国土地理院
Geospatial Information Authority of Japan

New Project for Constructing a VLBI2010 Antenna in Japan

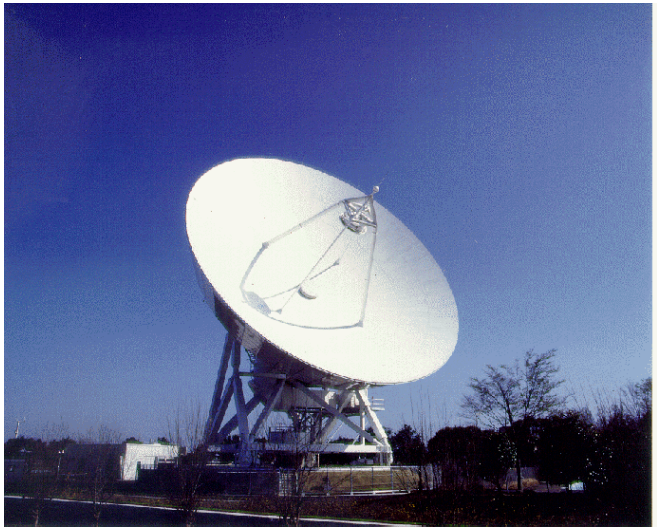
Yoshihiro FUKUZAKI
Geospatial Information Authority of Japan (GSI)
Ministry of Land, Infrastructure, Transport and Tourism

Introduction myself (FUKUZAKI)

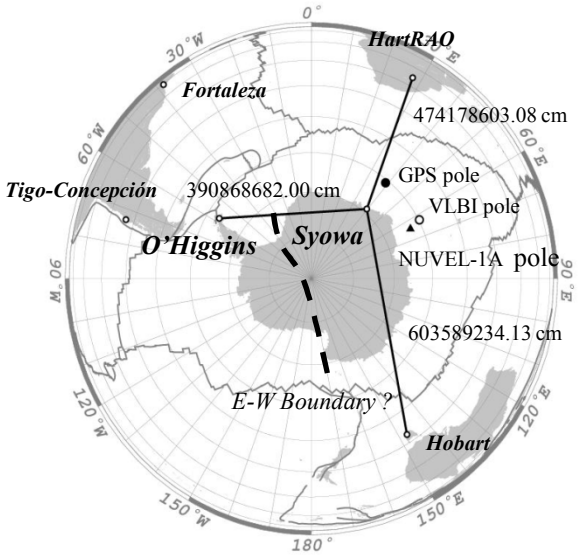
I have been working in GSI VLBI group since 1994.
My main tasks were;

- Operation of Kashima 26m station (It was removed in 2003.)
- Construction of Tsukuba 32m antenna and other GSI's antennas (1995 to 1998)
- Syowa VLBI experiment on Antarctica (Wintering from Dec. 1998 to Feb. 2000)
- Group leader of GSI VLBI group in 2000 & 2001
- Correlation & Analysis of Antarctic VLBI data in Bonn, Germany in 2002

Recently, I re-joined GSI VLBI group for a new project for constructing a new antenna!



Tsukuba 32-m antenna



GSI's VLBI Network & Components

Network Stations (in Japan)

Present GSI's VLBI Network
(GSI Advanced Radiotelescope NETwork: GARNET)

Correlator

Software-based correlator developed by NICT

Mainly, the following sessions are processed

- JADE (Japanese Domestic)
- JAXA (another Domestic)
- INT2

Analysis Center

CALC/SOLVE

OCCAM

C5++

Mainly, the following sessions are analyzed

- Global solution
- Rapid dUT1 production

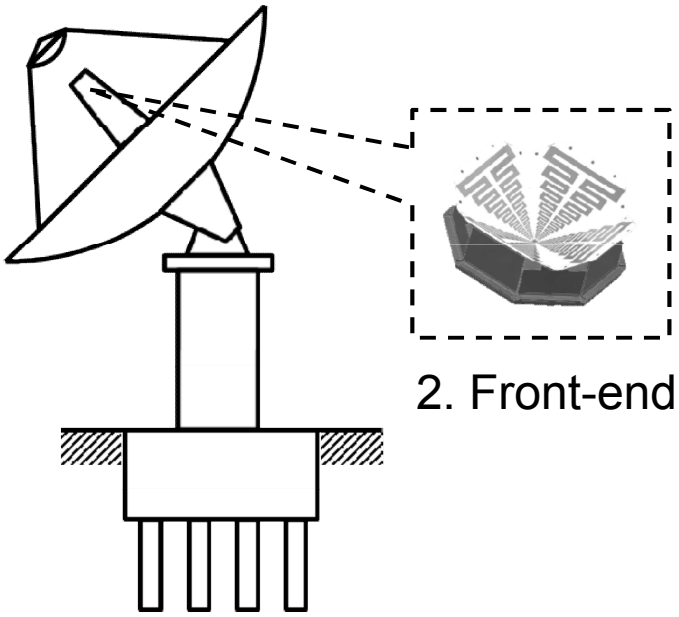
New Project for VLBI2010 in Japan

- Budget for a new antenna & facility obtained.
- Fully corresponding to VLBI2010 concept
- Observing facility including the following parts,
  1. Antenna (Single)
  2. Front-end
  3. Up-Down Converter
  4. Data Processing & Acquiring System
  5. Precise Frequency Standard (H-maser)

  (6. Operations Building)

Components

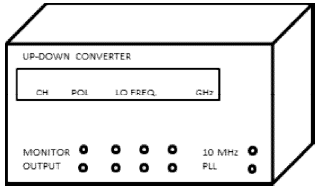
Antenna side



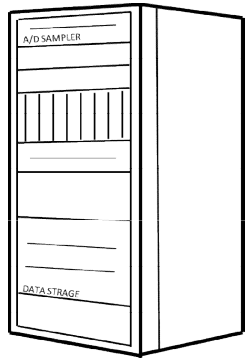
2. Front-end

1. Antenna

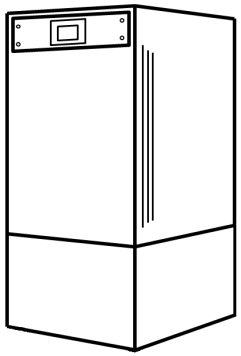
Operation Building side



3. Up-Down Converter



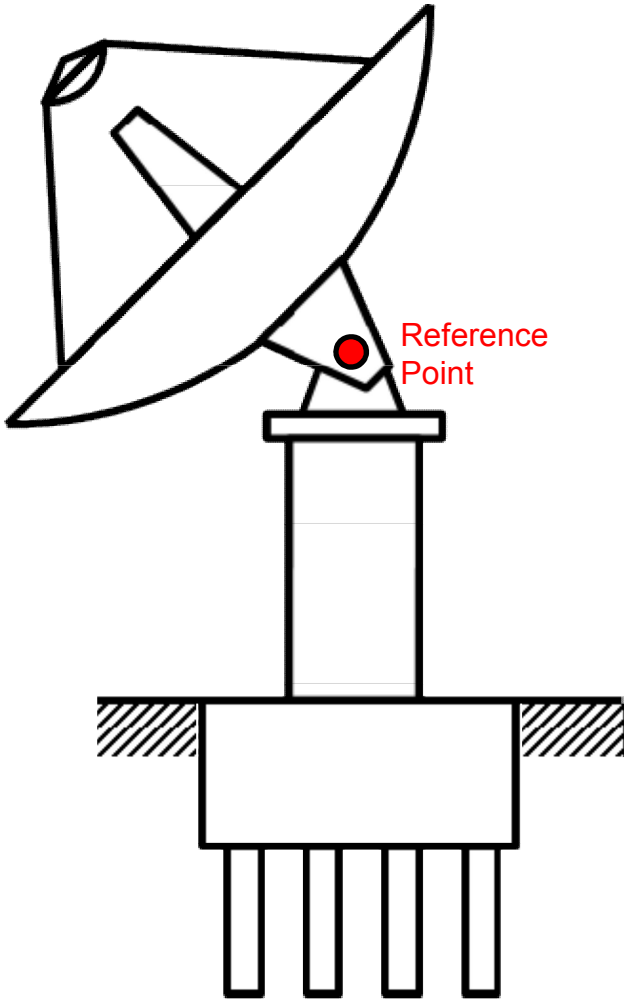
4. Data Processing & Acquiring System



5. Precise Frequency Standard (H-maser)

(6. Operations Building)

1. Antenna (Single type)



Diameter: 12-14m
Frequency: 2-14GHz
Aperture Efficiency: ≥ 50%
Antenna Noise Temperature: ≤ 10K
(Excl. Atmosphere Contribution)

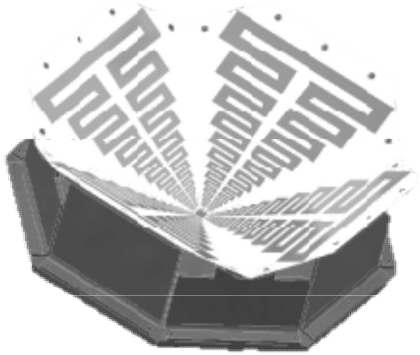
Eleven feed is assumed for antenna design.

Reference Point Stability
& Path Length Stability are proposed.
Reference Point should be measured directly from the ground for Co-location!

Driving Speed
Az slew rate: 12 deg/sec
El slew rate: 3.5 deg/sec
Az acceleration: 3 deg/sec^2
El: acceleration: 3 deg/sec^2

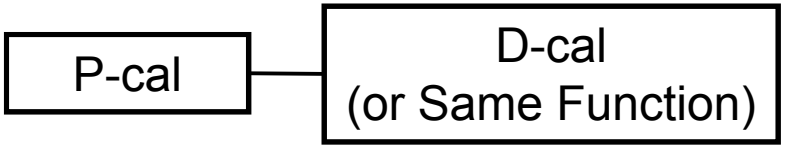
Optical Fiber cable: from Antenna to Building

2. Front-end



Eleven feed is assumed for antenna design.
Frequency: 2-14GHz

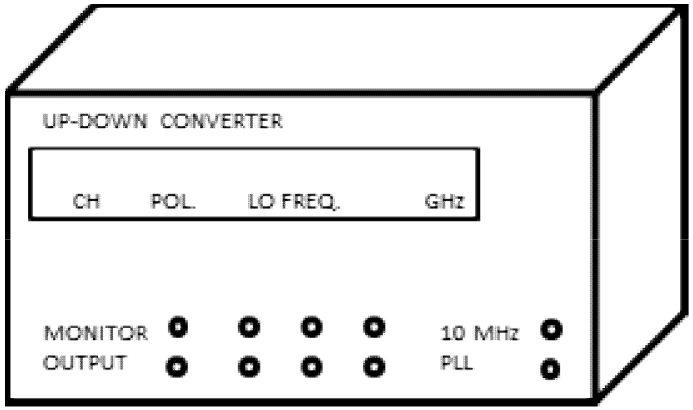
Receiver Noise Temperature: < 30K
System Noise Temperature: < 40K
(Excl. Atmosphere Contribution)



P-cal & D-cal (or the same function)
will be installed.

Injection of P-cal/Noise source
in the front of the Feed

3. Up-Down Converter

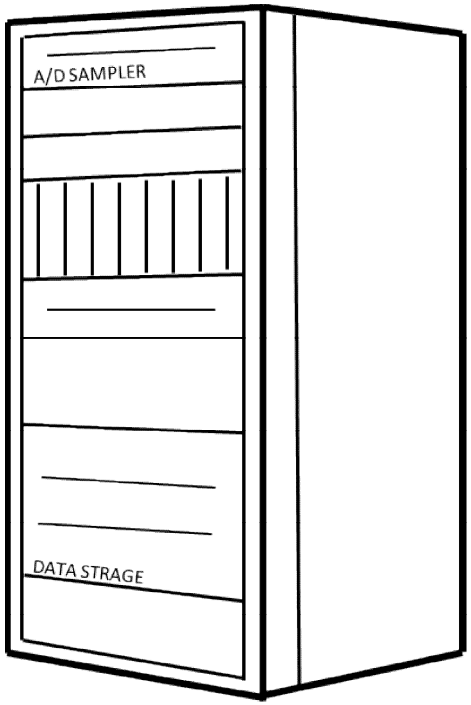


Input: 2-14GHz (Both linear polarizations)
Output: 1-2GHz/ch
(USB or LSB : selectable)

Number of channel: 8ch in total
(2polarization*4ch)

1st LO: Programmable with 0.4MHz step
2nd LO: Fixed (2 LOs for USB and LSB)

4. Data processing & Acquiring System

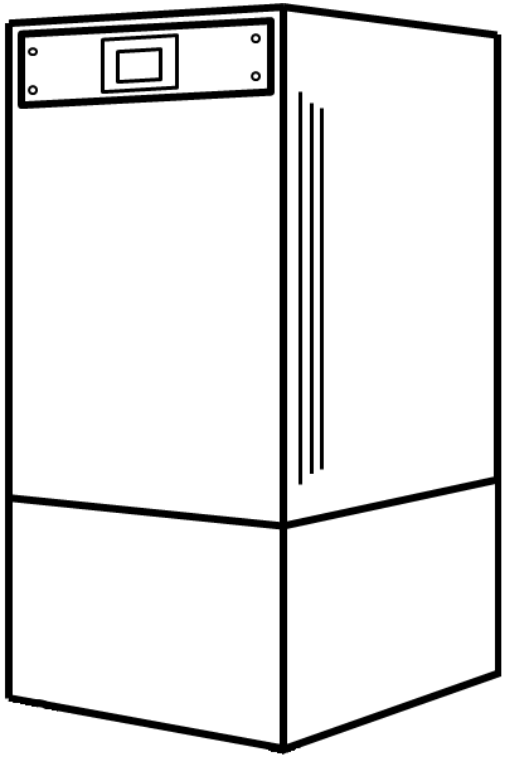


Sample rate: 2048 Msample/sec
Quantization : 1/2/4/8 bits (or more bits)

Digital Back-end (IVS recommended type)

Data Storage: ≥ 400TB

5. Precise Frequency Standard

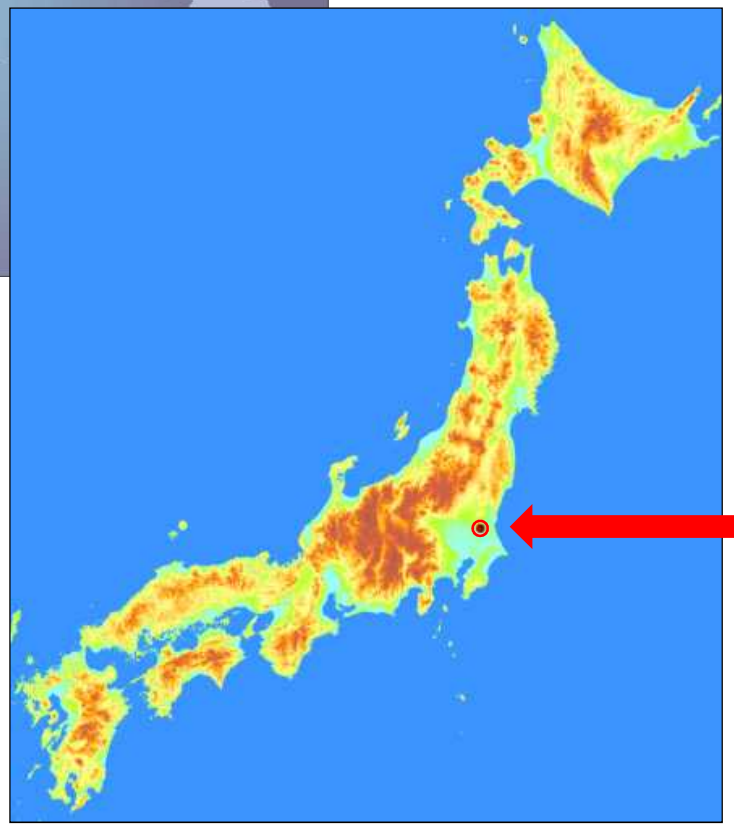


H-maser will be installed.

GPS time receiver will also be installed.

Clock comparison system will also be installed.

Site Candidate



Here!
(near Tsukuba)

Summary

- New project for constructing a new antenna has started in Japan.
- A new VLBI observing facility will be installed, fully corresponding to VLBI2010 concept.
- Next July, bids & contract will be done.
- Construction will be complete by the end of March, 2013 (It depends on the antenna manufacturer).

Thank you very much
for your attention!