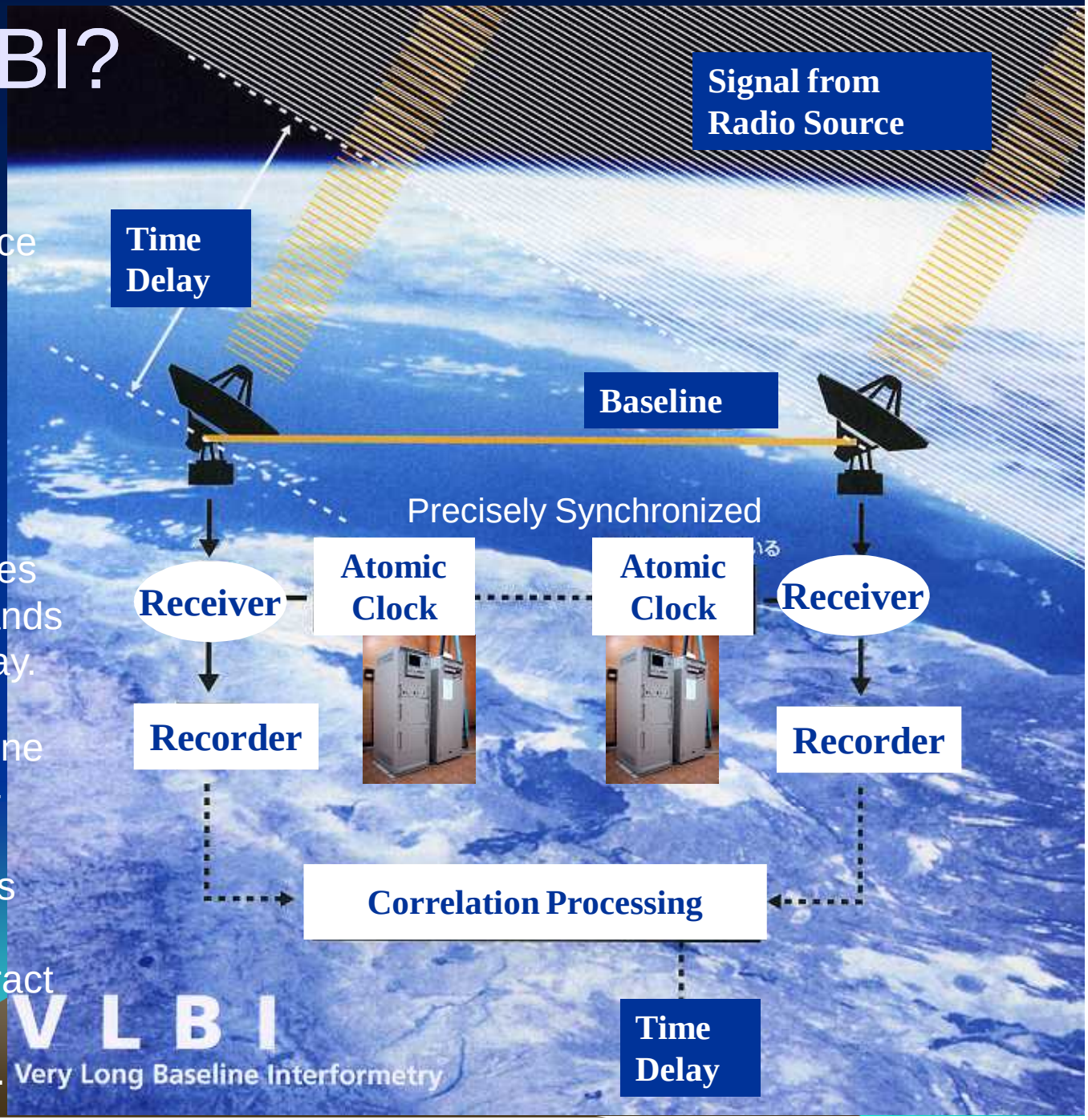

E-VLBI over DCN
eVLBI Group of NICT
Kashima Space Research Center
New Generation Network Reseach Center

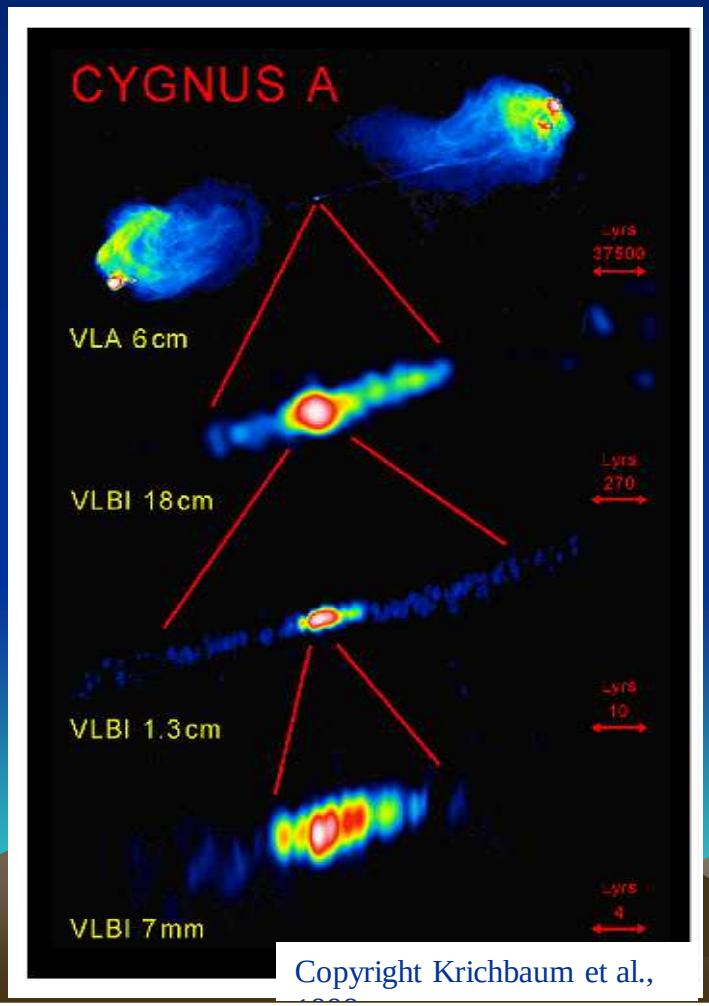
What is VLBI?

- Observation Tech. for Radio source in the space
- High Resolution tool for
  - Radio Astronomy
  - Geodynamics
  - Spacecraft Navigation
- The target Radio sources are at distances of thousands to billions of light year away.
- Data rate generated at one observatory is 256 Mbps - 1Gbps.
- The data from all stations have to be collected and correlation process to extract the common radio signal captured at observatories.



VLBI for Radio Astronomy

Space observation Technology with Highest angular resolution.
It is 100 times higher that the Habble Space Telescope .



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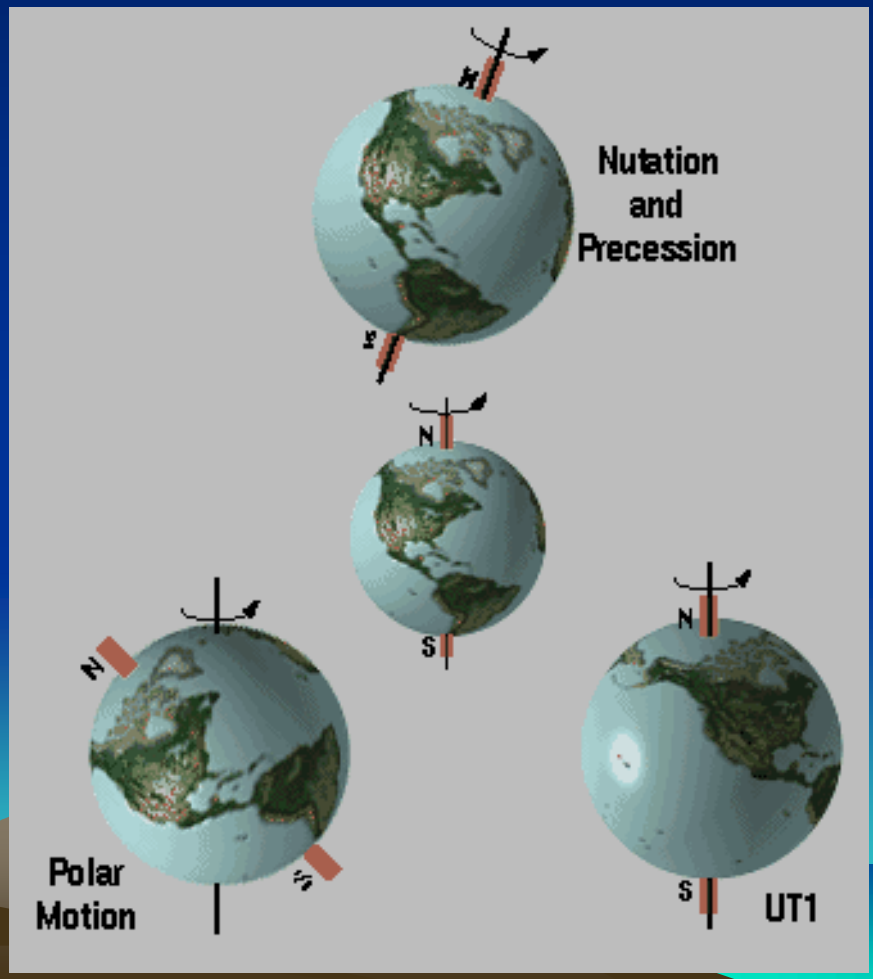
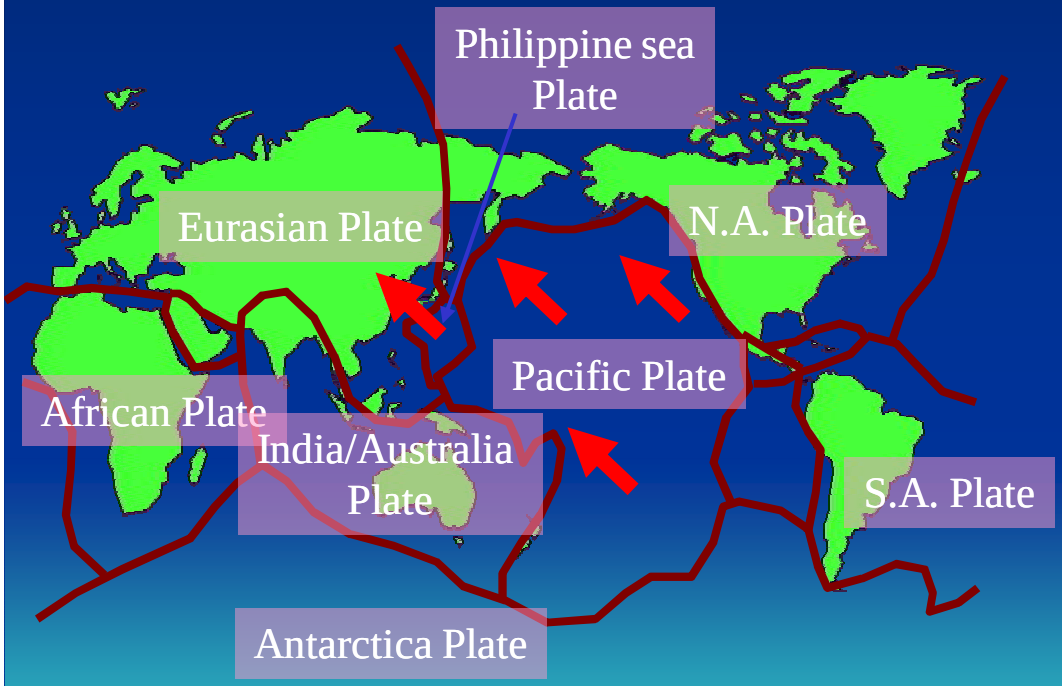
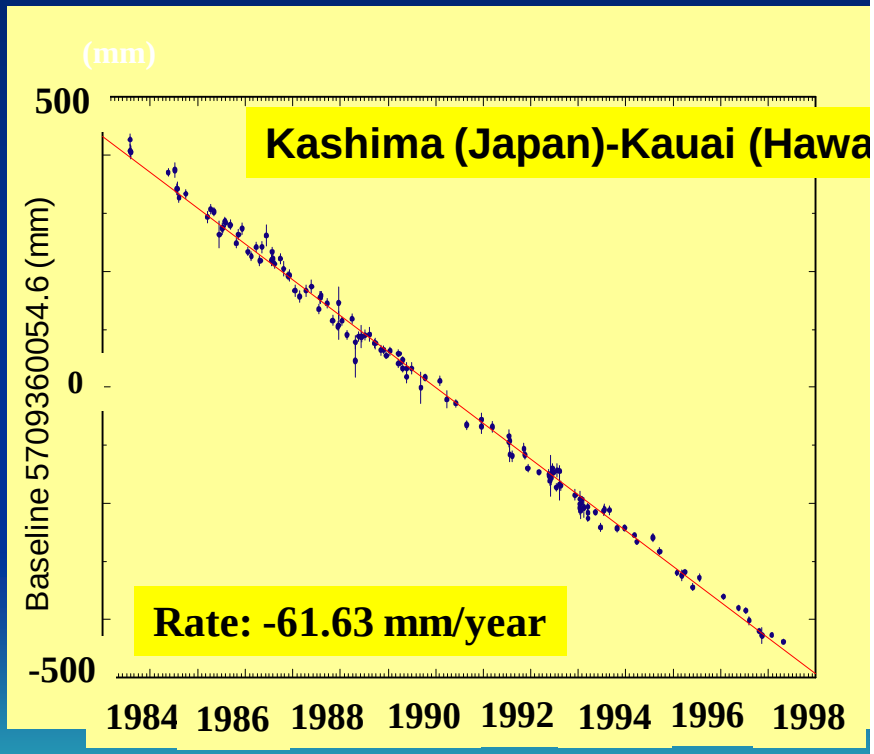


VLBI for Geodynamics

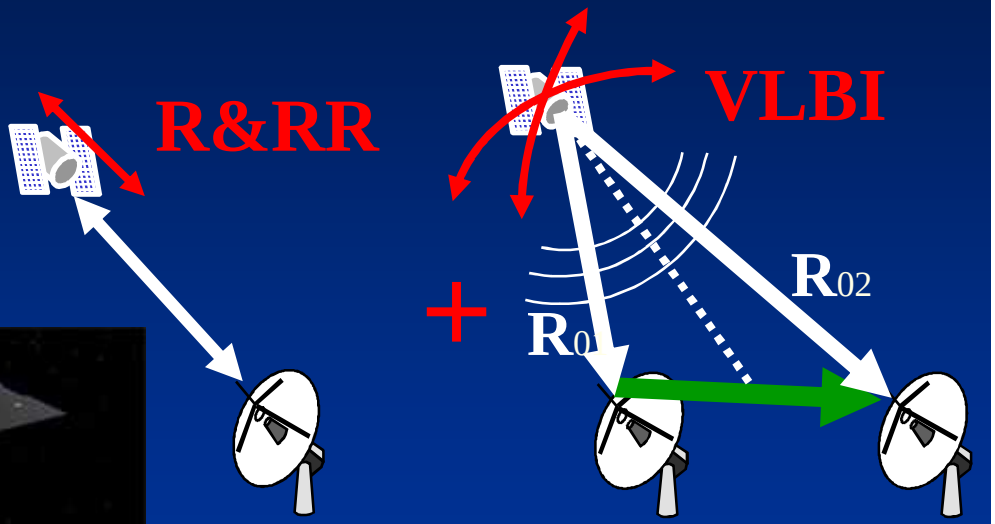
VLBI can measure the distances between radio telescopes with precision better than 1cm over thousands of km baseline length.
It has been used for motion of the crust on the surface of the Earth.





VLBI for Spacecraft Navigation

VLBI is used for precise orbit determination for spacecraft in the deep space.



Spacecraft NOZOMI for Mars exploration mission by ISAS Japan

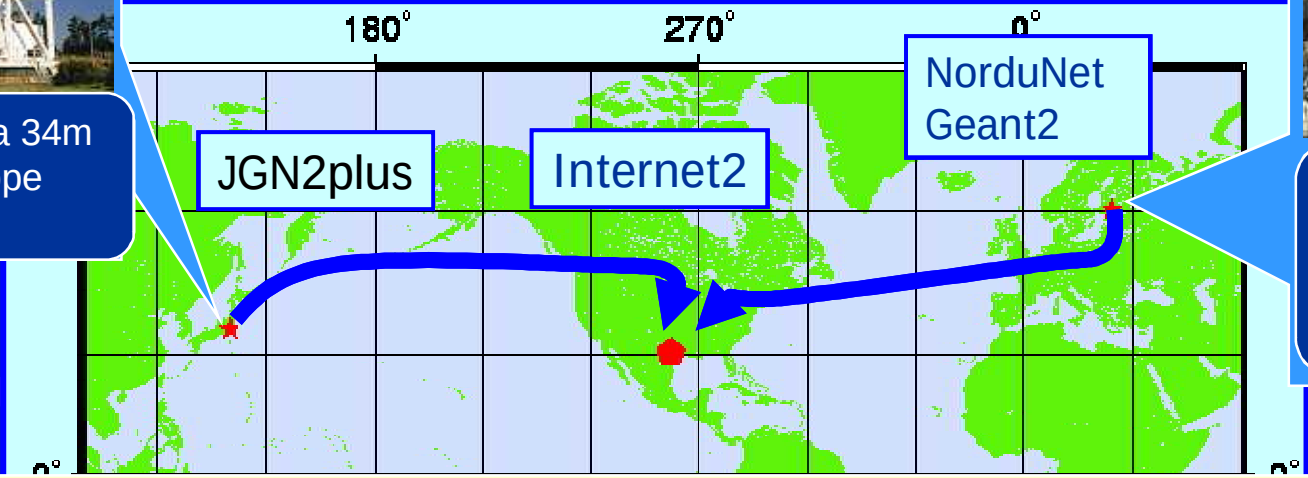
Spacecraft HAYABUSA for exploration of asteroid Itokawa launched by ISAS Japan

Quick results is required for this application. Thus network connected VLBI (eVLBI) is quite suitable for this application

eVLBI over DCN

NICT Kashima 34m
Radio Telescope
NICT (Japan)

Demo Overview: Global Map



Metsähovi Radio
Observatory 14m
Radio Telescope
Helsinki Univ.
Tech(Finland)

VLBI is quite tolerant on the error rate of the data communication.

VLBI allows error rate up to 1%!, and
it requires bandwidth order of 1G per station.

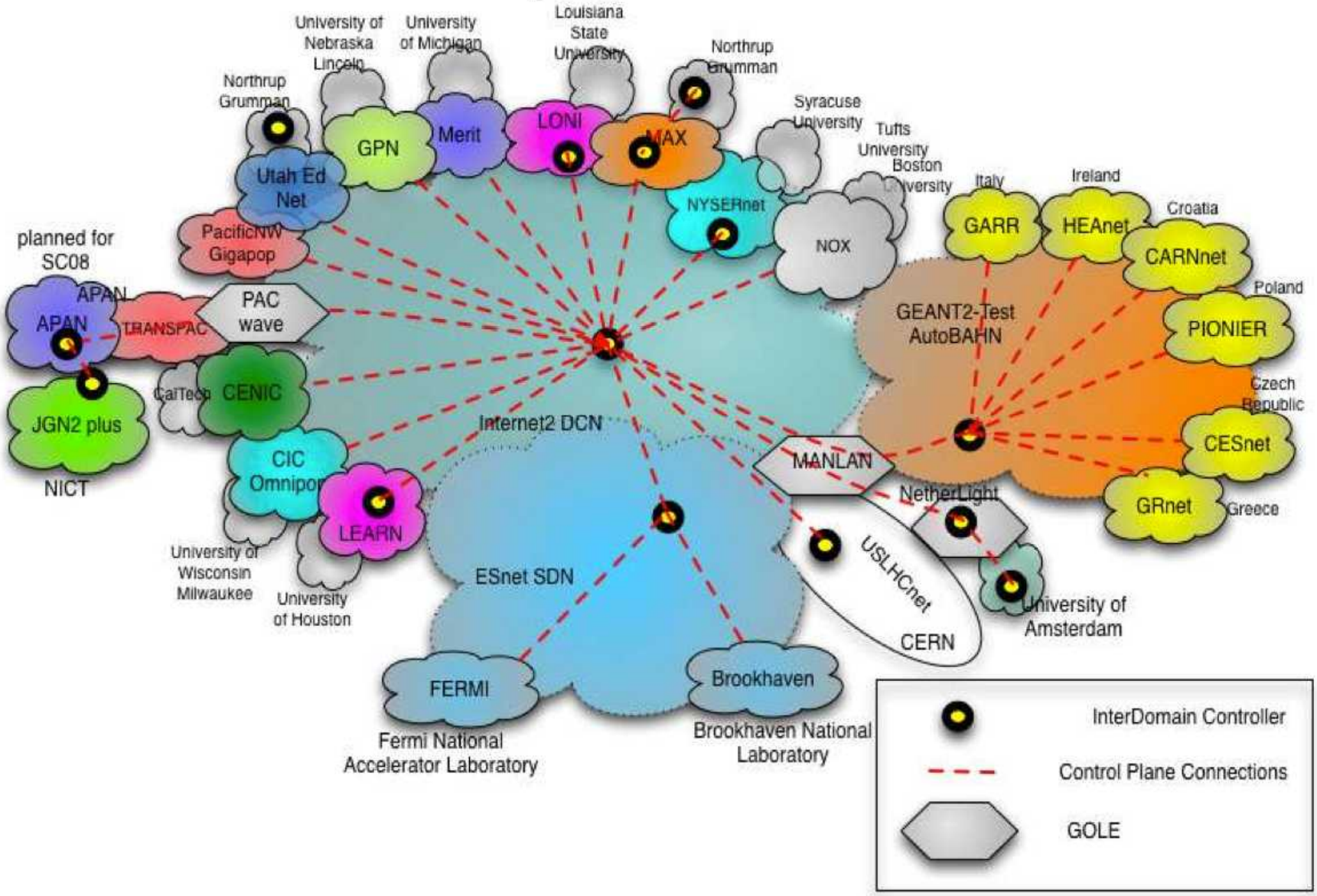
Therefore, Technology of Dynamic creation of dedicated network is promising for global e-VLBI application.

DCN
-Dynamic Circuit Network-

- Provides connection type of service
- VLAN path is created by user request
- Inter-domain connection is possible to be established by IDC

- Demonstration is the first time between U.S and japan

Global Dynamic Circuit Network



DCN Connection