382)	Jawa Barat	1							
6	ITB (4796)	Jawa Barat		1						
7	UB (46019)	Jawa Timur						1		
8	UGM (45705)	Yogyakarta			1					
9	ITS (33831)	Jawa Timur				1				
10	UNTAN (55687)	Kalimantan Barat	1							
11	UNG (132660)	Gorontalo								1
12	USU (55697)	Sumatera Utara								1
13	UAD (132642)	Yogyakarta								1
14	UMY (58818)	Yogyakarta								1
15	UAJY (55680)	Yogyakarta							1	
16	USD (55672)	Yogyakarta								1
17	STIKUBANK (59138)	Jawa Tengah								1
18	POLMAN (133805)	Jawa Barat							1	
19	TELKOM University (133357)	Jawa Barat							1	
20	UNSYAH (63510)	Aceh							1	
21	ISI (63876)	Yogyakarta							1	
22	UINSUSKA (133844)	Riau							1	
23	UNRI (56254)	Riau							1	
24	UNDIP (46049)	Jawa Tengah							1	
25	UIN-Malang (131781)	Jawa Timur					1			
26	UKSW (134627)	Jawa Tengah								1
27	UNLAM (58475)	Kalimantan Selatan								1
28	UNHAS (134614)	Sulawesi Selatan						1		
29	UNILA (56237)	Lampung						1		
TOTAL			2	1	1	1	3	13	4	5

IDREN SERVICE & APPLICATION

[Long Term]

Lapak IdREN, Open Data, Teleradiologi, DCN, **IM**



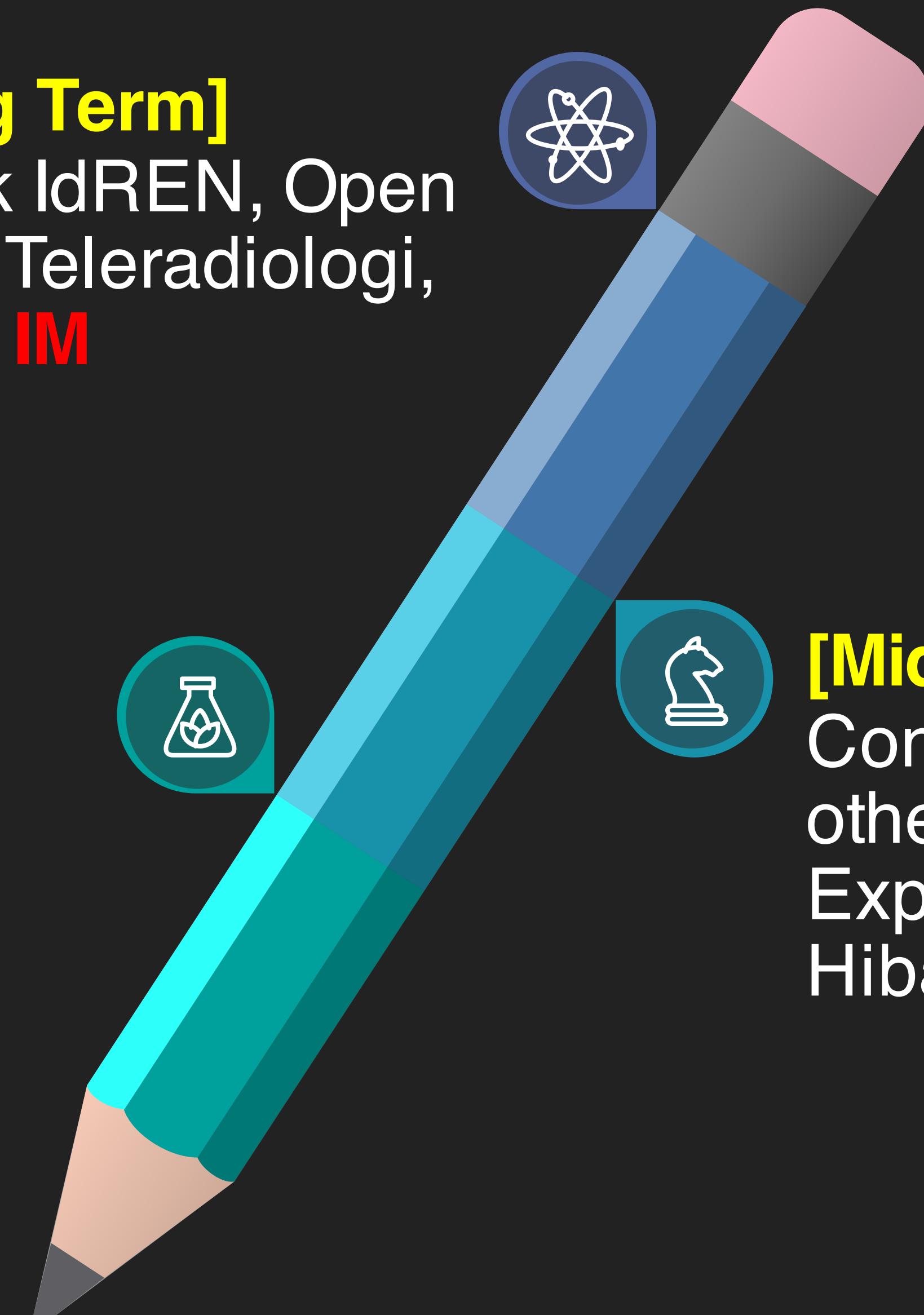
[Short Term]

HD Vicon
(Telemedicine),
Cloud Federation,
ID Federation,
PDDikti, PDITT



[Mid Term]

Connectivity to other REN, Online Experiment, GGC, Hibah Penelitian



MILESTONE



2015: IdREN is active

Forming Dedicated Team for IdREN

SK DIRJEN BELMA
KEMRISTEKDIKTI
No. 012/B1/KP/2016

IdREN Organization

2017

2018

2019-2021

Command Center
Kolaborasi dan
Hibah Penelitian

Aplikasi IdREN
jangka panjang

CONCLUSION

- ▶ Revival of INHERENT, IdREN has been actively running since September 2015.
- ▶ IdREN empower collaboration in online learning and research activities
- ▶ Needs supports from Gov. & Industry for sustainable operation
- ▶ IdREN members is getting bigger (growing)



ANY QUESTIONS?

THANKS!