KVN Correlator Project

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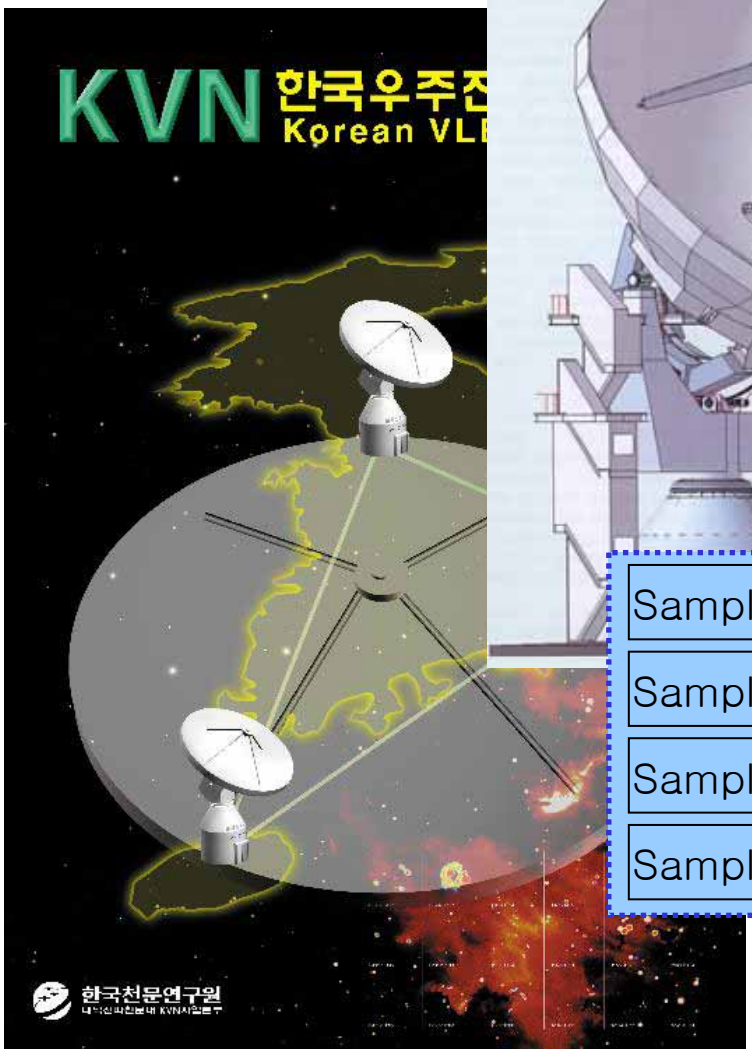
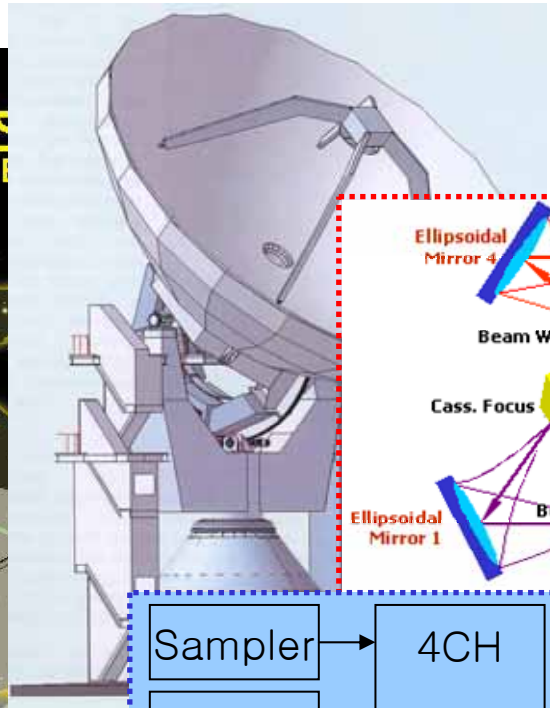
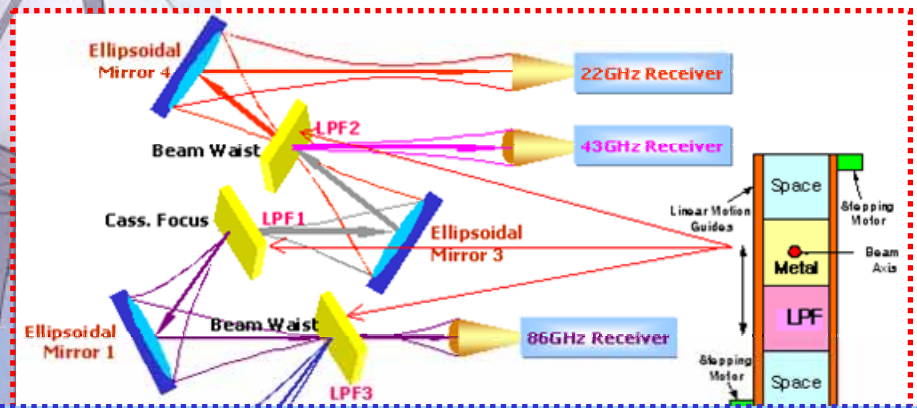
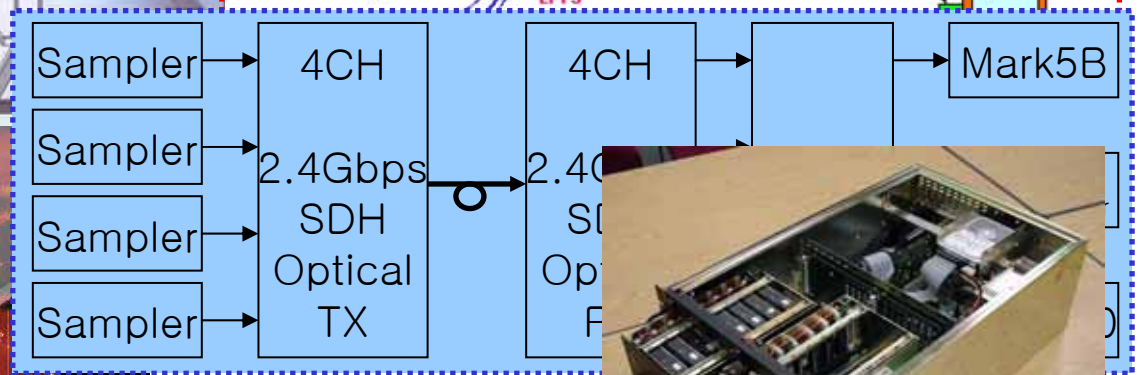
KVN / KAO

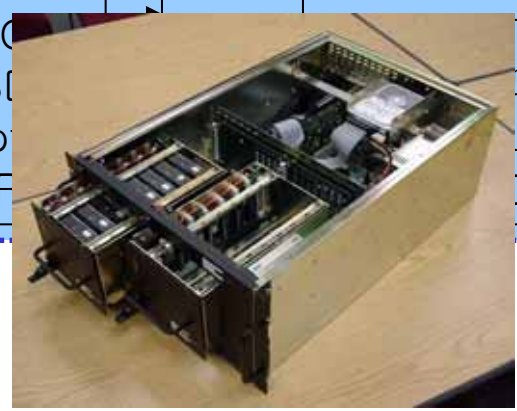
KVN is under construction ……







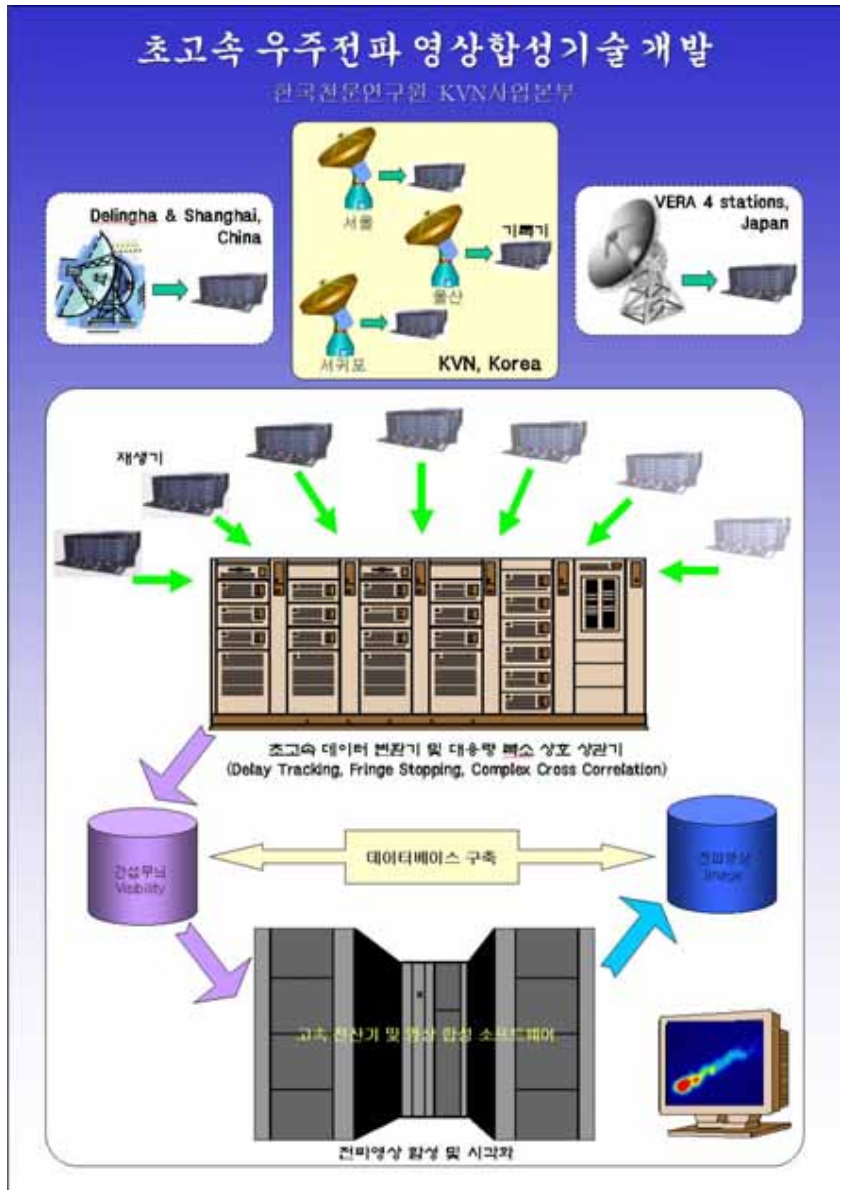




And, Finally we need a Correlator for KVN.

"KVN Correlator Project"
has been started
from July 30, 2004.

(5 Years)



KVN Correlator Project

- Correlator for KVN Science
  - Development of Correlator (1Gbps, for general needs)
  - Software correltor (for special needs)
- Data Correlation Center
  - Database
  - AIPS, …
  - Phase referencing software for multi-channel receiver

➔ Now, we are try to define what the KVN correlator should have.

Basic Considerations for KVN Correlator

- Number of Baselines
  - KVN only
  - KVN + Other Radio Telescopes in Korea
  - KVN + Other Radio Telescopes in the Worlds
    : KVN+VERA, KVN+VSOP2, …

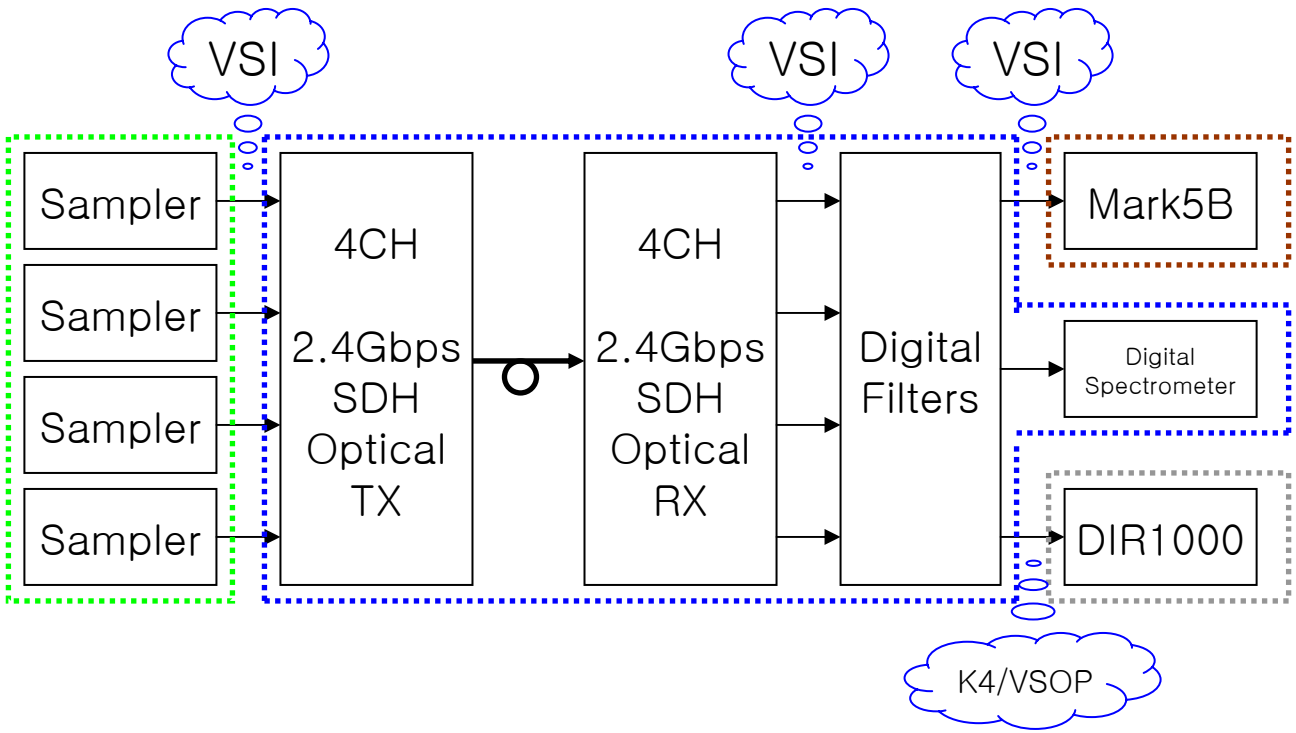
➔ 10 baselines for 5 stations at minimum.
More baselines, Better performance. But we consider
21 baselines for 7 stations at hopeful maximum.

Basic Considerations for KVN Correlator

- Observational Mode/DAS Specifications
  - Maximum Data Rate : 1,024 Mbps (x1, x2, x4, x8)
  - Data Expression : 2 bits 4 levels
  - Expected Obs. Mode
    a. Wideband Observation
    b. Simultaneous Multi-Frequency Observation
    c. Bandwidth Synthesis Observation
    d. Dual Polarization Observation

➔ Utilizing the Digital Filter and Mk5B Recorder,
Various Obs. Mode can be supported.

KVN DAS (Under Final Consideration)



Observation Modes of KVN

Mode	#IF	Bandwidth [MHz]	Max. #Chan	#Bits	Max. Data Rate [Mbps]	Recorder	VERA Modes
						Mk5B	
1	1	256	1	2	1,024	○	VLBI1
2	1,2	128	2	2	1,024	○	VERA1,VLBI2
3	1,2,3,4	64	4	2	1,024	○	VERA2,VLBI3
4	1,2,3,4	32	8	2	1,024	○	VERA4,VSOP1
5	1,2,3,4	16	16	2	1,024	○	VERA7,VERA9, 測地1, 測地2, VSOP2
6	1,2,3,4	8	16	2	512	○	測地3, 測地4, K4-1
7	1,2,3	64/128	2/1	2	1,024	○	VERA3
8	1,2,3,4	32/64/128	2/1/1	2	1,024	○	VERA5
9	1,2,3,4	32/128	4/1	2	1,024	○	VERA6
10	1,2,3,4	16/32/128	2/3/1	2	1,024	○	VERA8

Note) Data Output : 32pin x 32MHz.
For Mode 2~6, Digital Filter always operates in full output speed, and Mk5B may select the channels or bits to be recorded for supporting the sub-modes.

Basic Considerations for KVN Correlator

- Frequency Resolution
  - 62.5 kHz @ 64MHz BW : 1,024 lags
  - Higher spectral resolution obs. may be required for maser.
    a. Serial operation of CB
    b. Extending the number of lags in base unit

- Min. and Max. Integration Time

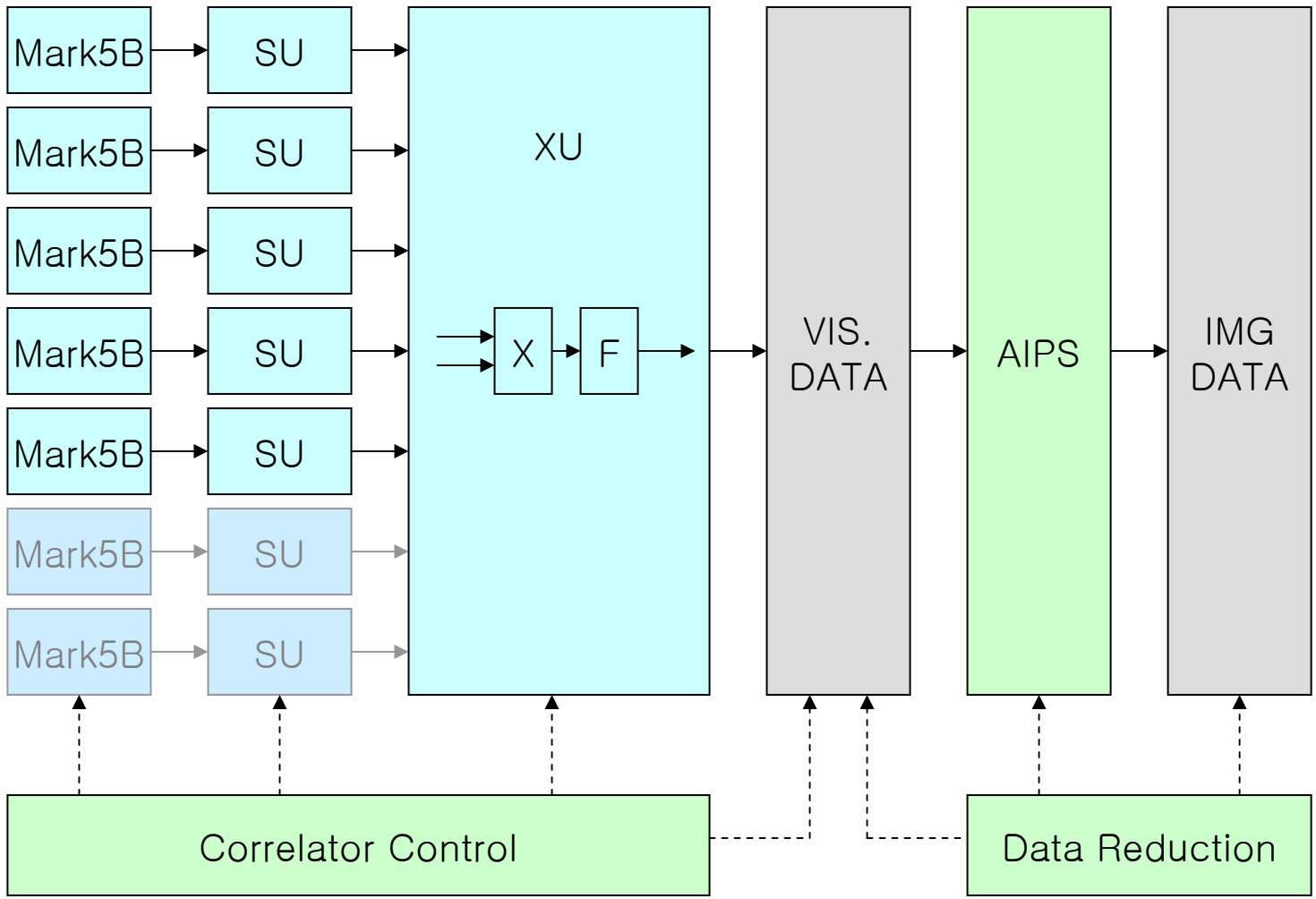
- Range of Delay Tracking, Fringe Stopping

Target Specifications of KVN Correlator

	Minimum	Hopeful Maximum
# of Stations(Baselines)	5 (10)	7 (21) ※1
Max. Data Rate / Station	1,024 Mbps	
Input Data Specification	2bits 4level	
# of Freq. Channels / Baseline	≥1,024	≥4,096 ※2
Cross- & Auto-Correlation	Both	

# of Input Channels	Bandwidth /Channel [MHz]	# of Freq. Channels	Total # of Freq. Channels	Freq. Resolution [kHz]
16	16	256 (1,024)	4,096 (16,384)	62.5 (16.625)
8	32	512 (2,048)	4,096 (16,384)	62.5 (16.625)
4	64	1,024 (4,096)	4,096 (16,384)	62.5 (16.625)
2	128	1,024 (4,096)	2,048 (8,192)	125.0 (31.25)
1	256	1,024 (4,096)	1,024 (4,096)	250.0 (62.5)

Concept of KVN Data Correlation Center



Summary

⦿ KVN group has started the ‘KVN Correlator Project’

⦿ Period : 2004. 7. – 2009. 7. (5Years)

⦿ Specifications of the Correlator is under discussion,
and the final ones might be defined soon.

Thank you !