

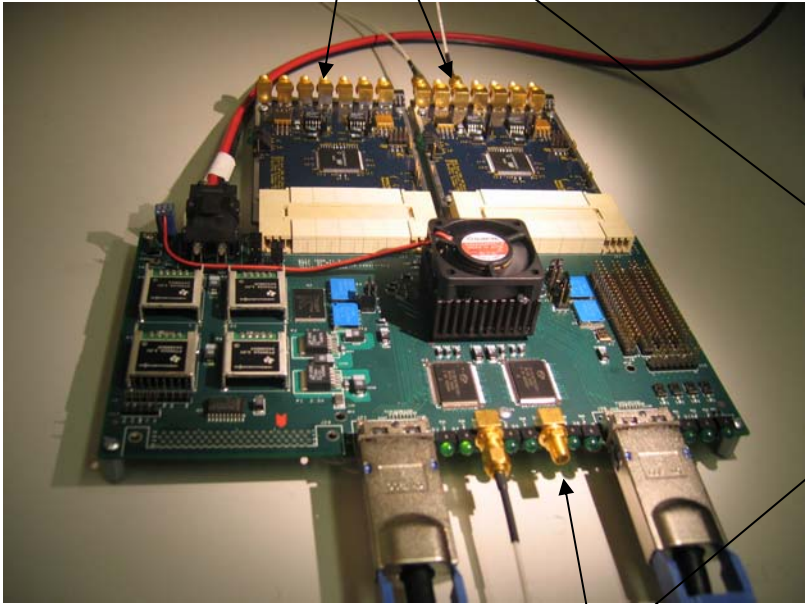
DBE – Status and Developments

Alan Whitney
MIT Haystack Observatory

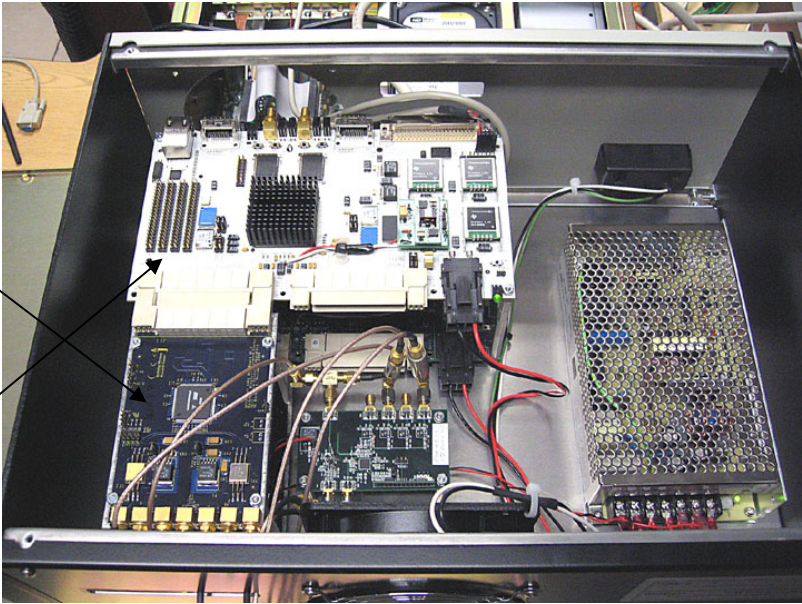
12
November 2007
EVN TOG
Yebees, Spain

iBob1/DBE1

Sampler boards



iBOB1
(2 x 500MHz BW IF; 4 Gbps)



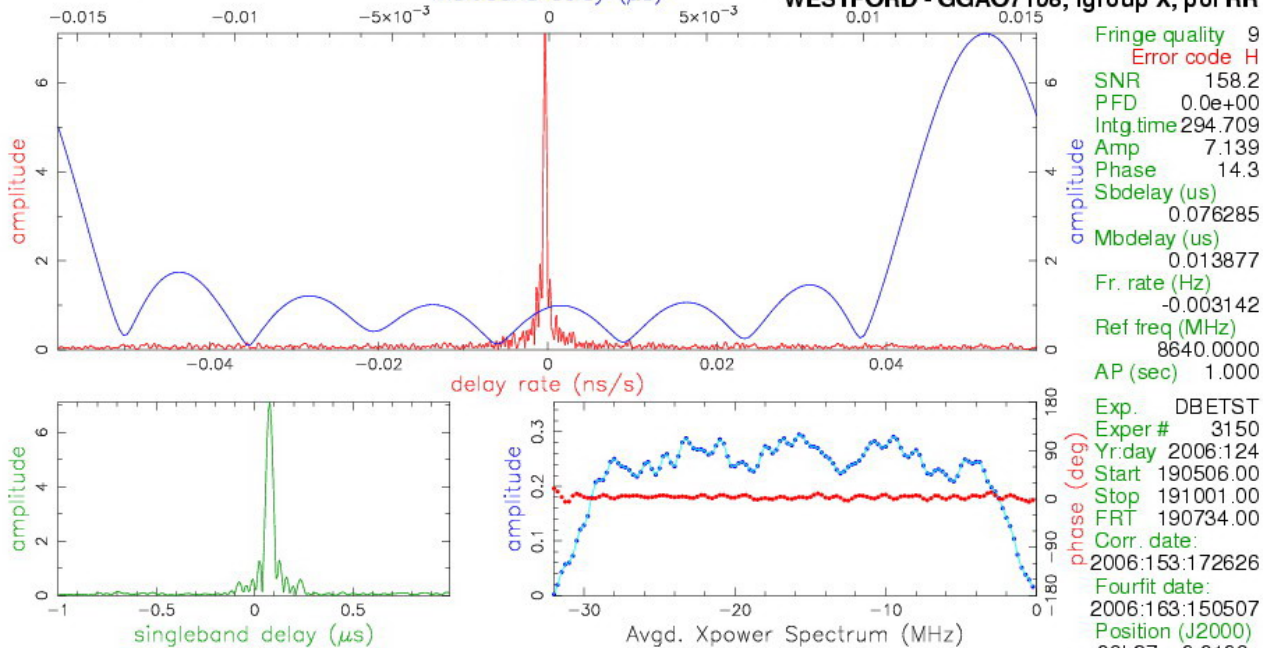
(two iBOB1 bds per chassis;
4 x 500MHz BW IF
8 Gbps aggregate output)

Mk4 Fringe Plot

4C39 25.sfjwg, dbets2 4c39 25 124-1905, EG

multiband delay (μ s)

WESTFORD - GGAO7108, fgroup X, pol RR



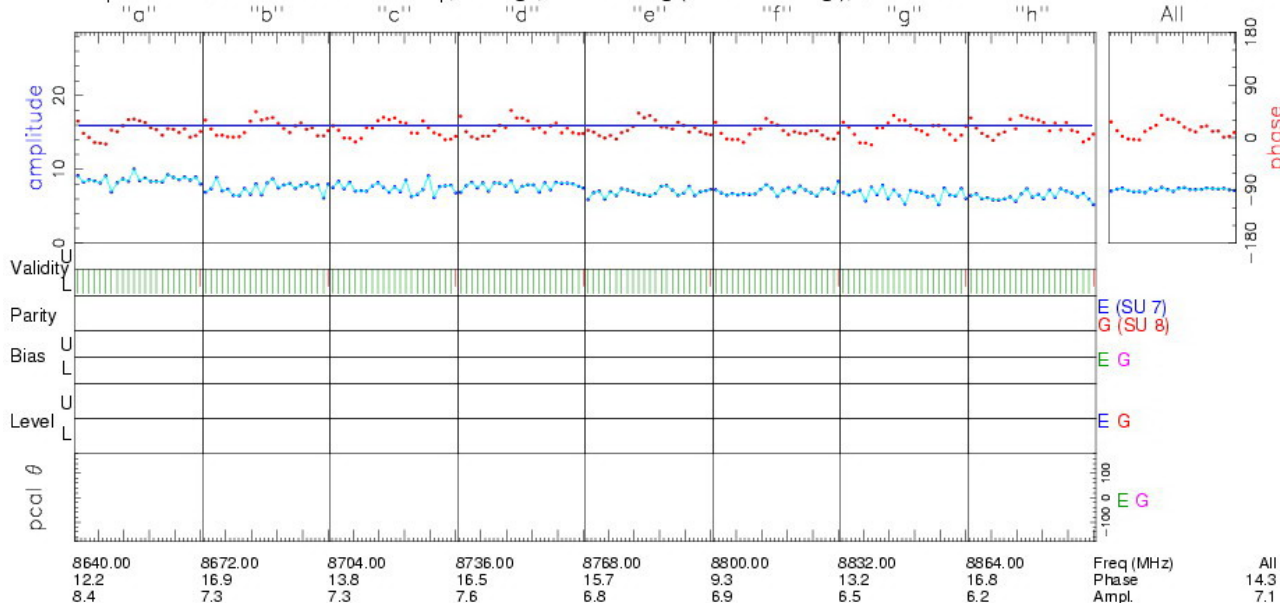
DBE vs DBE with no phase adjustments whatever

RMS phase across frequency channels:

RMS: 2.5 deg

Theor: 1.0 deg

Amp. and Phase vs. time for each freq., 23 segs, 13 APs / seg (13.00 sec / seg), time ticks 10 sec



Comparable to best we've seen even with 'manual' adjustments to embedded phase-cal

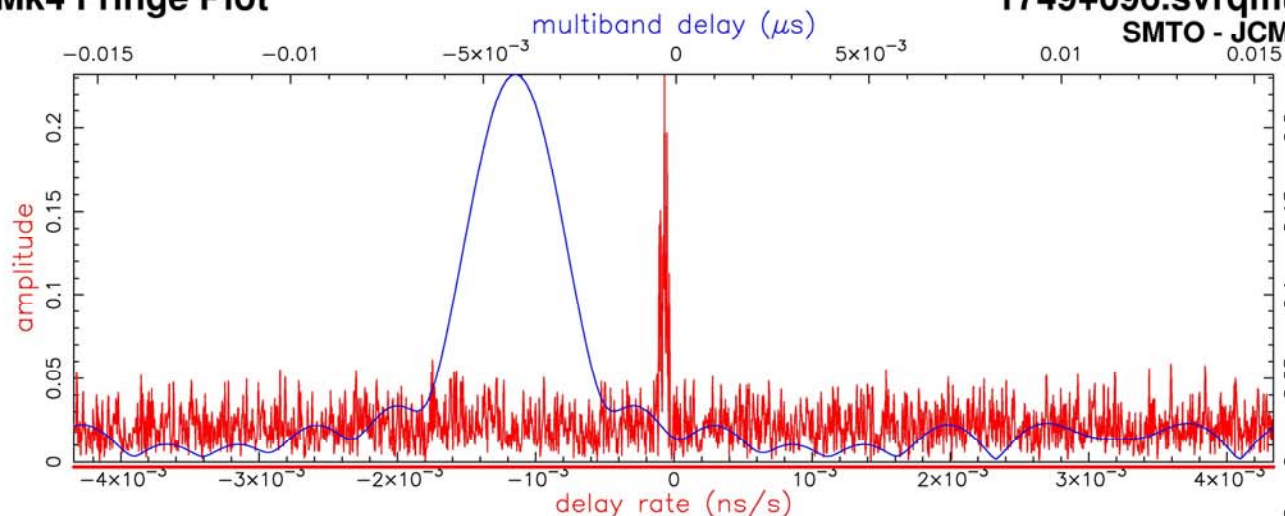
230GHz VLBI @ 4 Gbps

SMT0-JCMT: 1749+096 - 55 μ s fringe spacing.

Tcoh~60sec

Mk4 Fringe Plot

1749+096.svrqmu, 101-1420, SJ
SMT0 - JCMT, fgroup U, pol LL



Fringe quality 9

SNR 13.9

PFD 1.8e-34

Intg.time 596.765

Amp 0.233

Phase 2.7

Sbdelay (us)

-0.006376

Mbdelay (us)

-0.004169

Fr. rate (Hz)

-0.015820

Ref freq (MHz)

230385.0000

AP (sec) 0.500

Exp. mm098

Exper # 3180

Yr:day 2007:101

Start 142003.00

Stop 143000.00

FRT 142500.00

Corr. date:

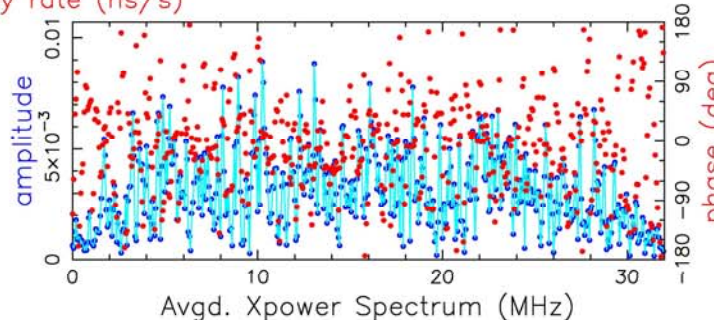
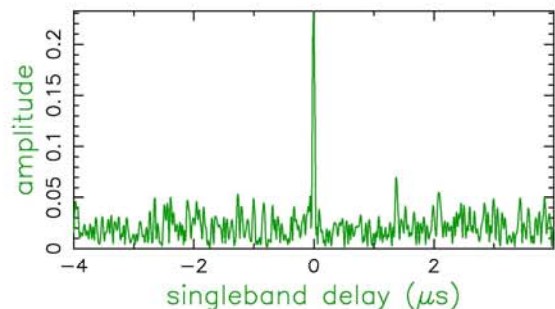
2007:133:224224

Fourfit date:

2007:134:112345

Position (J2000)

17h51m32.8186s

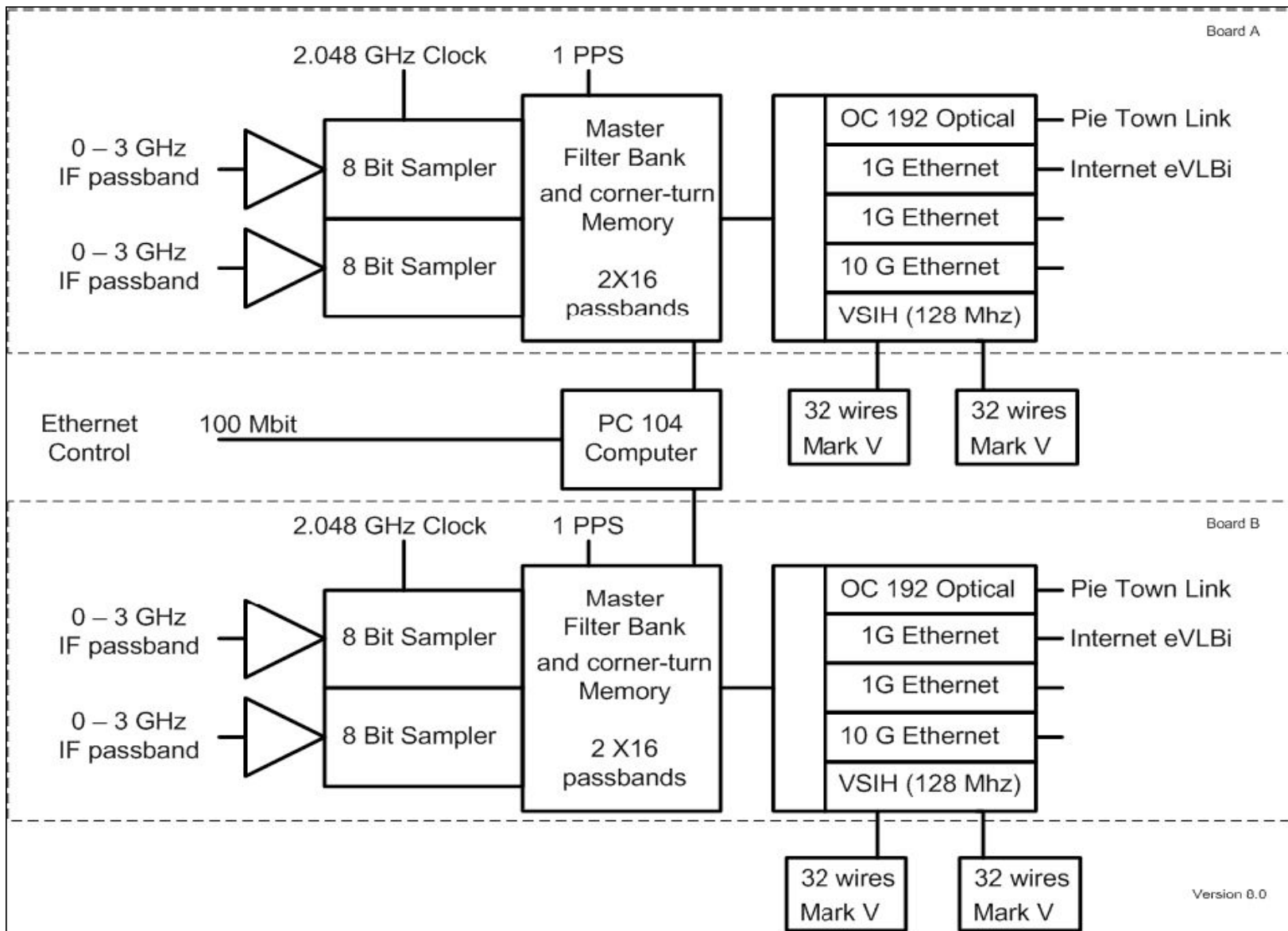


SagA* detected on SMT0/JCMT and CARMA/JCMT baselines!

iBob2/DBE2 Under Development

- Joint development with NRAO, UC Berkeley, South Africa
- Haystack will develop PFB application on iBob2 and package into ‘DBE2’; NRAO will develop DDC application on iBob2 (dubbed ‘VDBE’); Prototypes expected early 2008
- PFB specs:
 - Input: 4 x 1GHz BW IF (using two iBob2 boards)
 - Output: 4 x 10GigE; 16 Gbps aggregate output rate; compatible with Mark 5C
 - Cost: <\$10K
- Burst mode application
 - 16 Gbps to RAM for ~30 secs; 10GigE dribble to recorder at 4Gbps
 - Applications
 - mm-VLBI
 - Pulsars
 - broadband geodetic VLBI

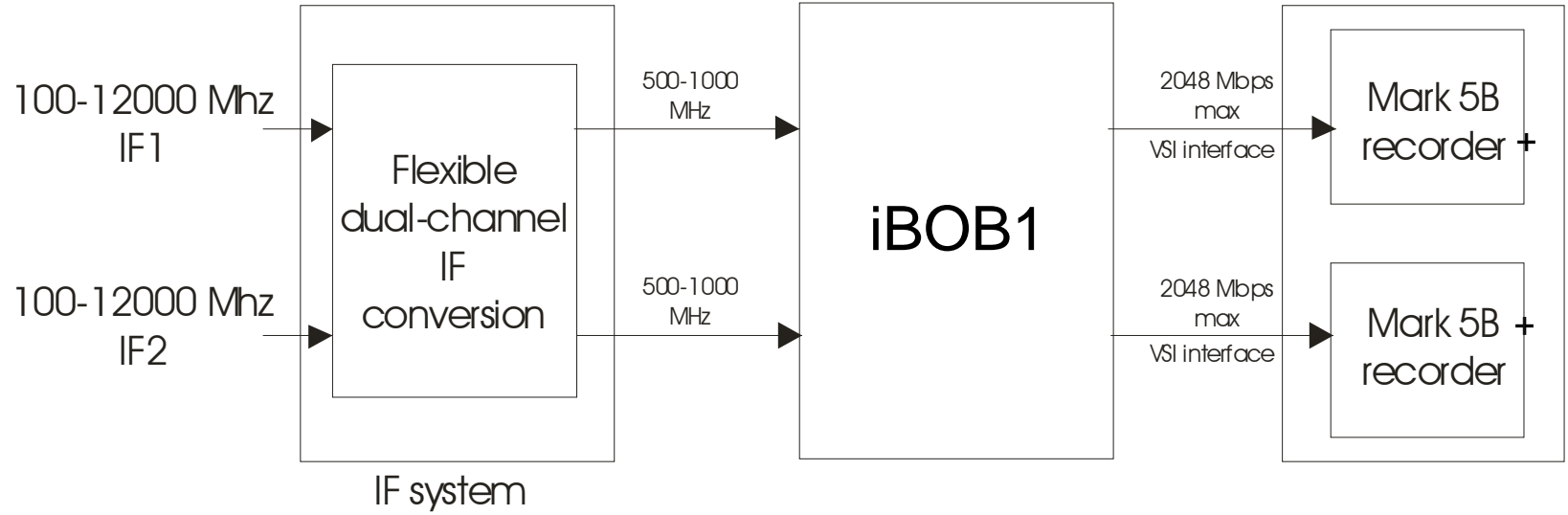
DBE2 block diagram



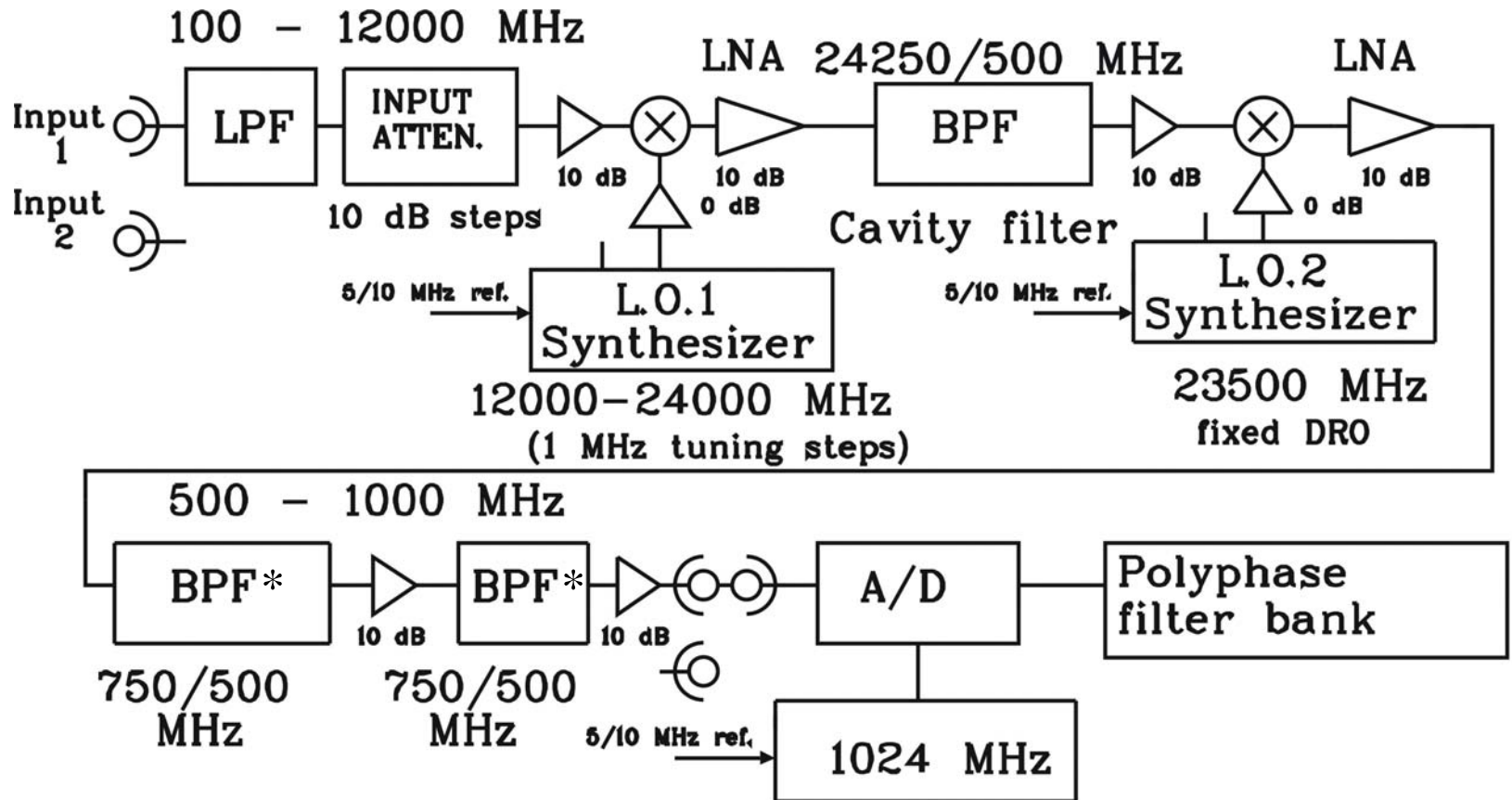
Flexible “Front-End Converter” for DBE

- Problem: Different systems need different IF frequency ranges
 - Even Mark 4 and VLBA systems use different IF ranges
 - Many modern RF/IF systems, particularly those at mm wavelengths, employ IF frequency ranges as high as 10-12 GHz
 - Often requires custom electronics at each such VLBI site
- Proposal is to couple a flexible dual-polarization IF frequency converter to the DBE for easy adaptability to almost any existing RF/IF system

Concept for flexible Up/Down Converter (UDC)



Block diagram of flexible IF converter



Note: L.F. channels share local oscillators

*BPF filter replaced with 1 GHz BW for iBob2/DBE2

Questions?

16 Gbps Burst-mode System

