

Global Development Learning Network (GDLN)

“HOW IT WORKS”

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GDLN Network

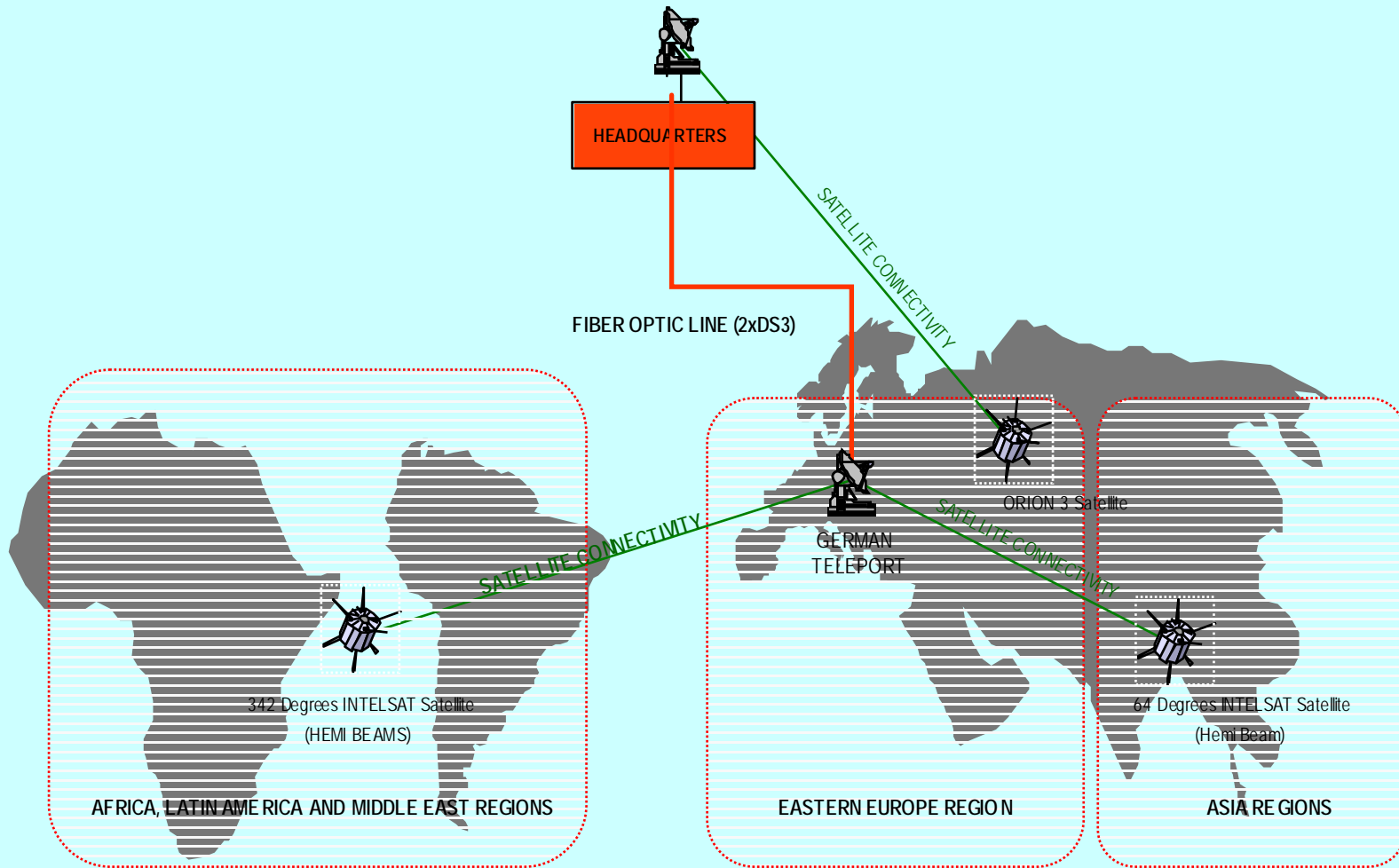
- World Bank Global Communications Network (119 countries)
- Distance Learning Centers
- Impact of Internet2

HIGH SPEED GLOBAL CONNECTIVITY: BRIDGING DISTANCE AND TIME



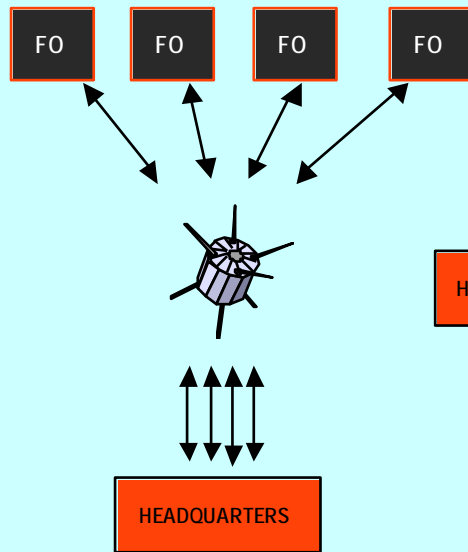
- **High-speed, reliable network of regional satellites and fiber**
- **A network of 3 satellites serves the Bank's offices in Africa, Asia, Europe, Latin America and the Caribbean, and the Middle East**
- **Voice, data, video, fax, Internet and Intranet access to 119 Bank Offices and 50+ Distance Learning Centers**

TELEPORT LOCATION

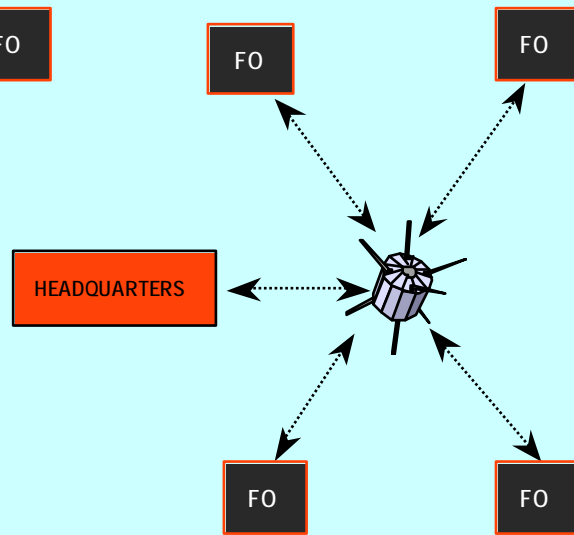


MIGRATION TO IP

PAMA
(Dedicated Links)

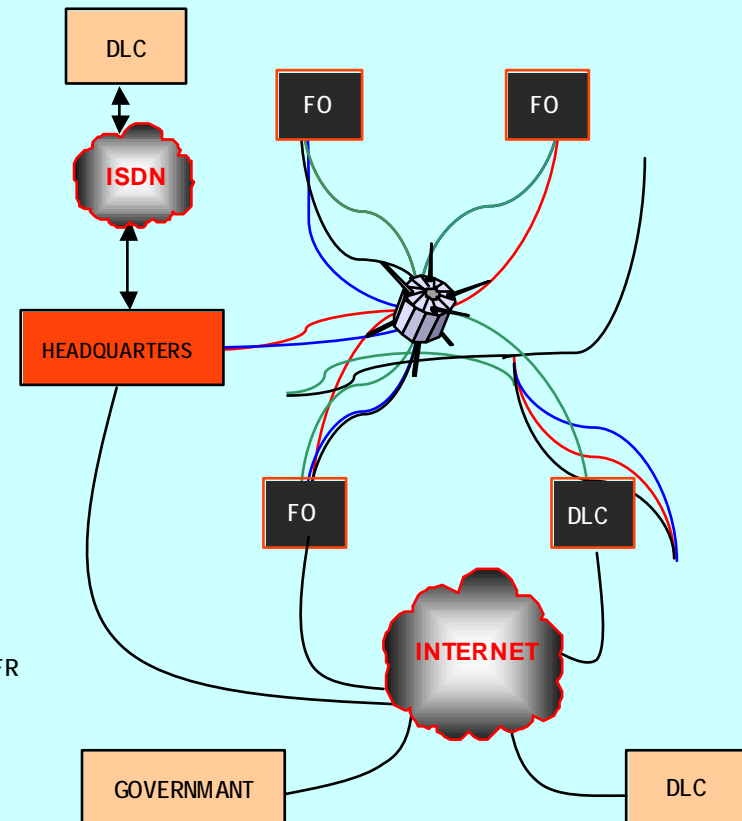


DAMA
(Virtual DAMA Links)

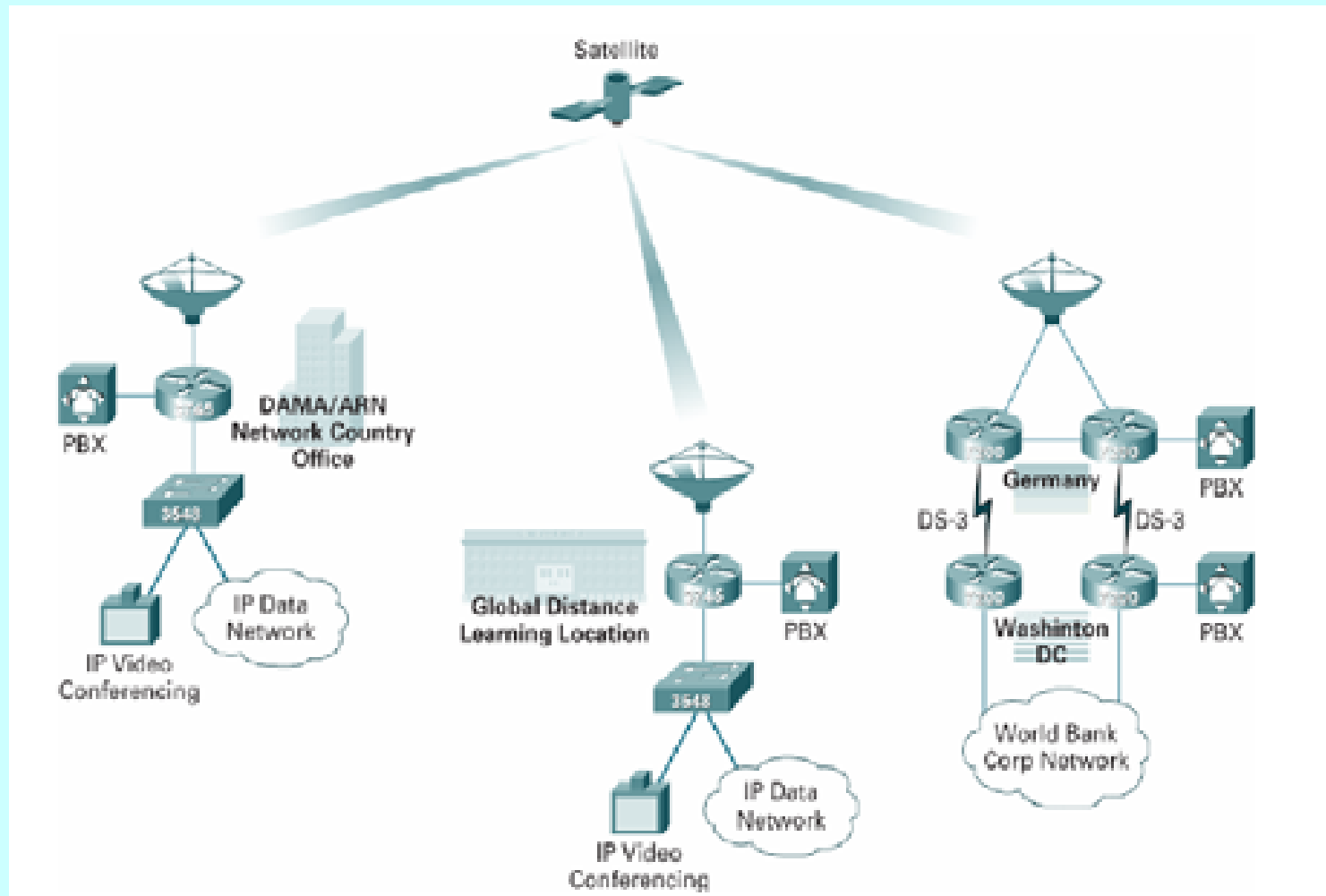


- INTELSAT'S DAMA
- NORTEL-DASA TDM/TDMA/FR

IP Over Asymmetrical SCPC
(Virtual DAMA Voice, Video and Data IP Channels)



CONVERGENCE OF VIDEO, VOICE, AND DATA TO IP PLATFORM



IP SERVICES WITH GUARANTEED QOS

- **QOS implemented on fragmented high utilized links supporting 768kbps**
- **QOS provides bandwidth and jitter guaranties**
- **QOS is based on end-to-end “diffserv” model**

VOICE HEADER COMPRESSION

- **VoIP is based on 8Kbps algorithm, which with overhead requires 26.4Kbps IP channel** (40 bytes IP/UDP/RTP header)
- **When RTP header compression (RFC2508) is used, for the same algorithm only 11.2Kbps IP channel is needed**
(40 bytes of IP/UDP/RTP reduced to 2–4 bytes)

IP VOICE (VoIP)

Toll bypass approach:

- **Keep existing telephones and PBXs**
- **Use VoIP to provide connectivity between the PBXs**

VoIP based on G.729 codec:

- **8kbit/s CS-ACELP codex**
- **Excellent voice quality**
- **MOS 3.92 (compare to MOS 4.1 for G.711/pcm)**

IP VIDEO

- **Room based videoconferencing systems**
- **H.323 based videoconferencing**
- **256Kbit/s per call**
- **G.711 for audio (64Kbits/s)**
- **H.261 for video (~180 Kbit/s)**

IP MIGRATION BENEFITS

- **Improved quality of all services**
- **Single communications pipe for voice, data and video**
 - **Low communications equipment complexity (only router)**
 - **Low operation and management costs**
- **Easy integration with local area networks (desk-top video)**

IP MIGRATION BENEFITS(continued)

- **Automated dynamic service interchange**
- **Automated videoconference scheduling**
 - **Full compatibility with Internet**
- **Simple re-engineering for future growth**

ASYMETRICAL SCPC SATELLITE CHANNELS

- **10 SCPC 384/768Kbps satellite channels combined into A single sub-group**
- **Each sub-group is served by a single 4/8Mbps outgoing channel and ten 384/768Kbps return channels**
- **Asymmetrical solution provides an excellent bandwidth utilization**
- **One single 256Kbps outgoing video stream is used to feed all eight nodes during multi-point video session**

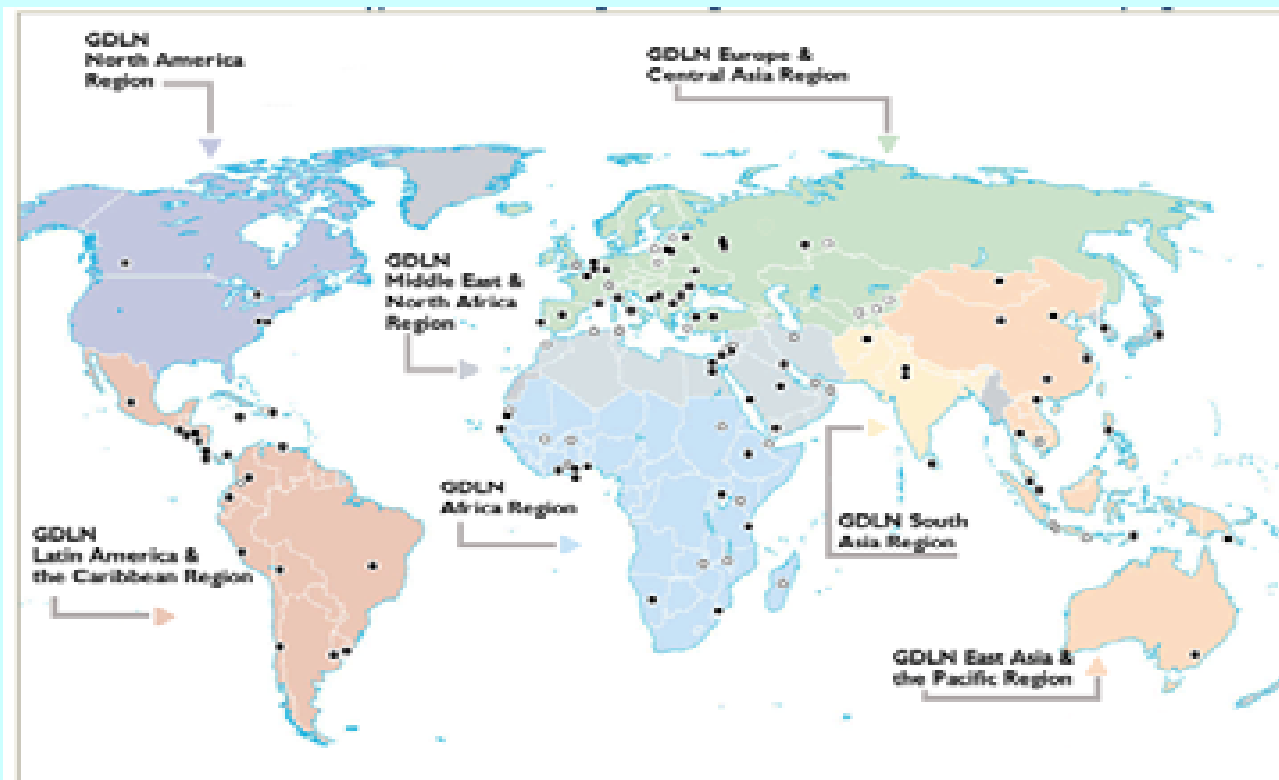
Distance Learning Centers

Locations and Functionality

Types of Distance Learning Centers

- In some cases we have built a separate center which is connected to World Bank Network via VSAT, IPL, ISDN, or INTERNET
- In some cases we have made space available at World Bank Country Offices to build a DLC.
- In some cases an institution has joined the GDLN as affiliate
- In some cases we have partnered with other organizations like British Council

LOCATION OF DLC CENTERS WORLDWIDE (82 EXISTING)



IBRD 32525
June 2003

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11 EXISTING DLC CENTERS IN AFRICA (2 PLANNED)

Country	City	GDLN Center
Benin	Cotonou	Centre d'Éducation à Distance du Bénin
Burkina Faso***	Ouagadougou***	Centre d'Éducation à Distance - Ouagadougou (CEDO)
Côte d'Ivoire	Abidjan	Centre d'Éducation à Distance - Côte d'Ivoire
Ethiopia	Addis Ababa	Ethiopian Civil Service College
Ghana	Accra	Ghana Institute of Management and Public Administration (GIMPA)
Ghana*	Accra*	British Council Knowledge and Learning Centre (KLC)
Kenya***	Nairobi***	World Bank Country Office
Mauritania	Nouakchott	Centre de Formation et d'Échanges à Distance (CFED)
Mozambique	Maputo	Eduardo Mondlane University
Namibia	Windhoek	University of Namibia (UNAM)
Senegal	Dakar	Centre d'Éducation à Distance - Ecole Nationale d'Administration et de Magistrature (ENAM)
Tanzania	Dar es Salaam	Tanzania Global Development Learning Centre (TGDLC)
Uganda	Kampala	Uganda Management Institute (UMI)

14 EXISTING DLC CENTERS IN EAST ASIA & PACIFIC (1 PLANNED)

Country	City	GDLN Centers
Australia	Canberra	Australian National University (ANU)
China	Beijing	World Bank Country Office
China	Guizhou	Guizhou School of Administration
China	Ningxia	Ningxia University
China	Shanghai	SNAI - Shanghai National Accounting Institute
Japan	Tokyo	Tokyo Development Learning Center (TDLC)
Malaysia*	Kuala Lumpur*	British Council Knowledge & Learning Center (KLC)
Mongolia	Ulaanbaatar	World Bank Country Office
Papua New Guinea	Port Moresby	World Bank Office
Philippines	Manila	Asian Institute of Management and The World Bank Development Resource Center (AIM-WB DRC)
Singapore	Singapore	Civil Service College of the Institute of Public Administration and Management (IPAM)
South Korea	Seoul	Korea Development Institute (KDI), School of Public Policy and Management
Thailand	Bangkok	Chulalongkorn University
Timor Leste	Dili	World Bank Country Office
Vietnam	Hanoi	Vietnam Development Information Center (VDIC)

9 EXISTING DLC CENTERS IN EUROPE (1 PLANNED)

Country	City	GDLN Centers
Belgium	Brussels	World Bank Country Office
France**	Marseille**	World Bank Institute, Marseilles Office
France	Paris	GDLN Services, World Bank Paris Office
France*	Paris*	British Council Knowledge & Learning Center (KLC)
Germany	Bonn	University of Bonn/ZEF
Italy	Milano	Chamber of Commerce of Milan/Promos
Italy	Rome	International Development Law Organization (IDLO)
Netherlands	Delft	UNESCO-IHE Institute for Water Education
Portugal*	Lisboa*	Universidade de Aberta
Spain	Madrid	Fundación CEDEET

14 EXISTING DLC CENTERS IN EASTERN EUROPE & CENTRAL ASIA (2 PLANNED)

Country	City	GDLN Centers
Bosnia and Herzegovina	Sarajevo	E-Net Center, Faculty of Economics - Sarajevo
Bulgaria	Sofia	Center for the Study of Democracy
Latvia	Valmiera	Vidzeme University
Lithuania	Kaunas	Kaunas University of Technology
Lithuania	Vilnius	Vilnius University
Romania	Bucharest	Institute for Business & Public Administration (ASEBUS)
Russian Federation**	Kaliningrad**	Kaliningrad State University, Institute of Information Technologies
Russian Federation	Moscow	Russian Academy of Public Administration
Russian Federation	Moscow	World Bank Office
Russian Federation**	Perm**	PSTU Regional Center of Informatization
Russian Federation	St. Petersburg	St. Petersburg State University, St. Petersburg
Slovenia	Ljubljana	Center of Excellence in Finance
Serbia & Montenegro*	Belgrade*	British Council Knowledge & Learning Center (KLC)
Turkey	Ankara	Bilkent University
Turkey*	Ankara*	British Council Knowledge & Learning Center (KLC)
Turkey	Istanbul	Istanbul Technical University
Ukraine	Kyiv	National Academy of Public Administration (UAPA)

19 EXISTING DLC CENTERS IN LATIN AMERICA (2 PLANNED)

Country	City	GDLN Centers
Argentina	Buenos Aires	Universidad de Buenos Aires (UBA)
Bolivia	La Paz	Servicio Nacional de Administración Personal (SNAP)
Brazil	Brasilia	World Bank Office
Chile	Santiago	UVirtual
Colombia	Bogotá	Universidad de los Andes
Costa Rica	San José	Universidad Estatal a Distancia (UNED)
Costa Rica	San José	Centro de Capacitación a Distancia (CECADI), Instituto Interamericano de Cooperación para la Agricultura (IICA)
Dominican Republic	Santo Domingo	Instituto Nacional de Administración Pública (INAP)
Ecuador	Cuito	Globatel, Inc.
Ecuador	Quito	Universidad Particular de Loja (UTPL)
El Salvador	San Salvador	Asociación Infocentros
Guatemala	Ciudad de Guatemala	Universidad Rafael Landívar
Honduras	Tegucigalpa	Profuturo
Jamaica	Kingston	UTech - University of Technology, Jamaica
México	Guadalajara	Universidad Autónoma de Guadalajara
México**	México City**	Instituto Politécnico Nacional (IPN)
Nicaragua	Managua	Centro de Capacitación a Distancia de Nicaragua, Oficina del Banco Mundial en Managua
Panamá	Ciudad de Panamá	Fundación Ciudad del Saber
Perú	Lima	Pontificia Universidad Católica del Perú
Uruguay**	Montevideo**	Universidad ORT Uruguay
Venezuela	Caracas	World Bank Office

7 EXISTING DLC CENTERS IN MIDDLE EAST AND NORTHERN AFRICA (2 PLANNED)

Country	City	GDLN Centers
Arab Republic of Egypt	Cairo	Regional Information Technology and Software Engineering Center (RITSEC)
Arab Republic of Egypt*	Cairo*	British Council Knowledge & Learning Center (KLC)
France	Marseille	World Bank Institute, Marseilles Office
Jordan	Amman	University of Jordan
Kuwait**	Kuwait**	Kuwait Distance Learning Center
Saudi Arabia	Jeddah	The Islamic Development Bank (IsDB)
Saudi Arabia	Riyadh	The Institute of Public Administration (IPA)
West Bank & Gaza	Birzeit	Birzeit University
Yemen, Rep. of**	Sana'a**	National Information Center - Training Unit (NIC)

4 EXISTING DLC CENTERS IN NORTH AMERICA

Country	City	GDLN Centers
Canada*	Ottawa*	Carleton University
Canada*	Edmonton*	University of Alberta
USA*	Washington, DC*	Howard University Telehealth Sciences and Advanced Technology Center
USA	Washington, DC	GDLN Services, World Bank Institute

4 EXISTING DLC CENTERS IN SOUTH ASIA

Country	City	GDLN Centers
Afghanistan	Kabul	Afghanistan Distance Learning Center (AfDLC)
India*	New Delhi*	British Council Knowledge and Learning Center (KLC)
India	New Delhi	The Energy and Resources Institute (TERI)
Sri Lanka	Colombo	Sri Lanka Institute of Development Administration (SLIDA)

TYPICAL GDLN CENTER (BRAZIL)

- **Managing public expenditure**
- **Judicial reform**
- **E-commerce, e-government**
- **Hospital management**
- **Indigenous profiles**
- **Municipal management**
- **Intellectual property rights**
- **Agricultural technology and productivity**
- **Child protection**
- **Citizen participation in national policy dialogue**
- **Anti-corruption and transparency**
- **Disaster management**

LEARNING INTERACTIONS THAT DEFINE GDLN FUNCTIONALITY

- **Interaction between student and teacher**

- Two-way videoconferencing
- Two-way voice communications
- Two-way collaboration tools

- **Interaction between students**

- Discussion forum
- Chat room and bulletin board

- **Interaction between student and study material**

- Web-based access to course material and information resources
- Internet access

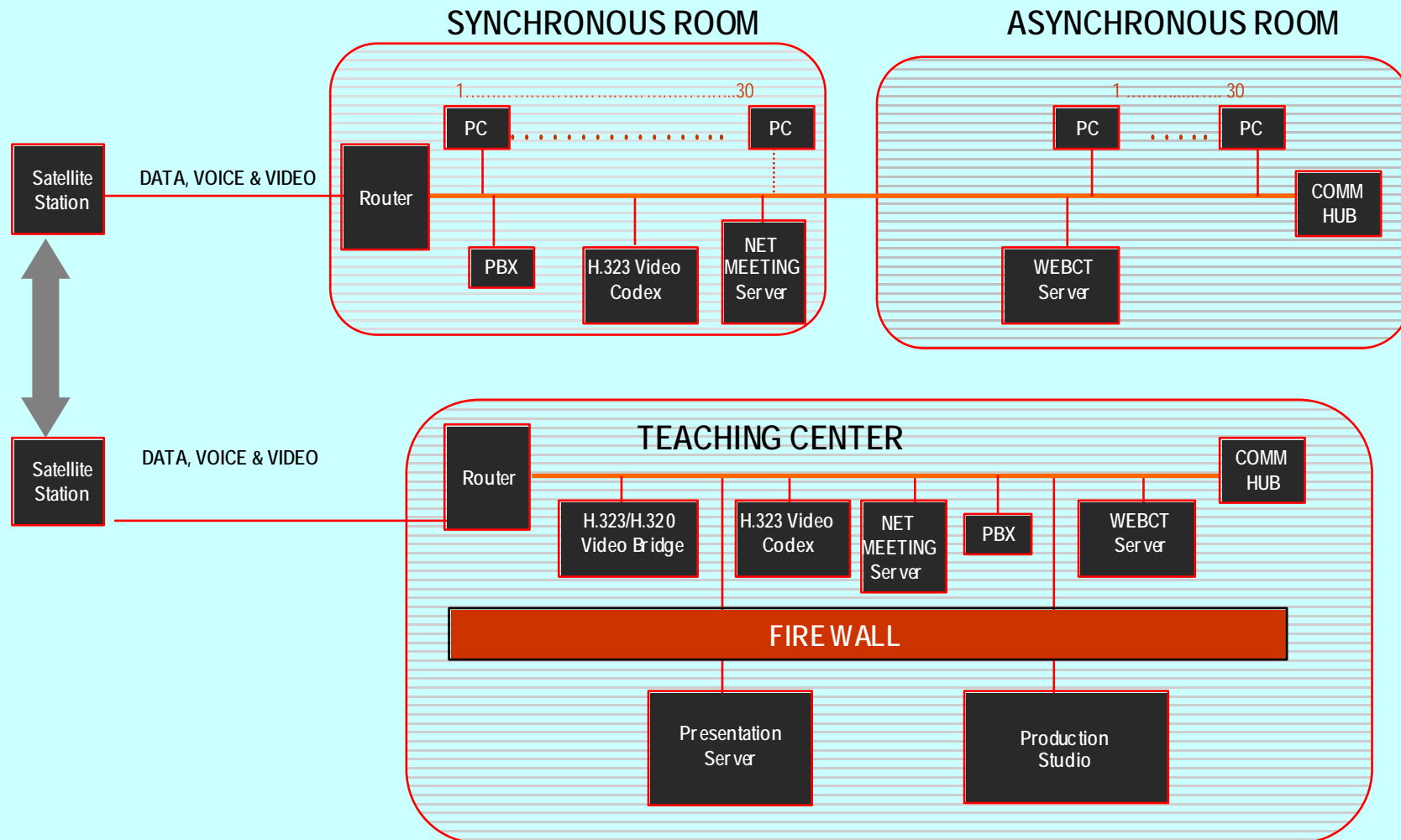
GDLN MULTIMEDIA SERVICE REQUIREMENTS

- **Two-way multi-channel toll-quality voice service**
- **High speed full duplex data service (up to 4mbps)**
- **High quality two-way video service (256kbps)**

GDLN VIDEO-CONFERENCING SERVICE REQUIREMENTS

- **Point-to-point: two-way real-time video communications between two DLCs**
- **Multi-point: multi-way real-time video communications between multiple DLCs**
- **Broadcast: one-way video communications between central site and multiple DLCs**

IP BASED GDLN CENTERS INFRASTRUCTURE





Future initiatives

Internet2

INTERNET ONE VERSUS INTERNET TWO

INTERNET ONE IPv4

- Originally Designed For Data Only
- 32bit IP Addresses (cca 4 billion addresses)
- Security Solutions Application Based
- Quality-of-Service (QoS) Only Implemented on Dedicated Routes
- Existing

INTERNET TWO IPv6

- Designed For Multimedia Applications (Voice, Video, Data)
- 128bit IP Address (cca 340 trillion trillion addresses)
- Built-in Security Solution
- Built-in Quality-of-Service Network Wide
- Slowly Emerging

CURRENT INTERNET TWO IMPLEMENTATIONS

- **Private Corporate Networks**
- **Limited Commercial Offerings On Dedicated Routes (In USA Sprint Provides Limited Service Between Some Cities)**
- **In Europe Some Universities Have implemented Internet Two at Their Campuses**
- **The World Bank Has Implemented Internet Two Over It's Global Network**

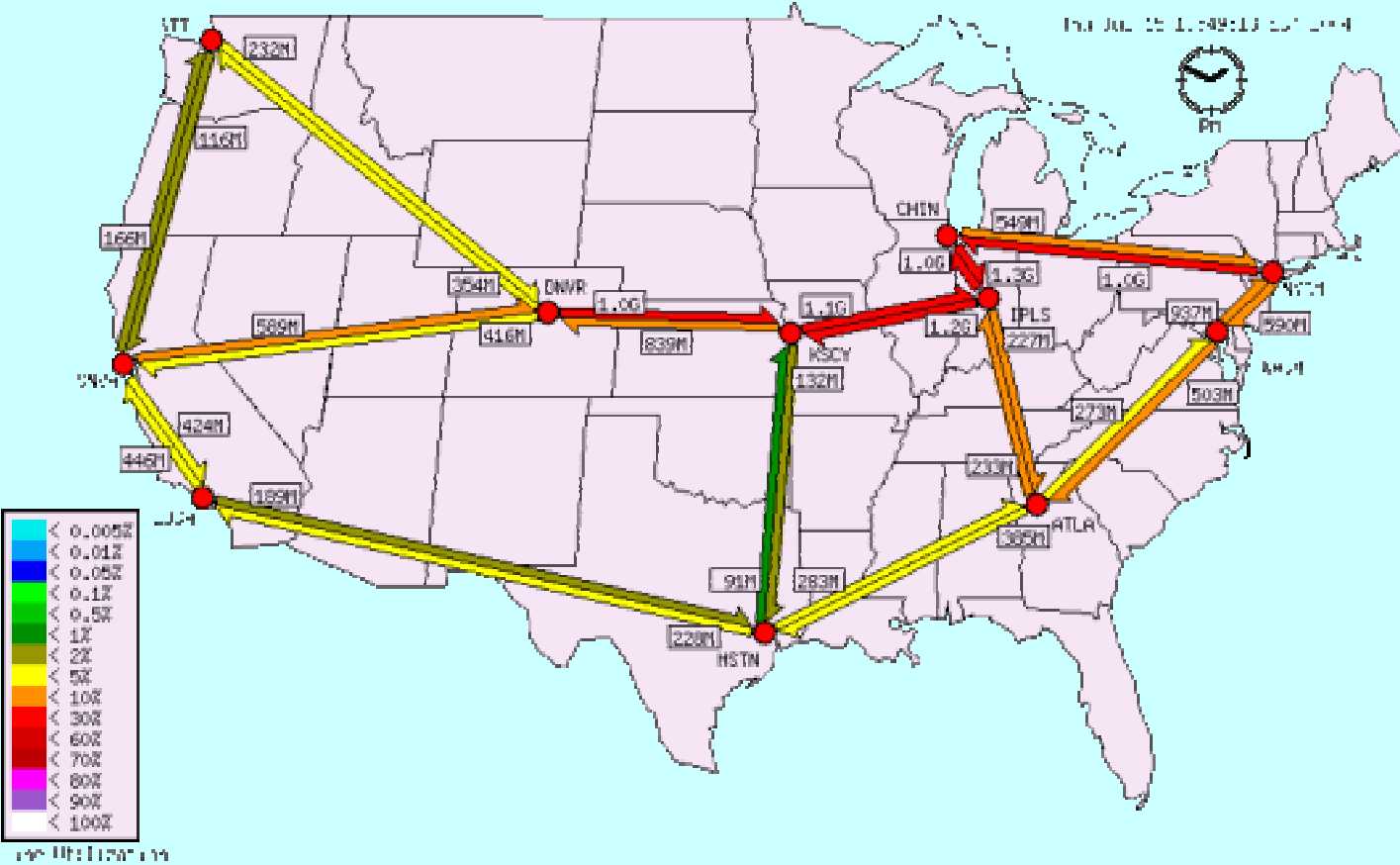
Internet2 Consortium

- **Consortium led by 200 universities working in partnership with industry and government**
- **Tasked to Develop and Deploy Advanced Network Applications and Technologies for tomorrow's Internet**
- **Aimed to Recreate the Partnership among Academia, Industry and Government (that fostered today's Internet in its infancy)**
- **Jointly, they have built Abilene Network**

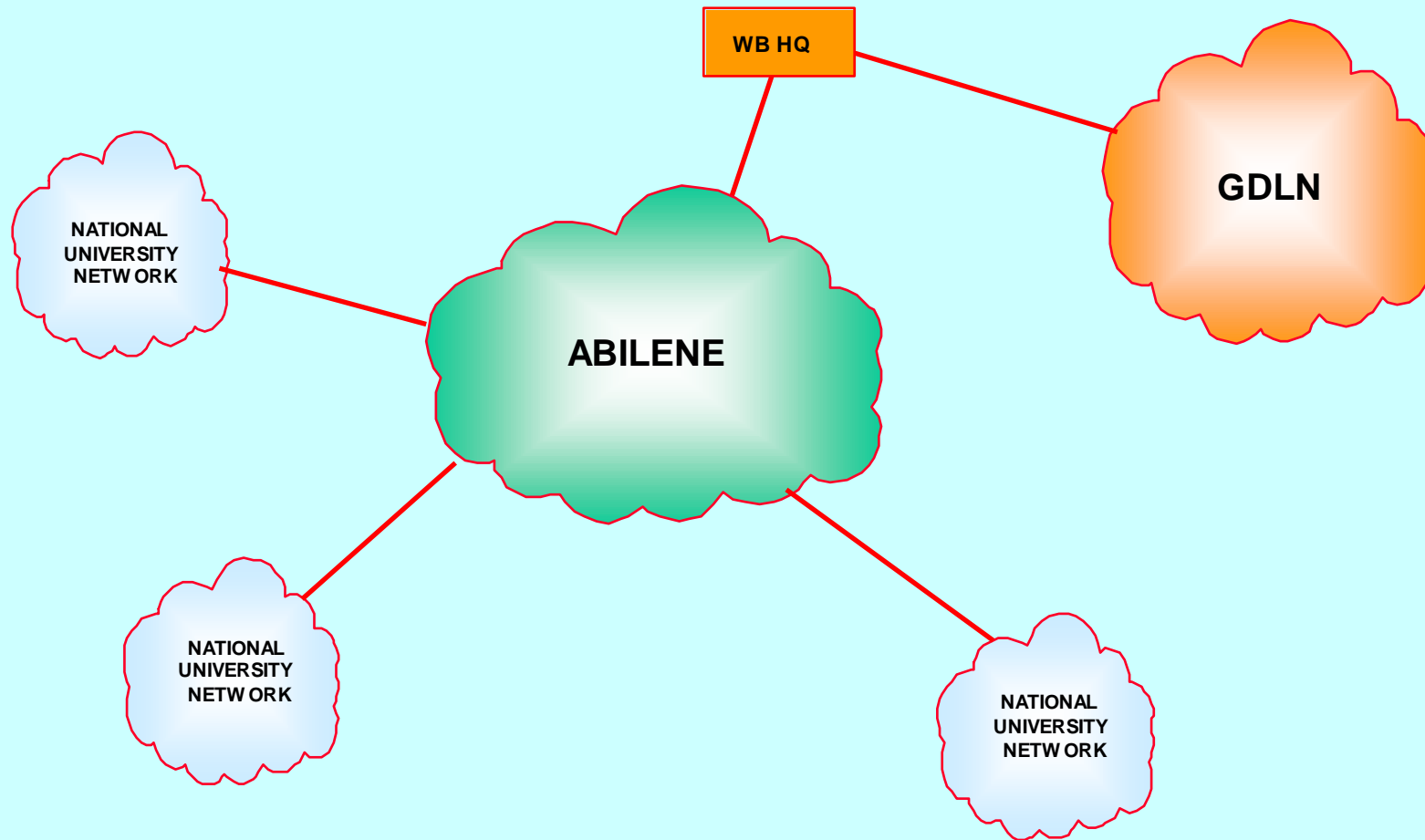
Current Status of Abilene Network

- **10 Gbps Backbone**
- **Uses both, Internet Protocol version 4 (IPv4) and native IPv6**
- **Based on OC-192c circuits**
- **All equipment collocated with Qwest points of presence (PoPs)**
- **Still not able to implement QoS**
- **Heavily underutilized, enabling VC support without QoS**

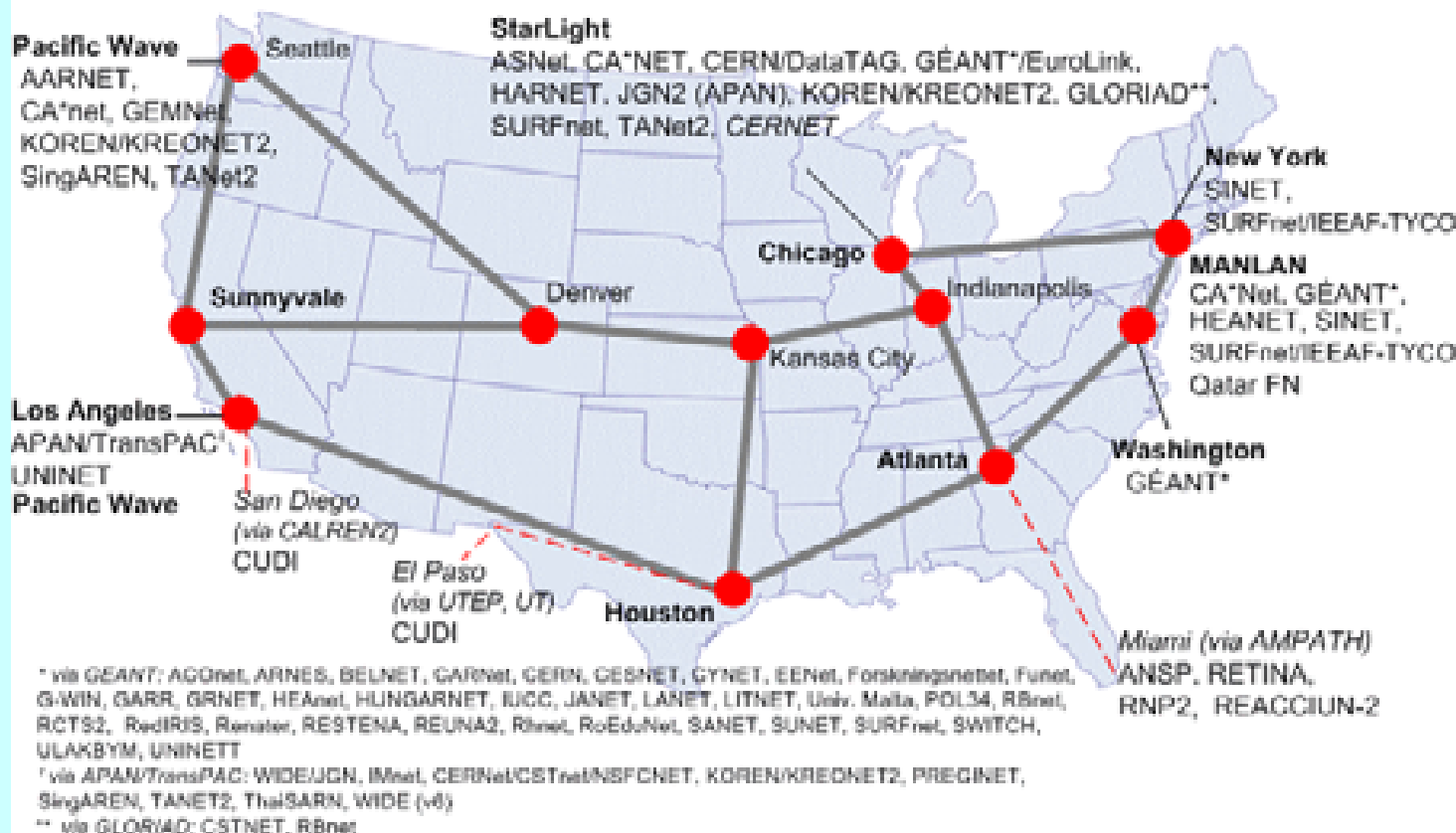
Abilene Network Backbone Utilization



How GDLN will connect to Internet2



Abilene International Network Peers



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SINET

What is the Science Information Network (SINET)?

The Science Information Network (SINET) is an information communication network dedicated to academic research. This network connects nationwide connection points (nodes) through high speed communication lines; at each node, facilities such as ATM switches and IP routers are installed.

SINET mutually connects with the Inter-Ministry Research Information Network (IMnet) and commercial Internet service providers to promote the international exchange of information as well as exchange of research data between the industrial, governmental, and academic sectors.




[Composition Figure \(Japan Map\)](#)

A Chronology of the Science Information Network (SINET)

Domestic Activities

January, 1987	Operation of the packet switching network service is started.
October, 1990	Operation of access point service is started.
March, 1991	Planned development of the packet switching network is completed as planned.
April, 1993	Operation of the Internet backbone network service (SINET) is started. Access to "SINET" is used to

Composition Figure (Japan Map)

-  Super SINET 10Gbps
-  International line Approximately 5Gbps
-  Domestic Circuit 30~100Mbps

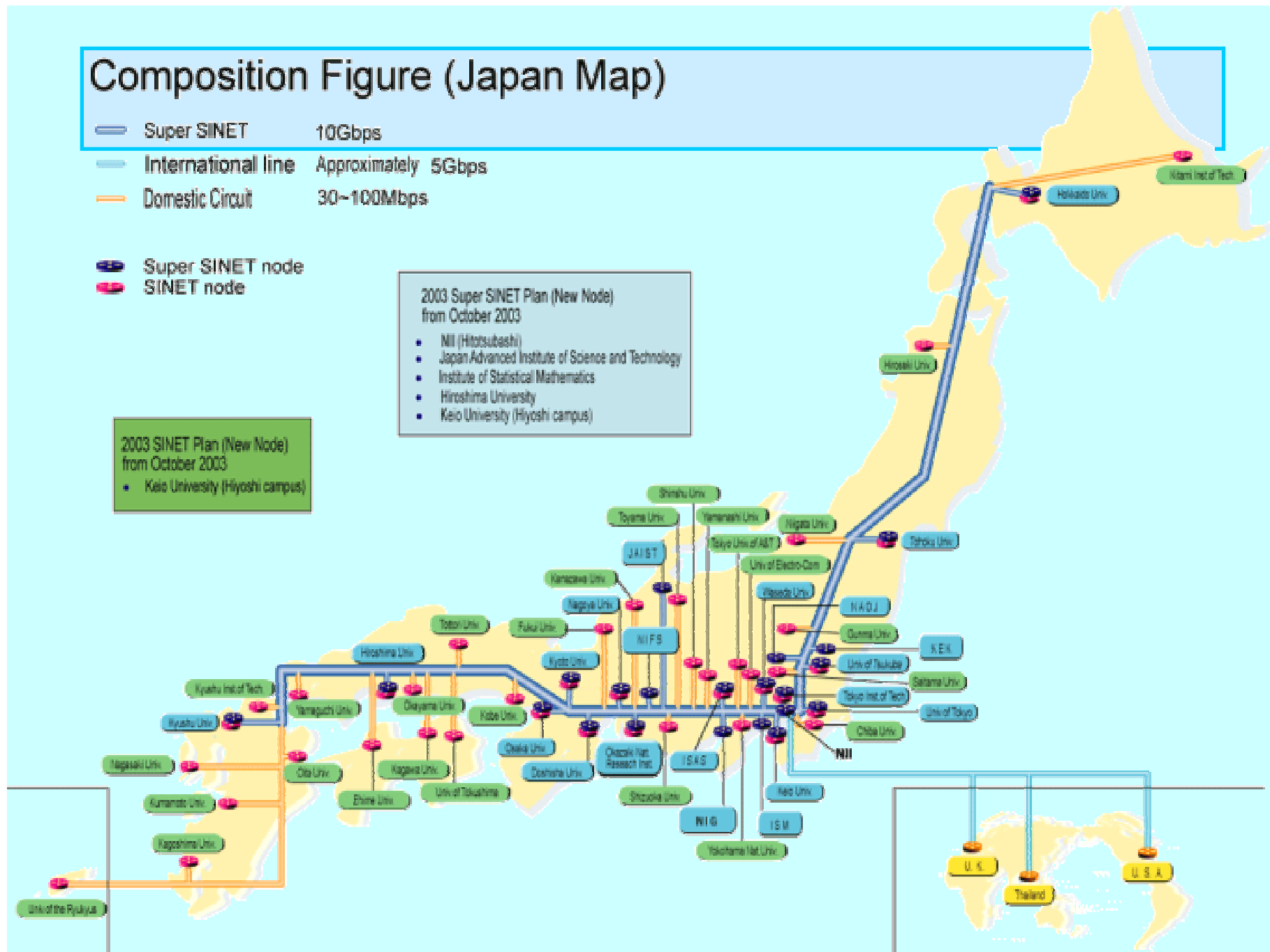
-  Super SINET node
-  SINET node

2003 Super SINET Plan (New Node) from October 2003

- NII (Hitotsubashi)
- Japan Advanced Institute of Science and Technology
- Institute of Statistical Mathematics
- Hiroshima University
- Keio University (Hiyoshi campus)

2003 SINET Plan (New Node) from October 2003

- Keio University (Hiyoshi campus)



Key to Successful Utilization Of Abilene Resources

- **On the long run, full usage of multipriority QoS scheme**
- **As QoS currently is currently not supported, VC performance over the Abilene backbone is “enabled” on the best-effort-basis and is achieved using the network’s excess capacity.**
- **Leased line providing connectivity between GDLN center and Abilene backbone has to provide enough capacity to prevent an overload. This will enable VC usage without QoS.**
- **Once QoS is implemented leased line capacity can be reduced**

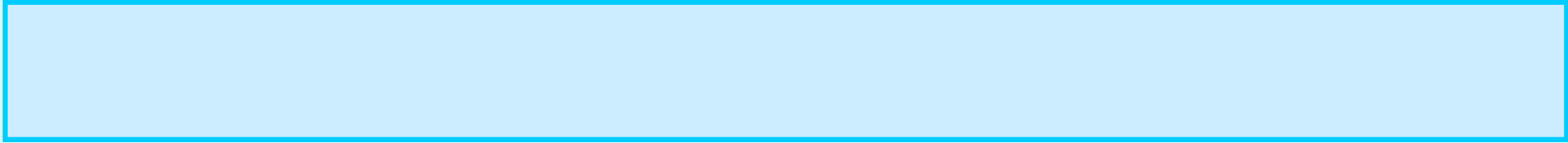
Resources

www.gdln.org
www.jointokyo.org

Background reading (handouts):

Cisco article

CIO article



THE END