What AI3 has done to Indonesia

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Institute of Technology Bandung

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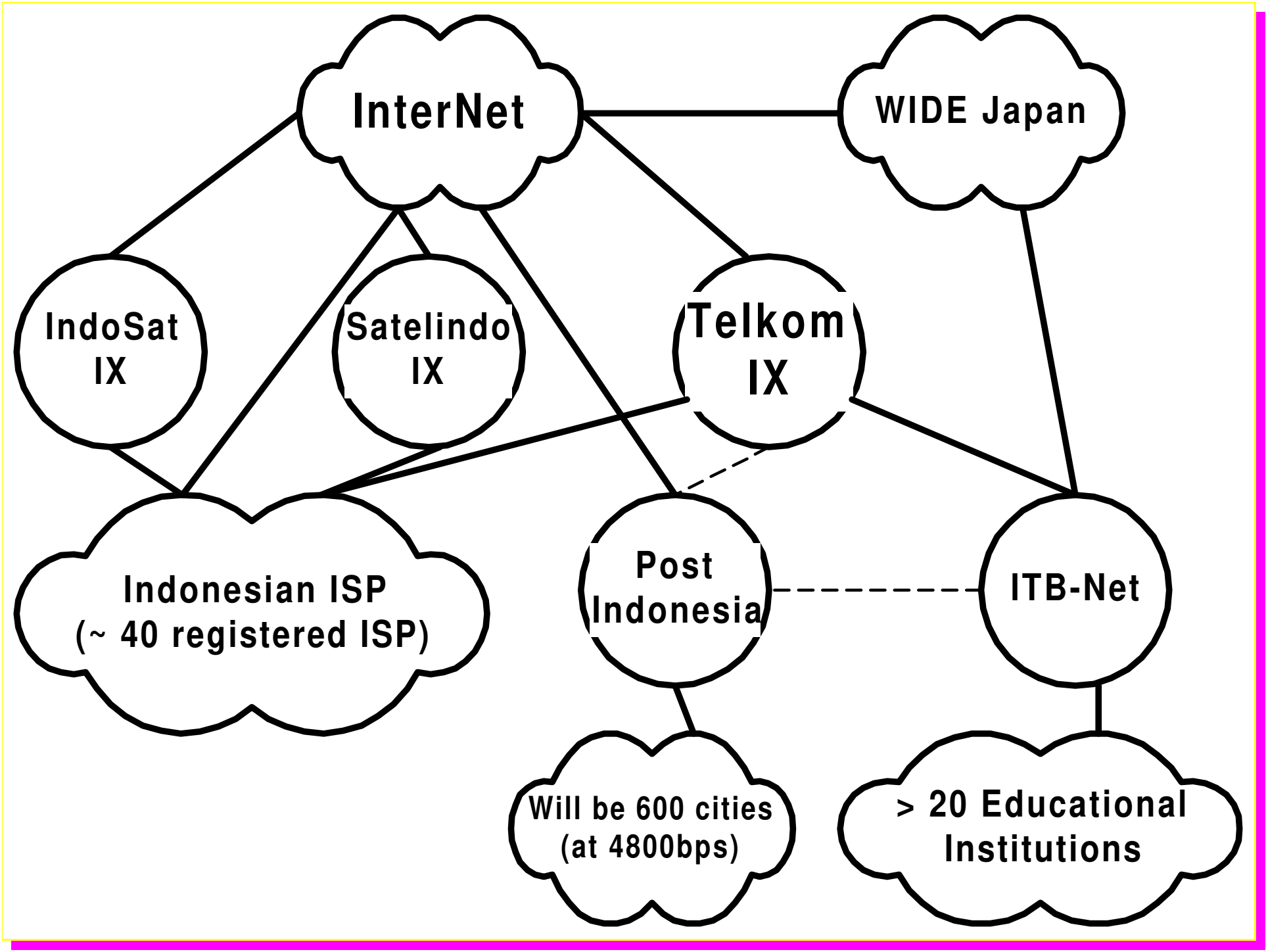
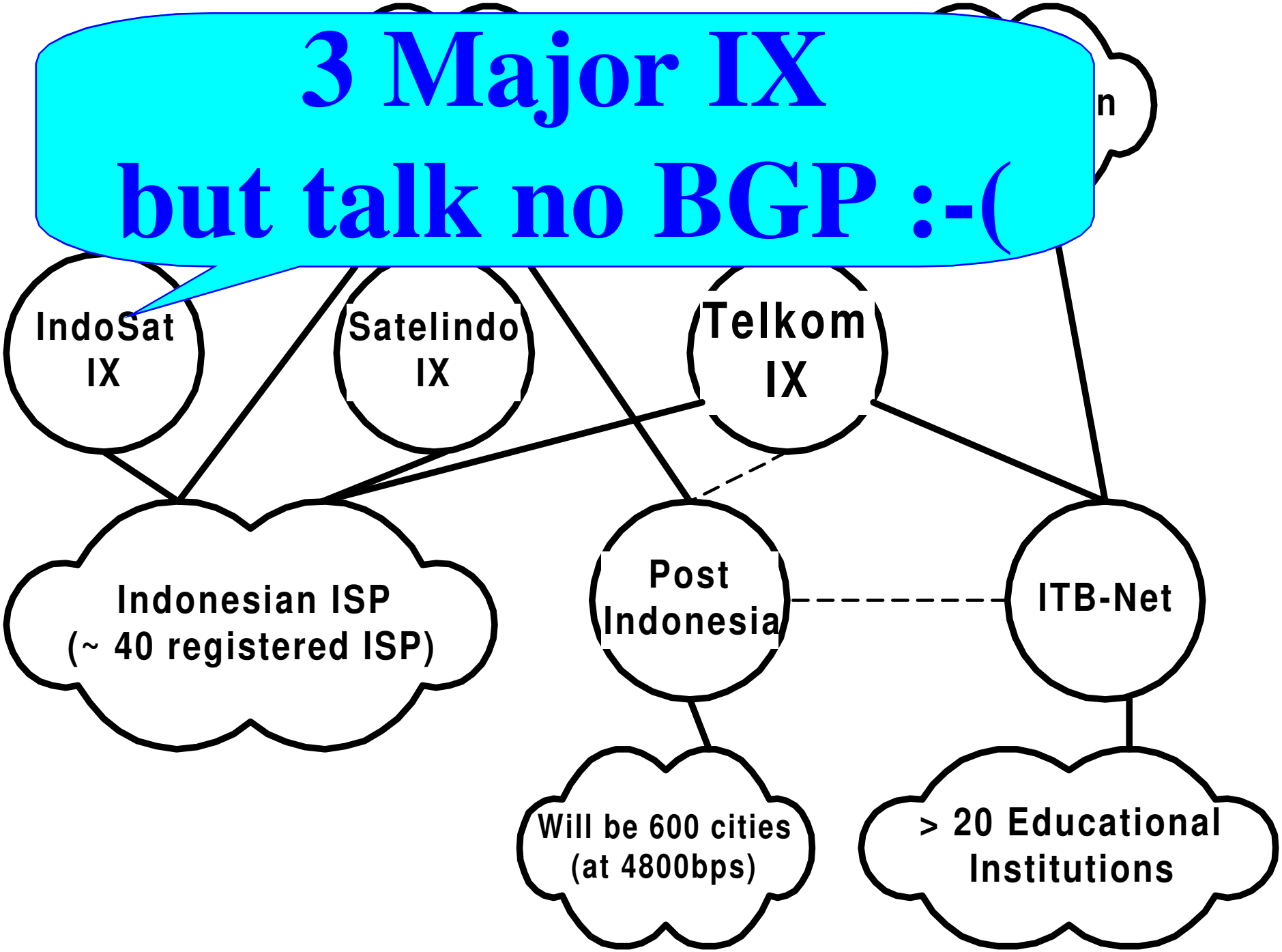
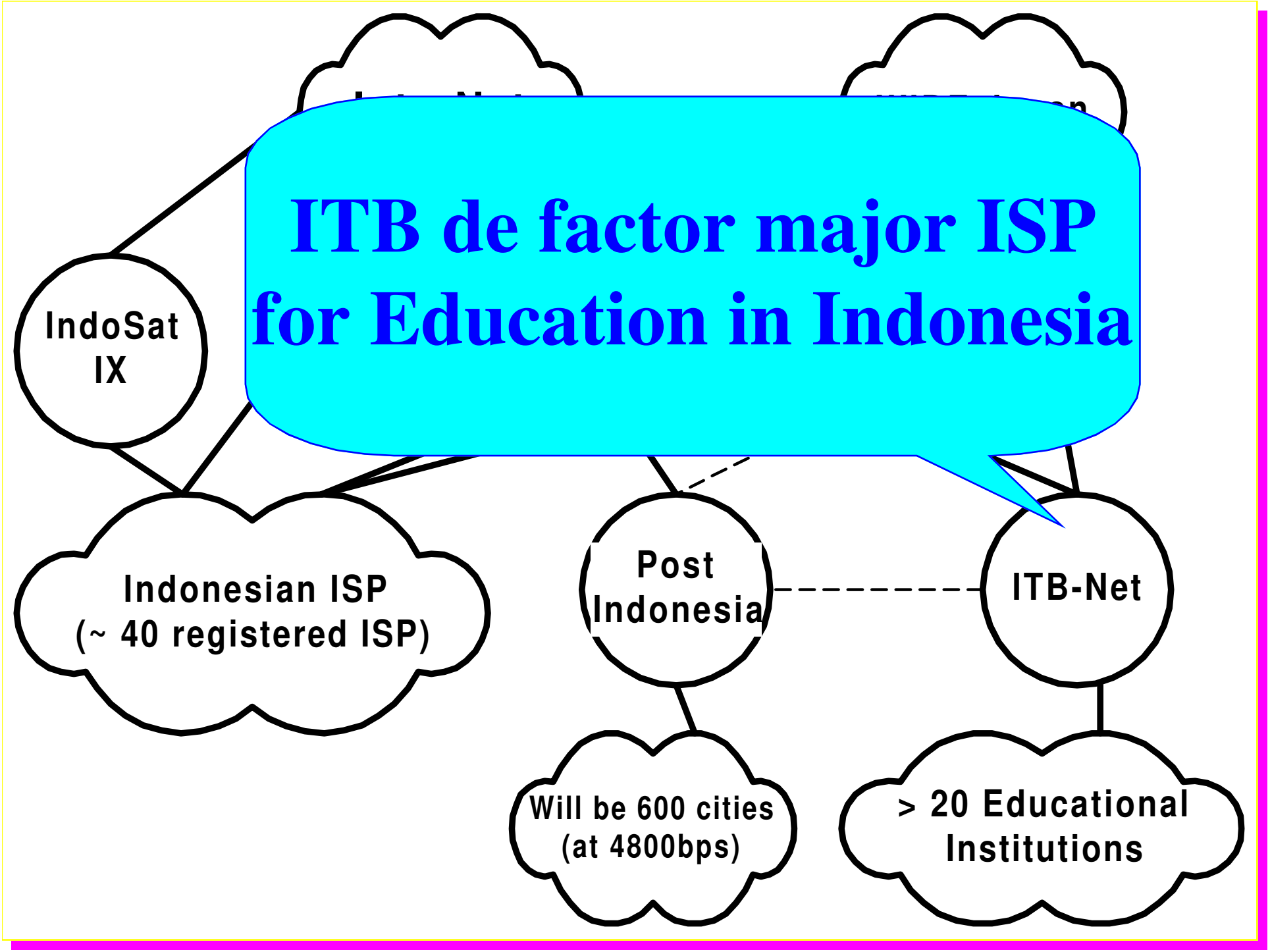
Outline

- Indonesia Internet Topology.
- Indonesia Education Network.
- Brief results in Physical layer.
- Brief results in Network layer.
- Brief results in Application layer.
- Summary.


InterNet
WIDE Japan
IndoSat IX
Satelindo IX
Telkom IX
Indonesian ISP
(~ 40 registered ISP)
Post Indonesia
ITB-Net
Will be 600 cities
(at 4800bps)
> 20 Educational Institutions

3 Major IX but talk no BGP :-(




ITB de factor major ISP
for Education in Indonesia
IndoSat
IX
Indonesian ISP
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Will be 600 cities
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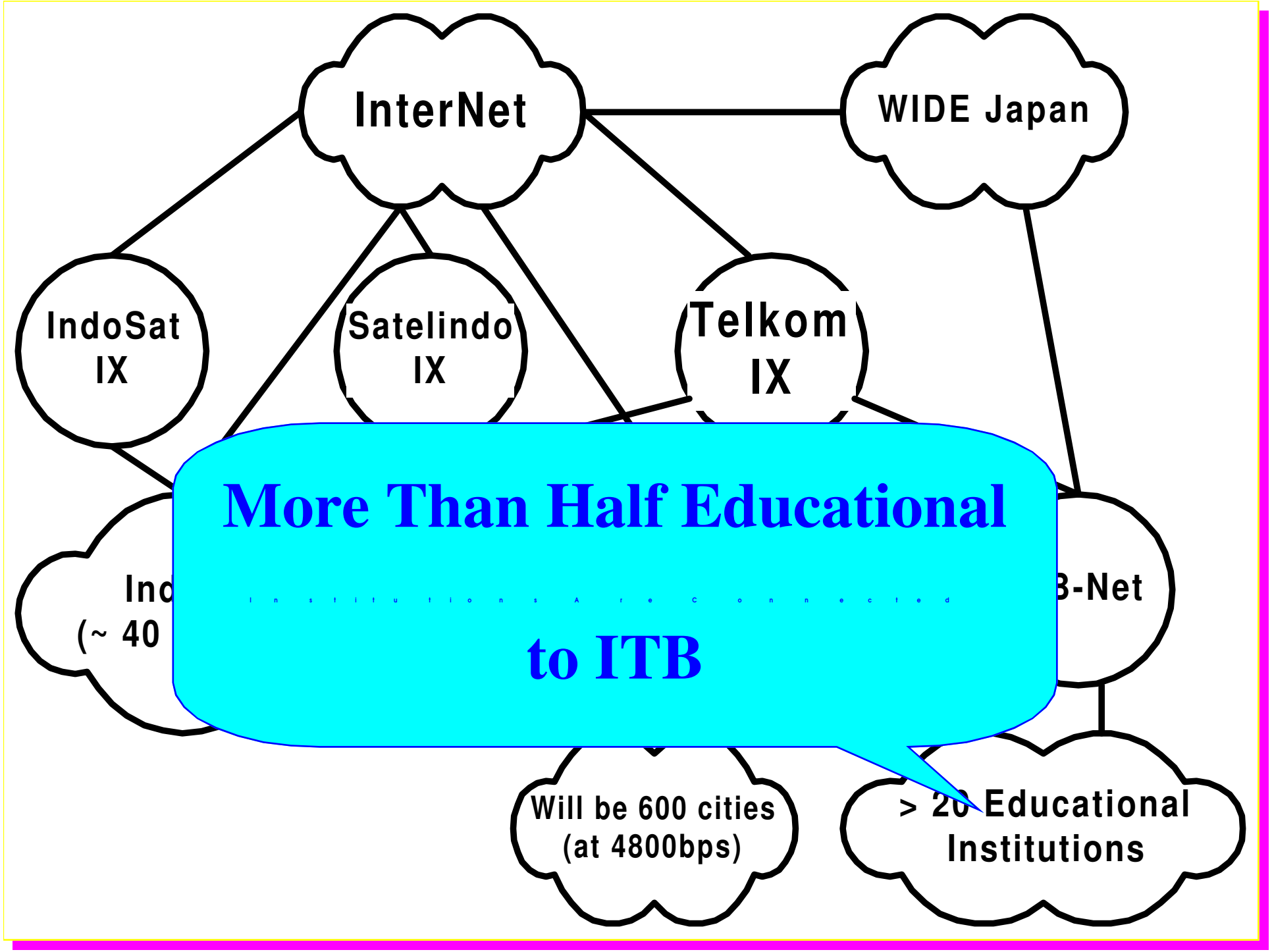
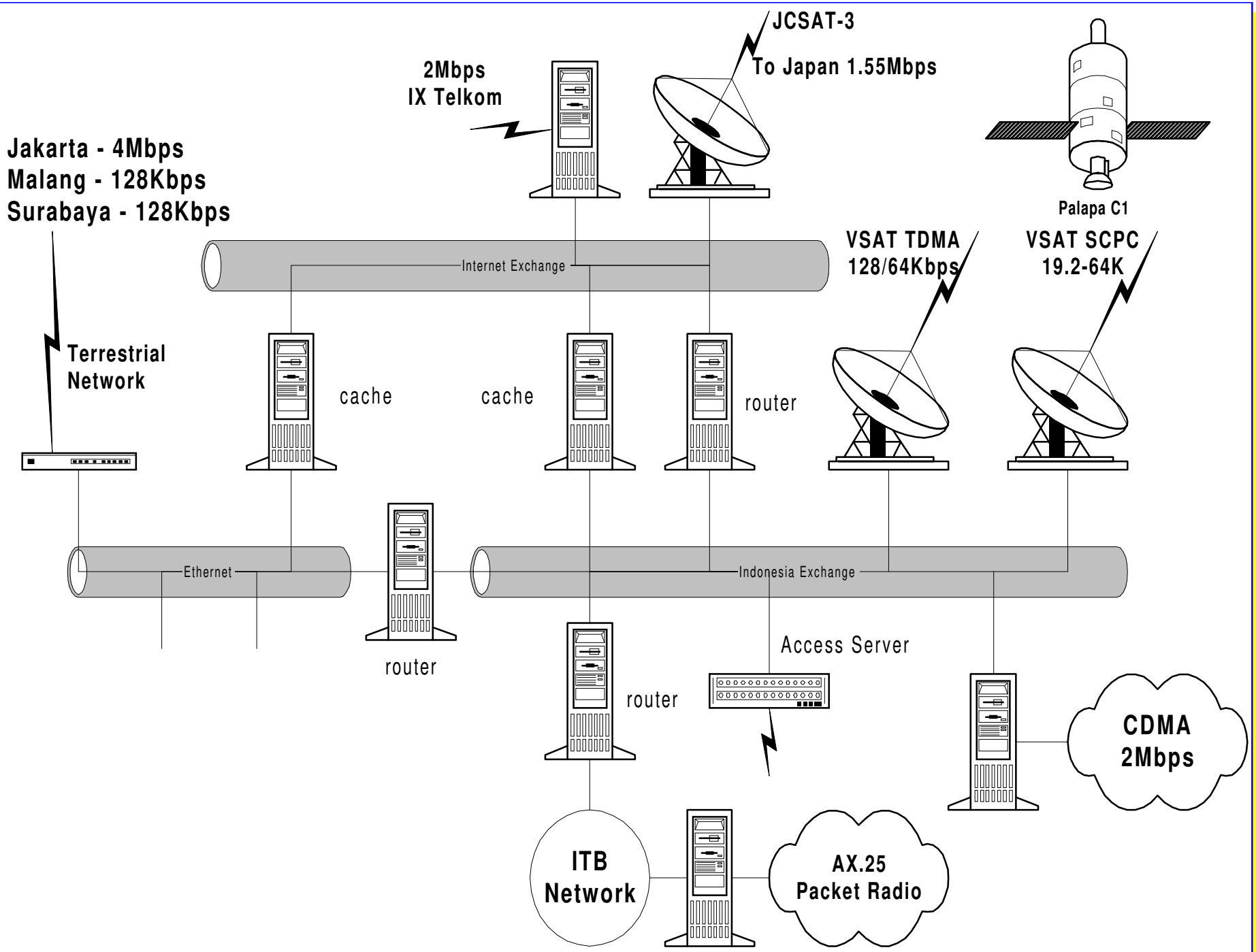
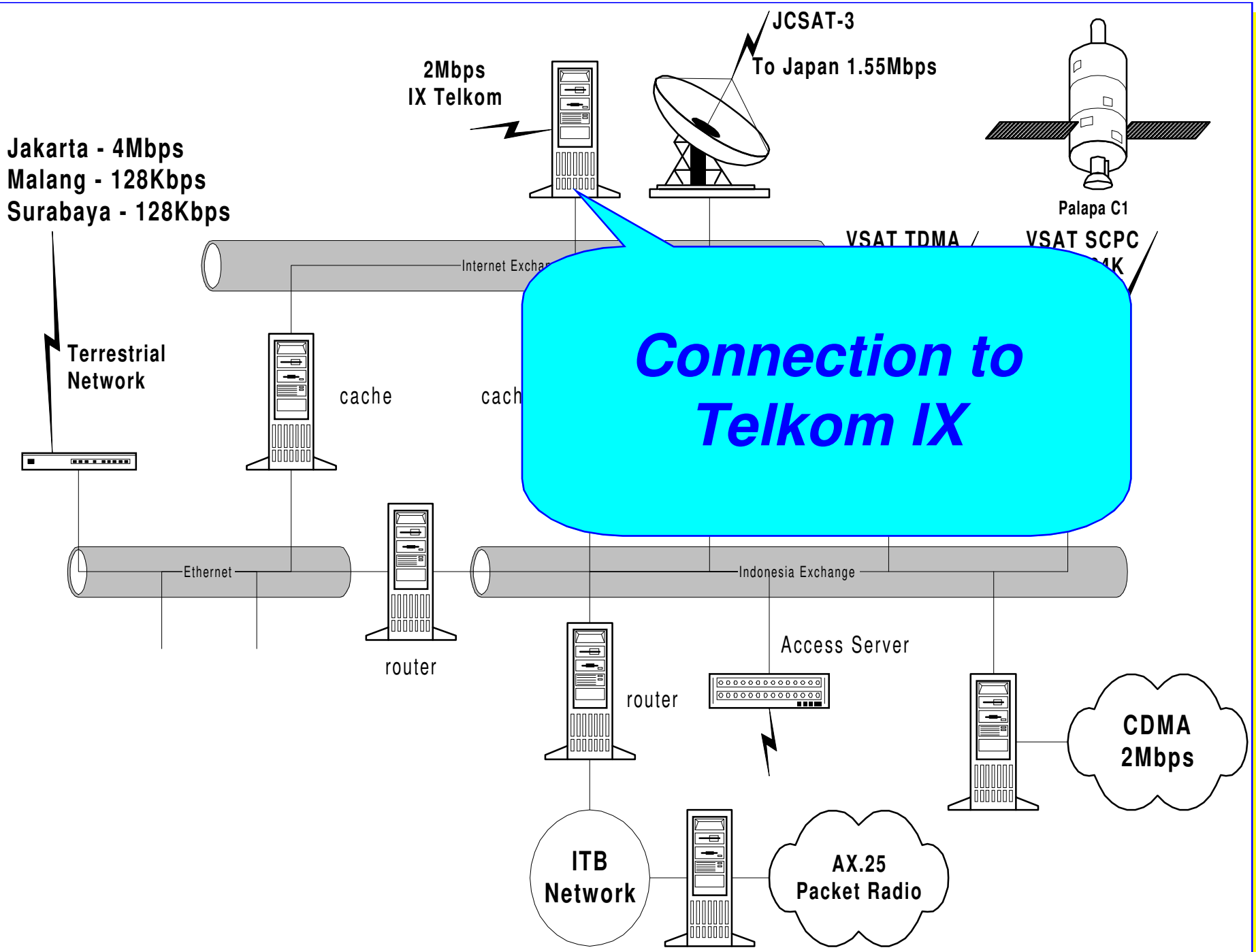

InterNet
WIDE Japan
IndoSat IX
Satelindo IX
Telkom IX
More Than Half Educational
Institutions Are Connected
to ITB
Ind
(~ 40
B-Net
Will be 600 cities
(at 4800bps)
> 20 Educational
Institutions


JCSAT-3
To Japan 1.55Mbps
2Mbps
IX Telkom
Palapa C1
Jakarta - 4Mbps
Malang - 128Kbps
Surabaya - 128Kbps
VSAT TDMA
128/64Kbps
VSAT SCPC
19.2-64K
Internet Exchange
Terrestrial
Network
cache
cache
router
Ethernet
Indonesia Exchange
router
router
Access Server
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio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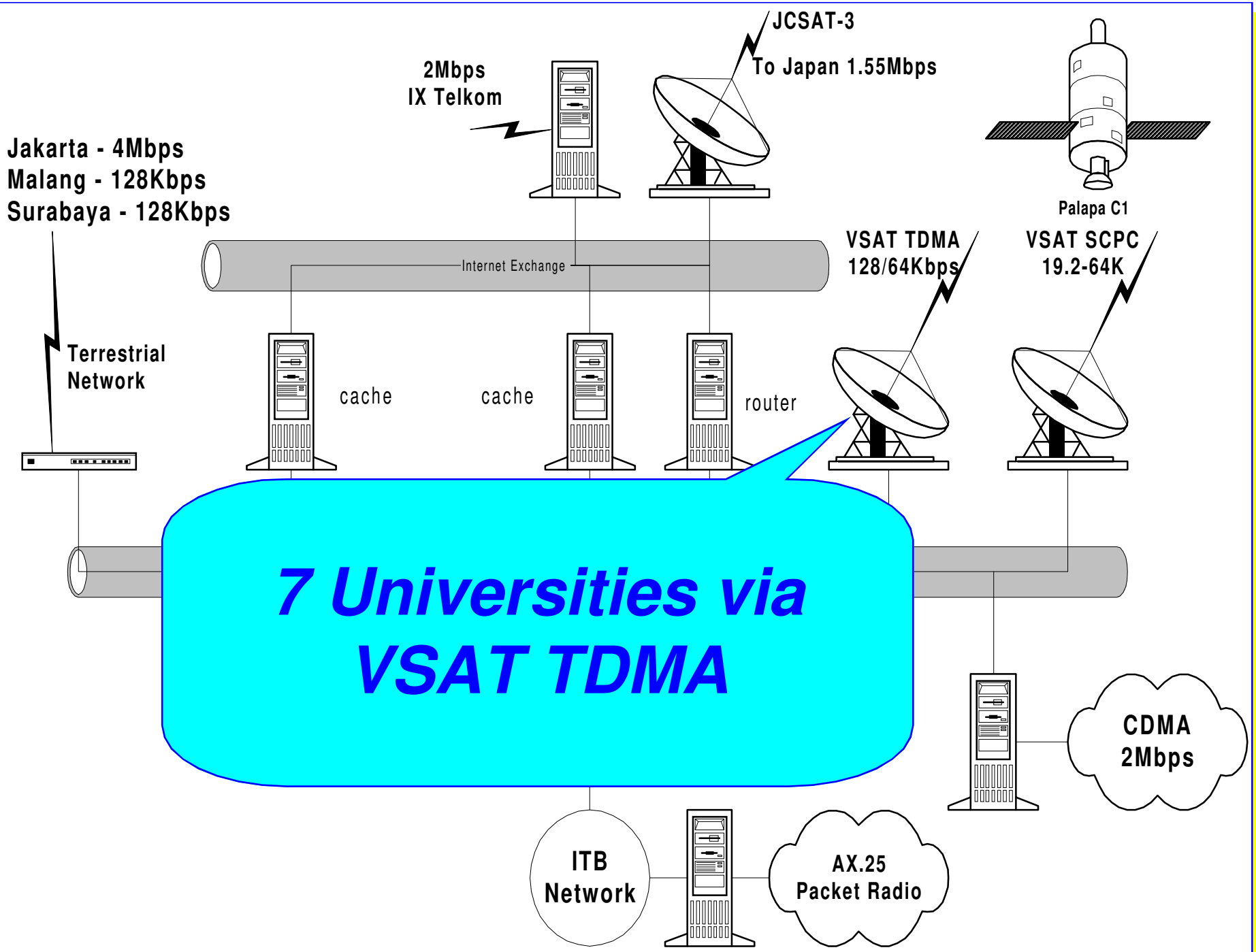
VSAT TDMA
VSAT SCPC
Internet Exchan
Terrestrial
Network
cache
cach
Connection to
Telkom IX
Ethernet
Indonesia Exchange
router
router
Access Server
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio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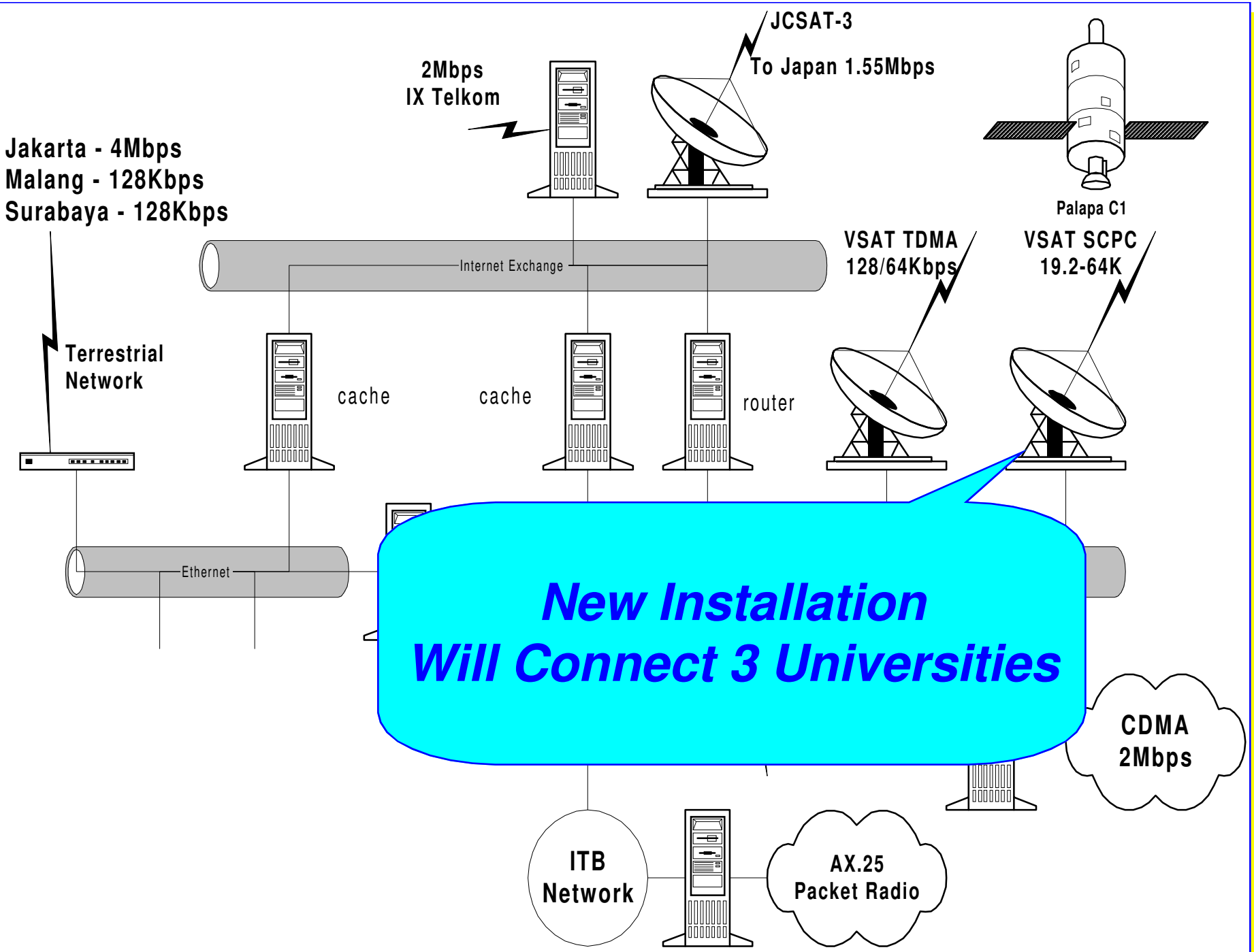
VSAT TDMA
128/64Kbps
VSAT SCPC
19.2-64K
Internet Exchange
Terrestrial
Network
cache
cache
router
7 Universities via
VSAT TDMA
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio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To Japan 1.55Mbps
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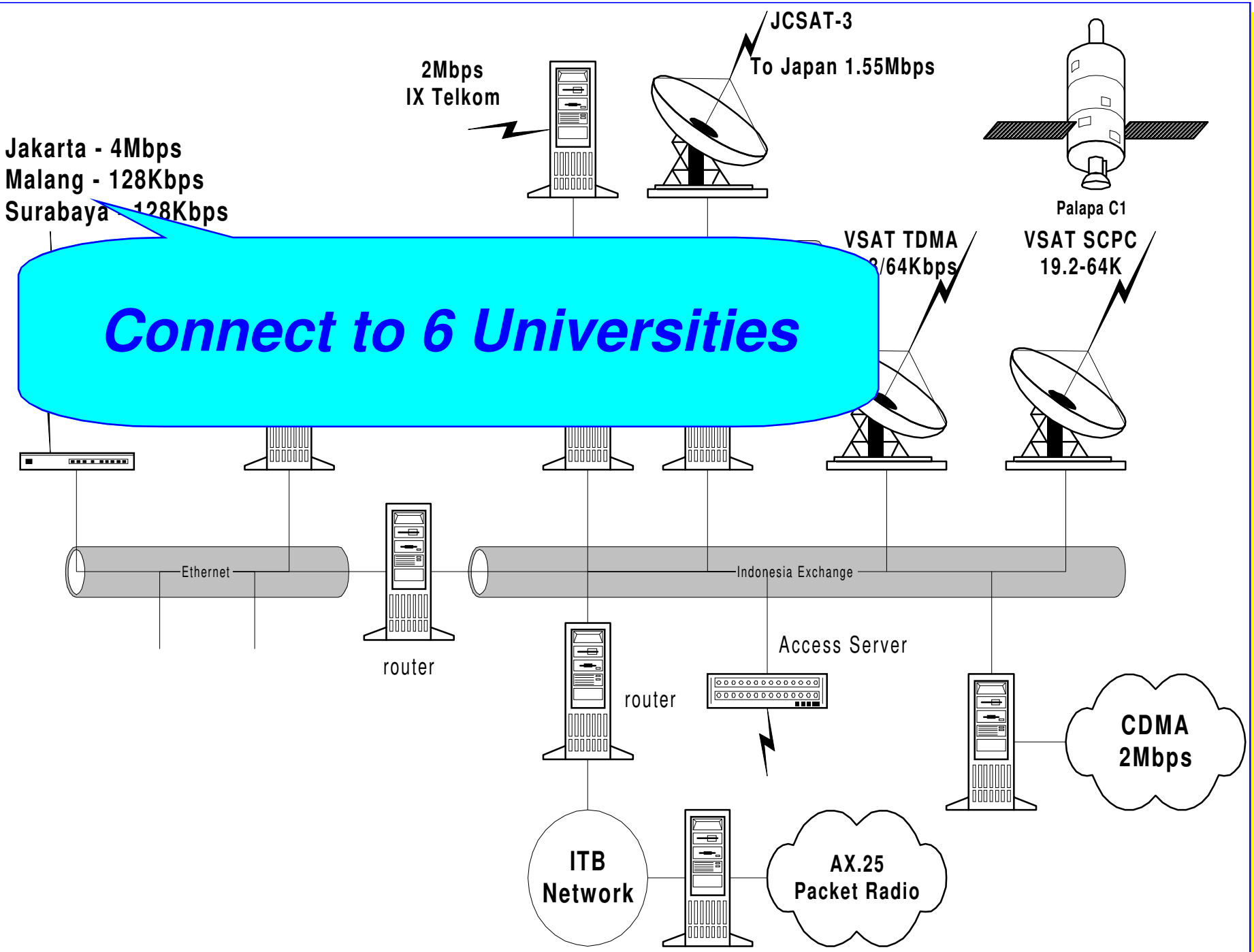
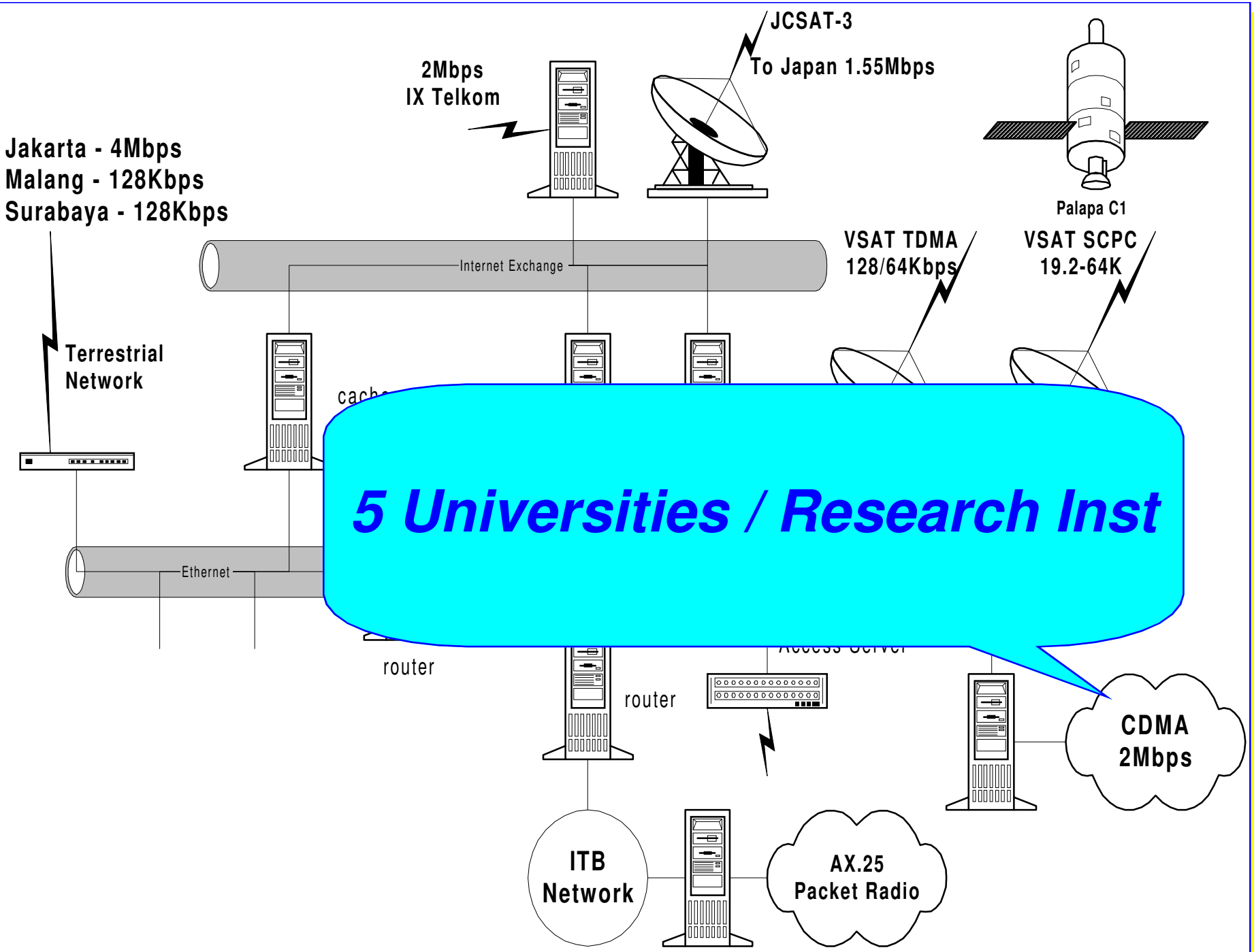
VSAT TDMA
128/64Kbps
VSAT SCPC
19.2-64K
Internet Exchange
Terrestrial
Network
cache
cache
router
Ethernet
New Installation
Will Connect 3 Universities
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio


JCSAT-3
To Japan 1.55Mbps
2Mbps
IX Telkom
Palapa C1
Jakarta - 4Mbps
Malang - 128Kbps
Surabaya - 128Kbps
VSAT TDMA
VSAT SCPC
19.2-64K
Connect to 6 Universities
Ethernet
Indonesia Exchange
router
router
Access Server
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio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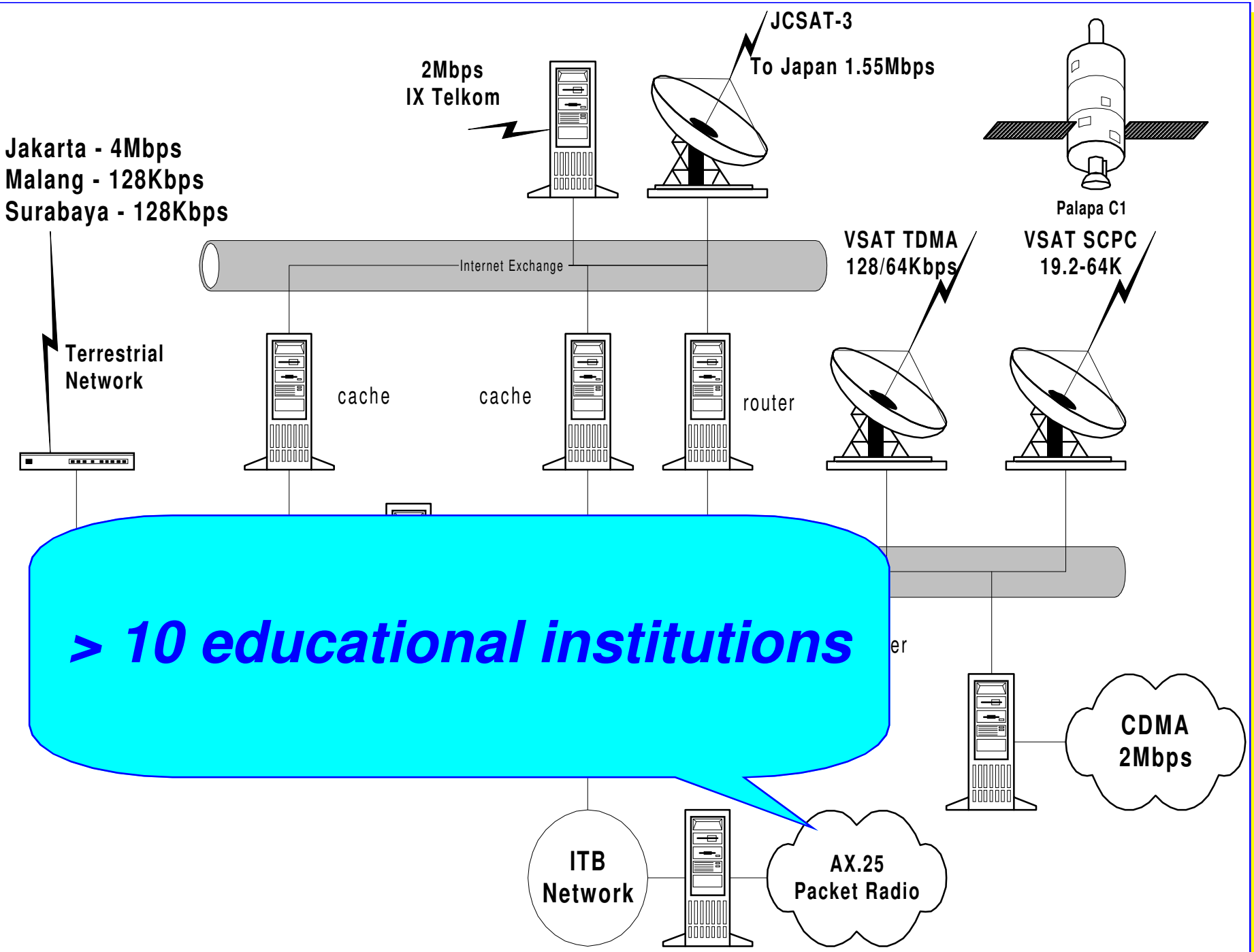
Surabaya - 128Kbps
VSAT TDMA
128/64Kbps
VSAT SCPC
19.2-64K
Internet Exchange
Terrestrial
Network
Ethernet
5 Universities / Research Inst
router
router
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio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Jakarta - 4Mbps
Malang - 128Kbps
Surabaya - 128Kbps
VSAT TDMA
128/64Kbps
VSAT SCPC
19.2-64K
Internet Exchange
Terrestrial
Network
cache
cache
router
> 10 educational institutions
CDMA
2Mbps
ITB
Network
AX.25
Packet Radio

Results in Physical Layer

- Homebrew 2Mbps CDMA.
- Wireless Data Network.
- VSAT TDMA vs. SCPC Network.
- Fast Ethernet Test Bed.
- Low Cost Access for Schools.

Homebrew 2Mbps CDMA

- Uses Lucent CDMA 2Mbps card 915MHz 250mW
- Run on FreeBSD.
- Homebrew antenna (cost ~US$150).
- Max. distance 15km (use PA for more).
- Most of our high speed MAN using this technology.

Consequences CDMA2Mbps

- bypassing local line.
- FYI, Indonesia currently have only 300 N-ISDN lines in operation.
- We promote different alternative for building high speed network.

Wireless Data Network

- DataTAC 19.2Kbps Wireless Data Network

Wireless Data Network

- DataTAC Wireless Data Network at 19.2Kbps.
- Internet Access.
- Interface to FAX.
- Interface to Pagers.
- Interface to Short Message Services (SMS)

256Kbps packet radio

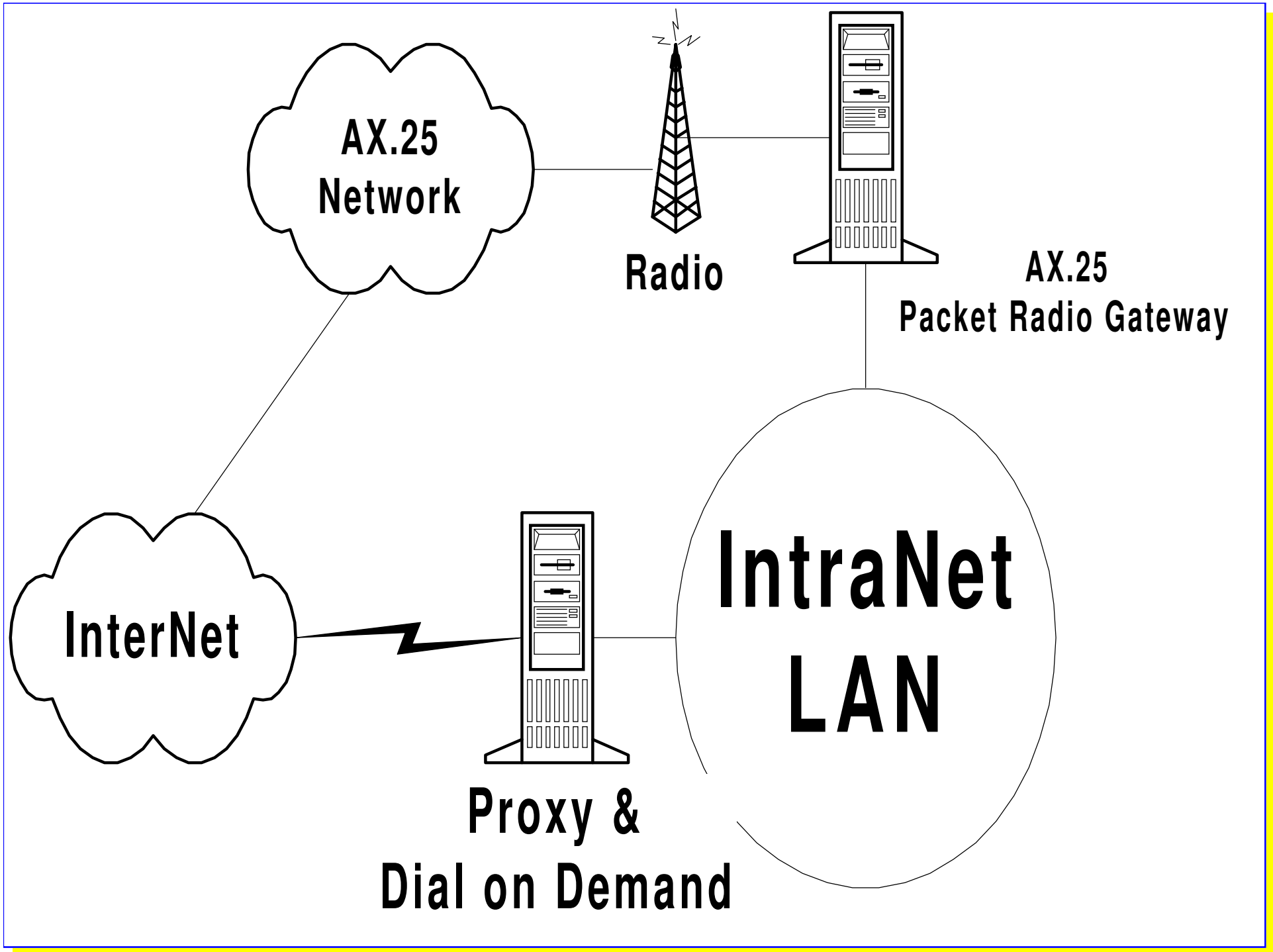
- We are prototyping 64-256Kbps packet radio network in the lab by **adnan@itb.ac.id.**
- AX.25 link layer protocol is used.
- GMSK MX 586 one chip modem is used.
- We drive the modem via parallel port.
- MMIC Mini circuit is being

Fast Ethernet Test Bed

- Supported by Intel.
- Test Intel Fast Ethernet board to run on FreeBSD.
- This test bed is driven by our overloaded MPEG-3 traffic :-)....

Low Cost Access for Schools

- AX.25 1200bps Packet Radio Network.
- Proxy Server.
- Dial on Demand for Web & Interactive Internet Access.

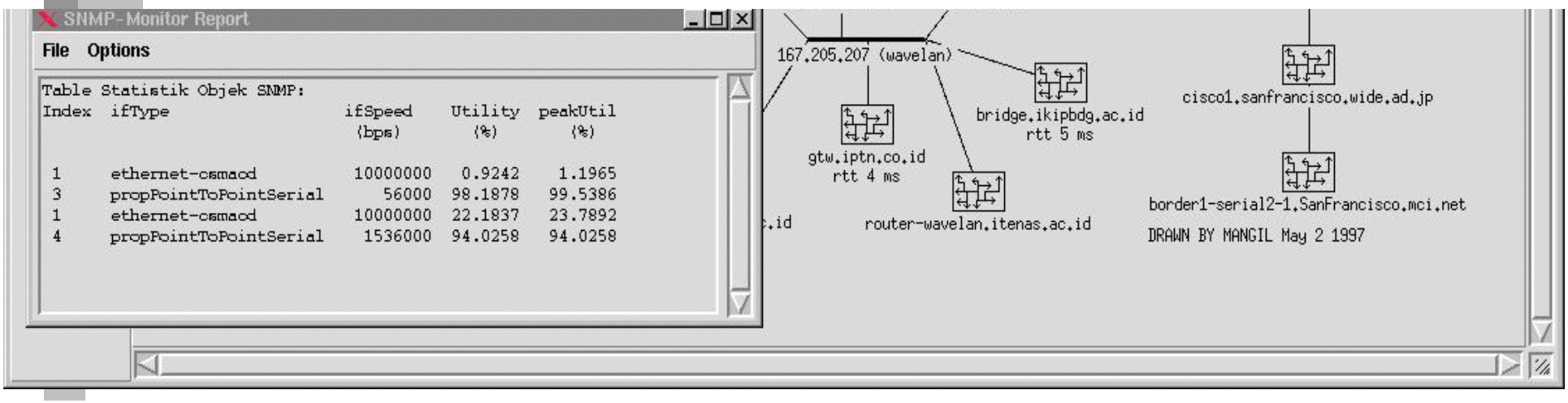

AX.25
Network
Radio
AX.25
Packet Radio Gateway
InterNet
IntraNet
LAN
Proxy &
Dial on Demand

VSAT TDMA vs. SCPC

- VSAT TDMA 128Kbps Outbound
- VSAT TDMA 64Kbps Inbound
- VSAT TDMA is not suitable for Internet application (especially Web).
- Tune TDM for 40 byte (originally 256byte packet).
- Migrating to VSAT SCPC 19.2Kbps at least.

Results in Network Layer

- Network Monitoring by ismail@cnrg.itb.ac.id.
- Monitor at http://netmon.itb.ac.id/
  - Network Map
  - Sample of traffic by protocol, port, etc.
  - Graph of total traffic.
- Migration to OSPF for Internal routing.


SNMP-Monitor Report
File Options
Table Statistik Objek SNMP:
Index ifType ifSpeed (bps) Utility (%) peakUtil (%)
1 ethernet-csmacd 10000000 0.9242 1.1965
3 propPointToPointSerial 56000 98.1878 99.5386
1 ethernet-csmacd 10000000 22.1837 23.7892
4 propPointToPointSerial 1536000 94.0258 94.0258
167.205.207 (wavelan)
gtw.iptn.co.id
rtt 4 ms
bridge.ikipbdg.ac.id
rtt 5 ms
router-wavelan.itenas.ac.id
cisco1.sanfrancisco.wide.ad.jp
border1-serial2-1.SanFrancisco.mci.net
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