

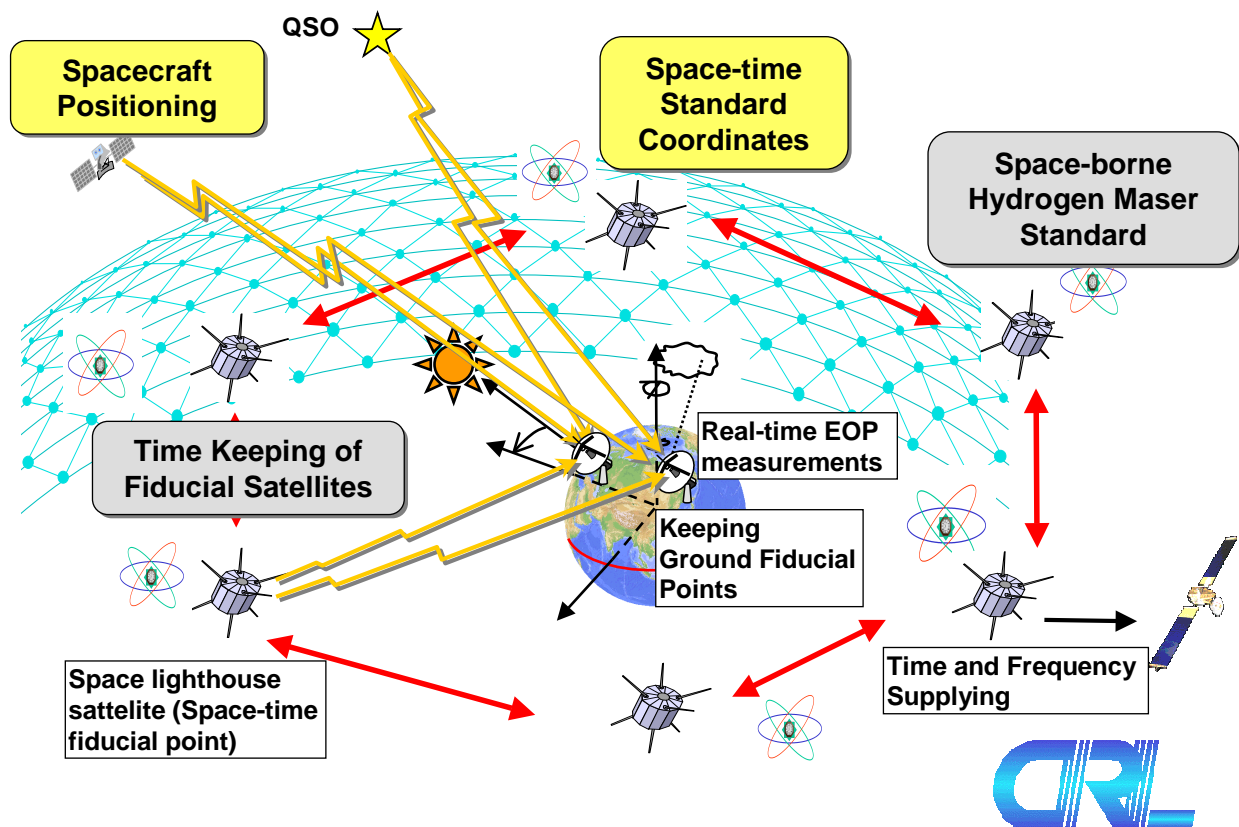
A plan for real-time monitoring of the earth orientation parameters using the Internet VLBI

T.Kondo, Y.Koyama, J.Nakajima,
M.Sekido, R.Ichikawa, E.Kawai,
H.Okubo, H.Osaki, and M. Kimura

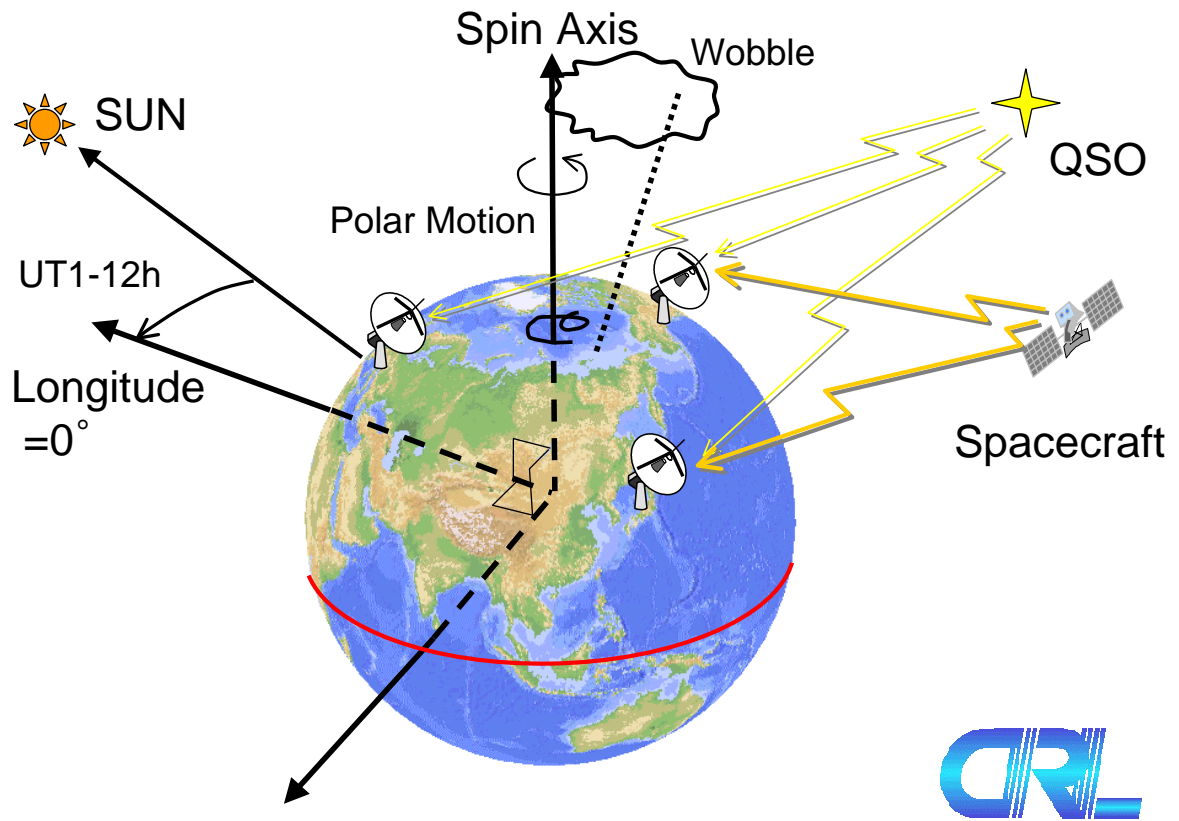
Communications Research Laboratory



Key Technology for Establishing Space-Time Infrastructure in Space

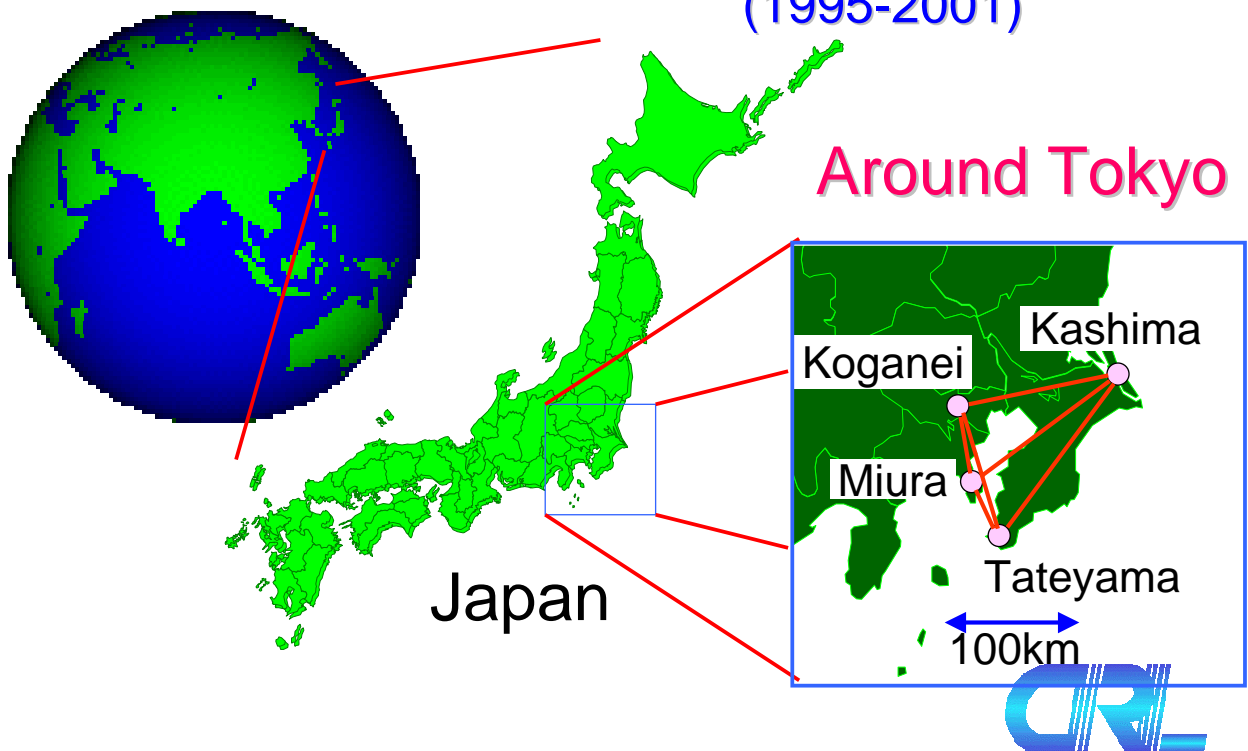


Real-time EOP Monitoring and Spacecraft Positioning



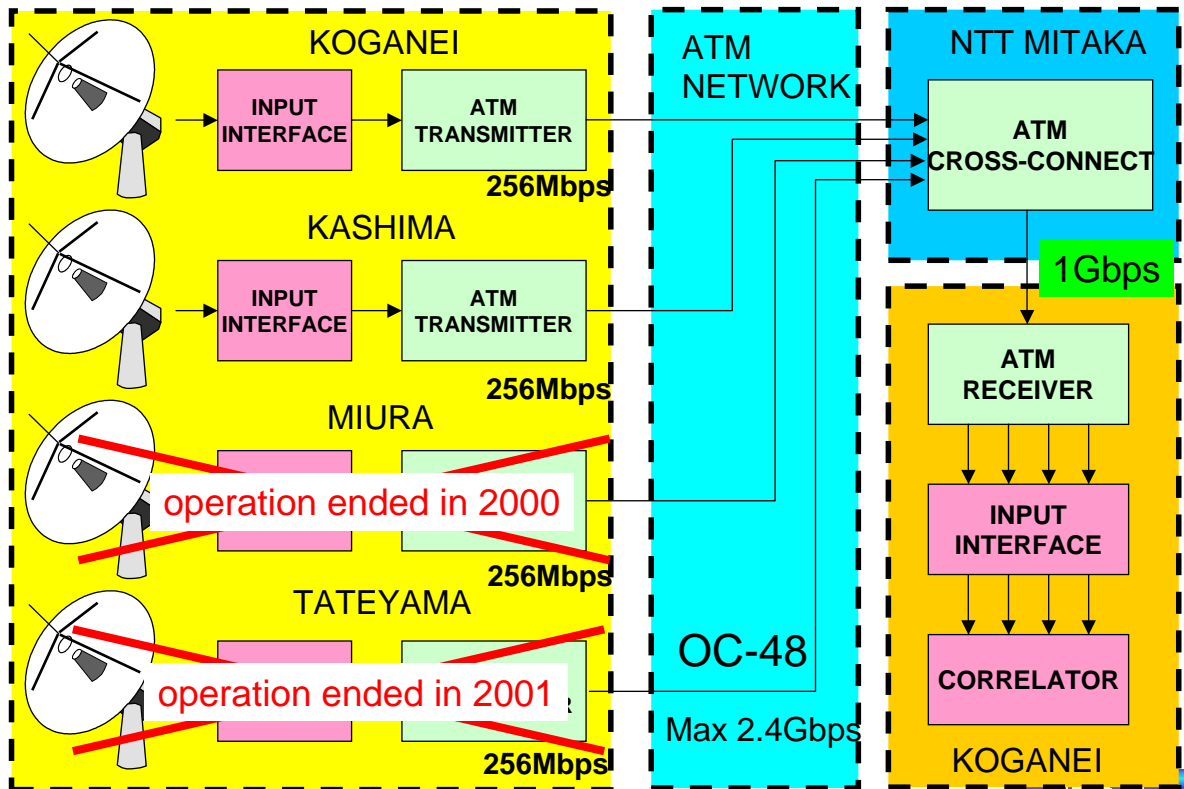
KSP VLBI network

(1995-2001)



Real-Time VLBI System

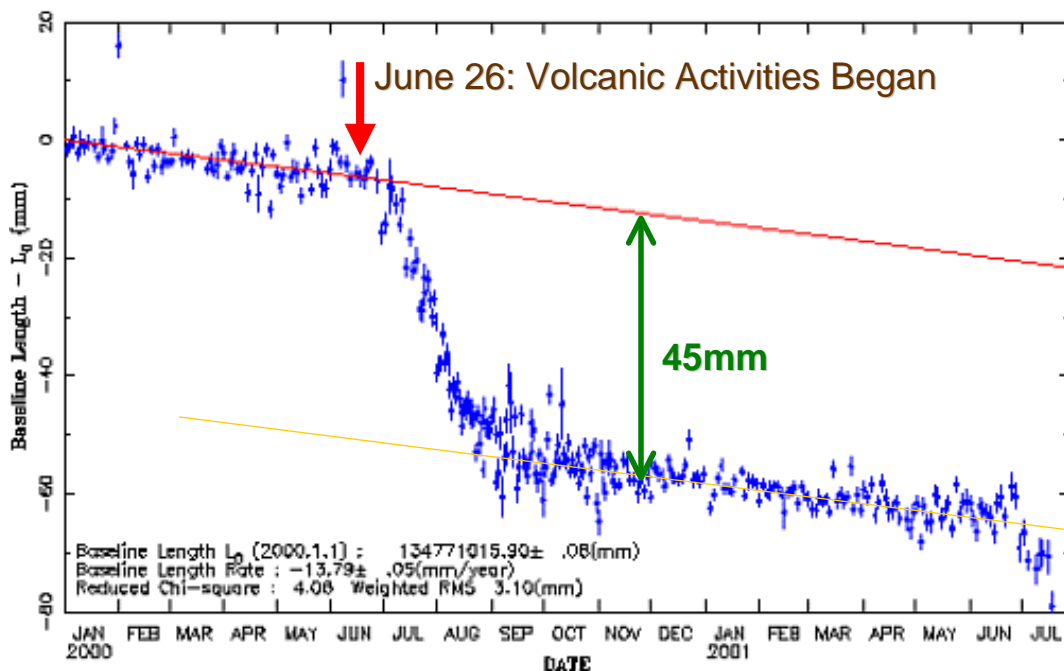
256Mbps(=16Mbps × 16ch)/station



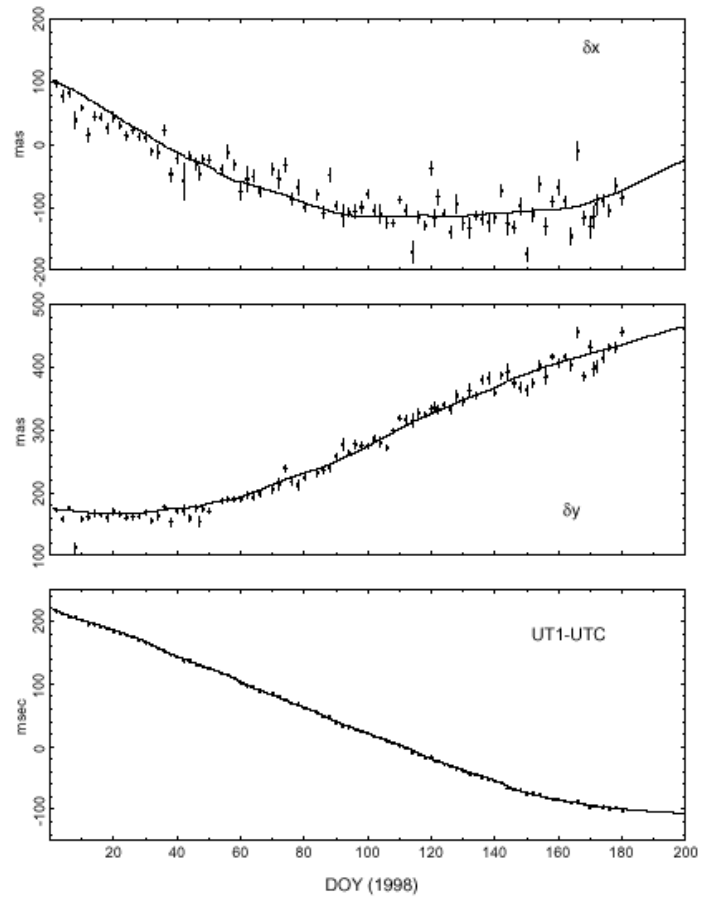
Kashima-Tateyama

KASHIM11-TATEYAMA

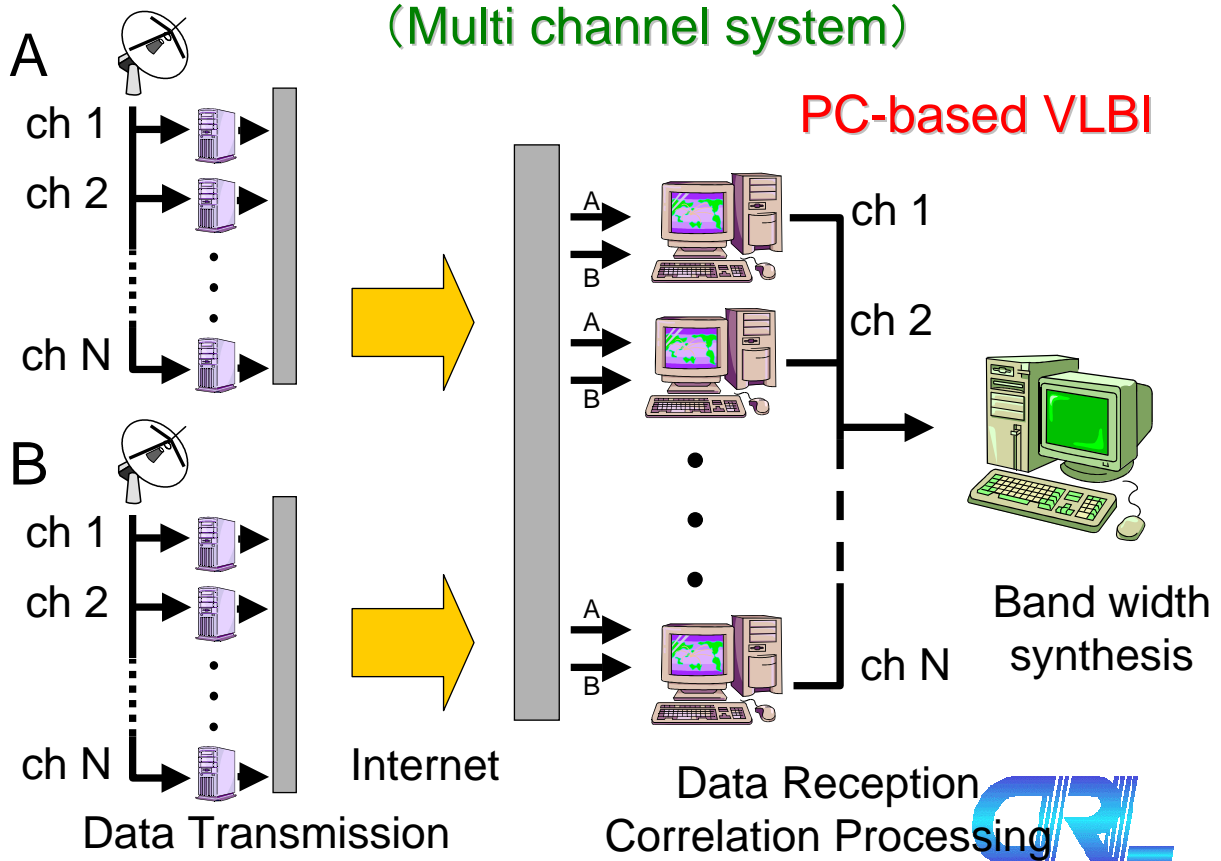
20-Jul-01 02:56:24 (JST)



Demonstration of Real-time EOP Determination on the KSP Network

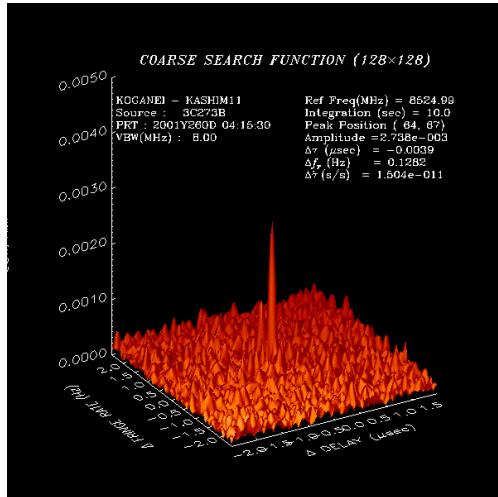


Internet-VLBI for Geodetic Use (Multi channel system)

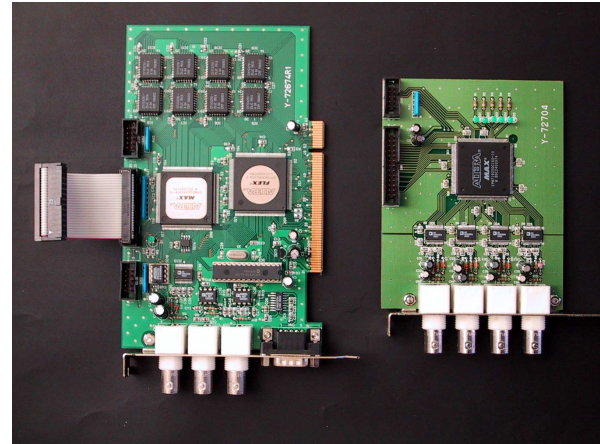


Internet-VLBI System

First Fringe on Kashima-Koganei Baseline



16MHz sampling



PCI Sampler board

Sept.17, 2001

3C273B

10sec integration

(Note : This is offline processing!)



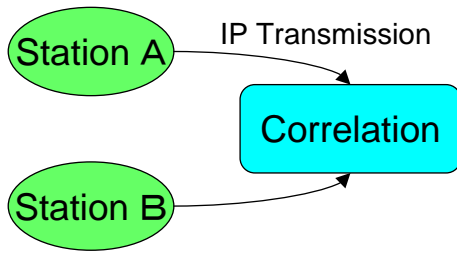
Specifications of Sampler Board

Reference signals	10MHz (+10dBm), 1PPS
Number of INPUT CH	1 : main board only 4 : with auxiliary board
A/D	1, 2, 4, 8 bits
Sampling Freq.	40kHz, 100kHz, 200kHz, 500kHz, 1MHz, 2MHz, 4MHz, 8MHz, 16MHz

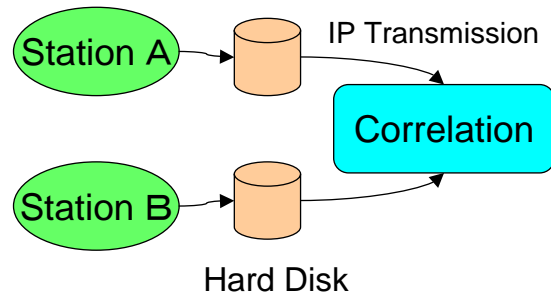


Operation form of Internet VLBI

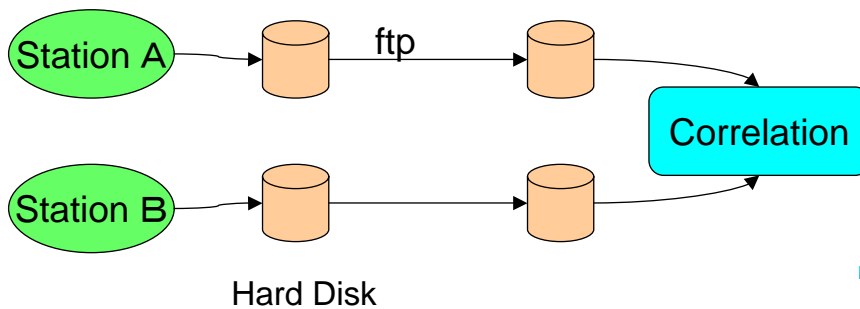
Real-time VLBI



Quasi real-time VLBI

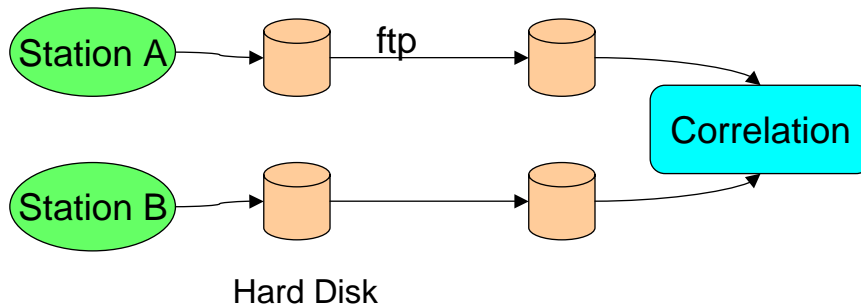


Off-line VLBI (ftp-VLBI or e-VLBI)



Disk volume requirements

Off-line VLBI (ftp-VLBI)



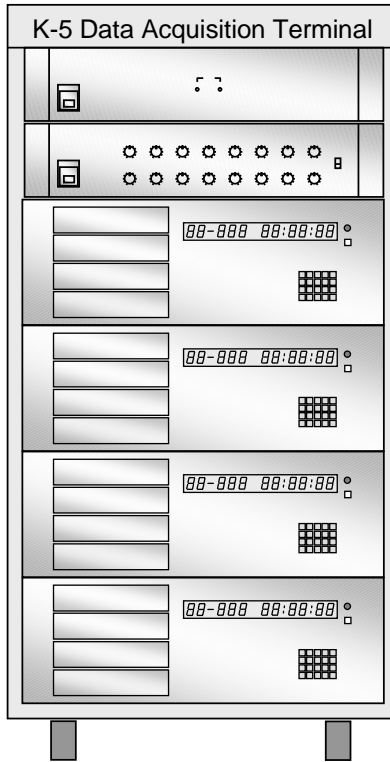
24-hour session { scan length : 200 sec
number of scans : 300

Data rate 256Mbps (16ch X 16Mbps) → 1.92TB
64Mbps (16ch X 4Mbps) → 480GB



K5 Data Acquisition Terminal

(coming soon)



7625A (Reference signal distributor)

7626 (16ch video amps)

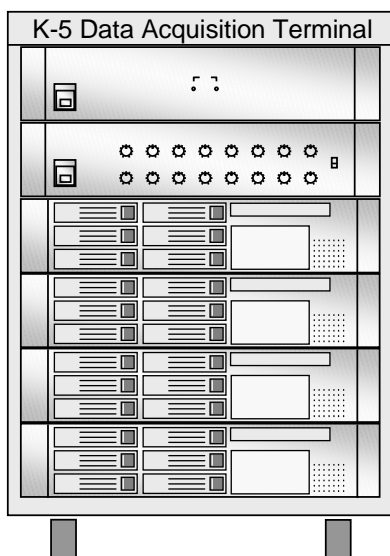
7680 (Versatile Scientific Sampling Processor)
x 4

Hard disk drive
120GB x 16 = 1.92TB



K5 PC-based Data Acquisition Terminal

(under consideration)



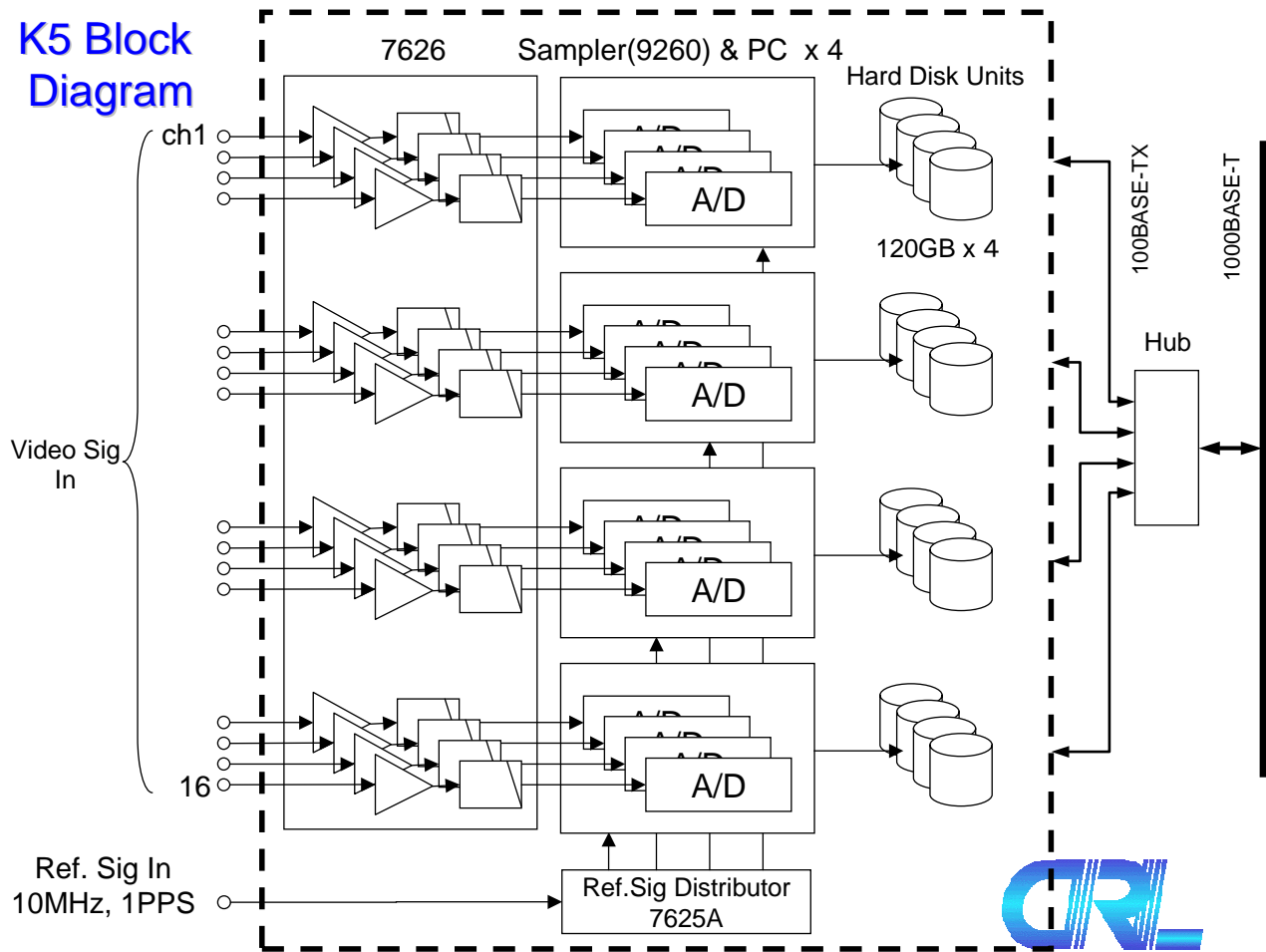
7625A (Reference signal distributor)

7626 (16ch video amps)

2U rack mount server
(with an IP-VLBI board (9260)
and removable hard disk drive
120GB x 6)
x 4



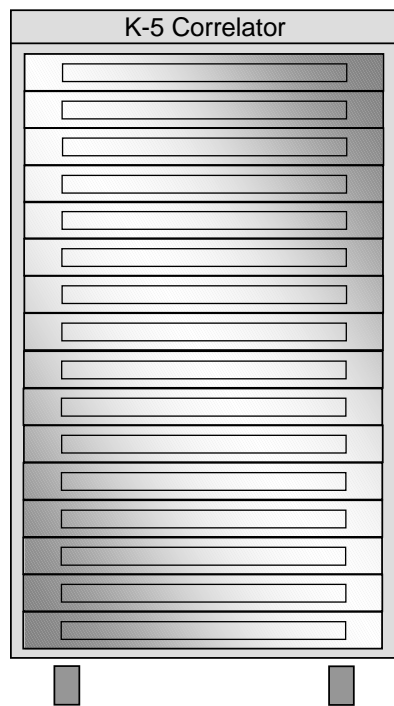
K5 Block Diagram



Characteristics of K5 Terminal

Item	Characteristic
Reference signals	10MHz(+10dBm), 1PPS
Number of input channels	16
Low pass filter	4MHz / 8MHz
Sampling frequency	40kHz, 100kHz, 200kHz, 500kHz 1MHz, 2MHz, 4MHz, 8MHz, 16MHz
A/D resolution (bit)	1, 2, 4, 8
Hard disk drives	120GB (minimum)/ch total > 1.92TB
Maximum sampled data rate	256Mbps
Real-time VLBI	supported
Typical operation mode	16ch x 4Mbps 16ch x 8Mbps 16ch x 16Mbps
Cost	< 40,000 US\$
VSI out	will be supported

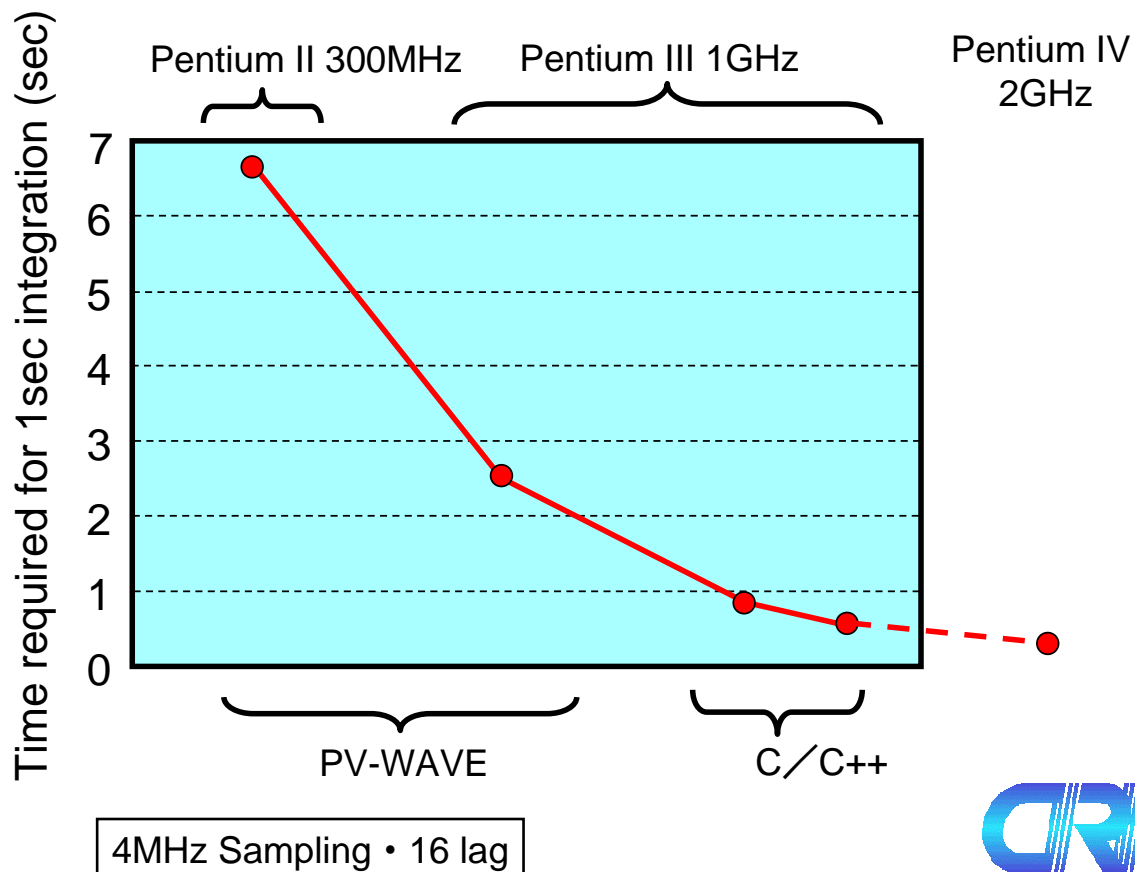
K5 PC-based correlator



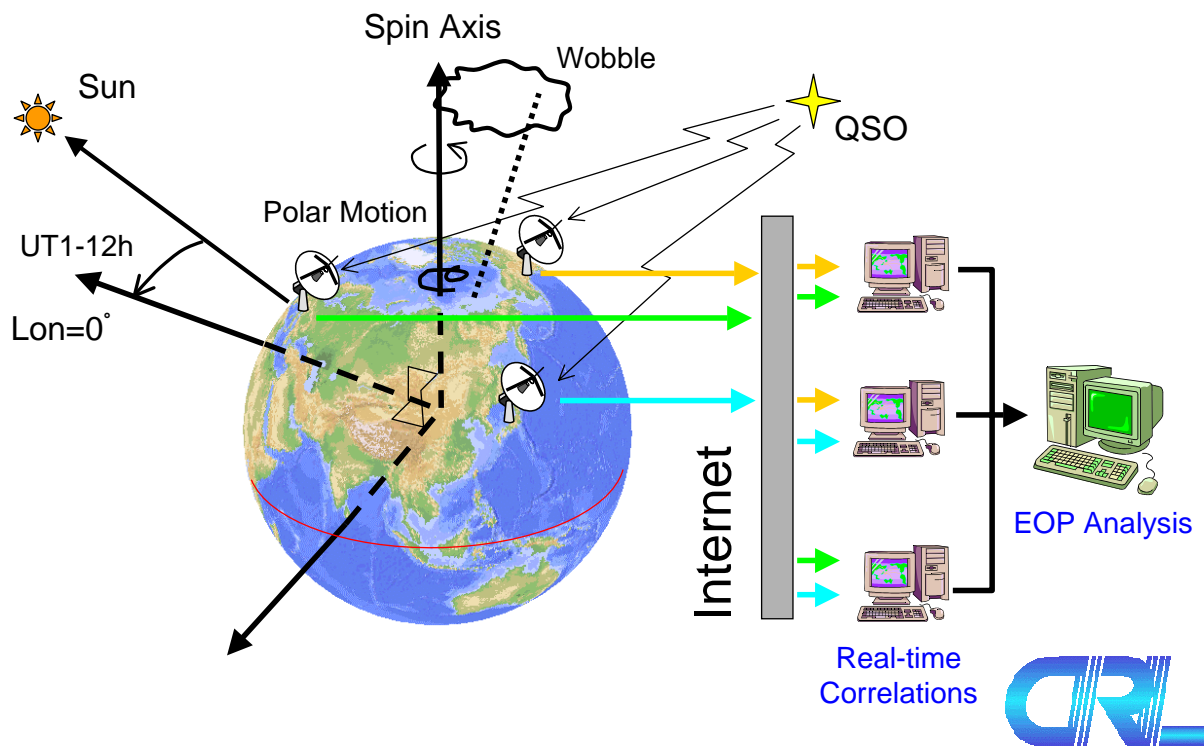
Rack mount server with
240GB hard disk drive
x 16



Progress in Software Correlation Processing Speed



Real-time monitoring of Earth Orientation Parameters



Conclusions

- Internet real-time VLBI system to take over current geodetic VLBI system is under development
- PC-based system for signal sampling and data correlations has been developed
- Ftp VLBI is possible

