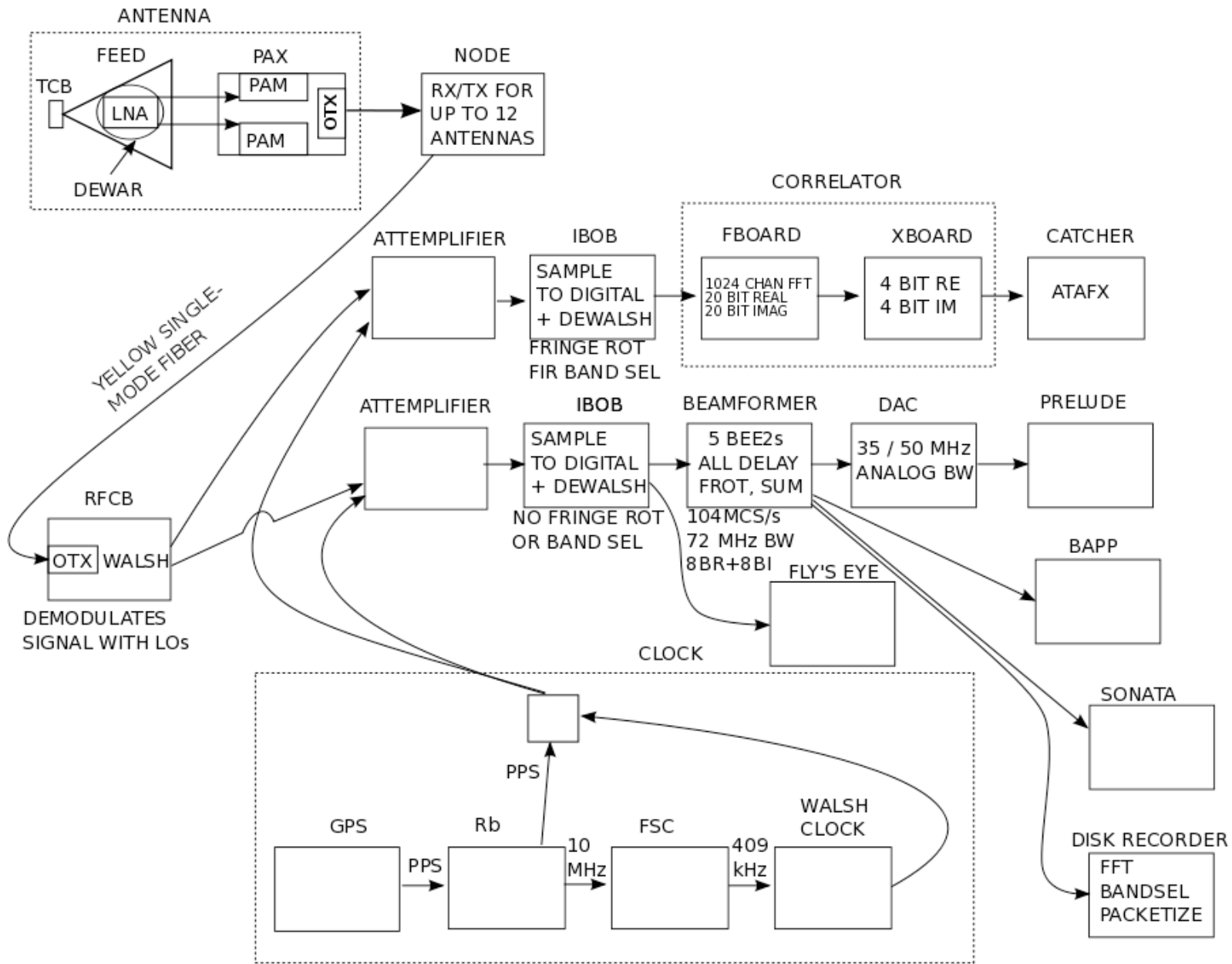# ATA Data Capture Antennas To Disk
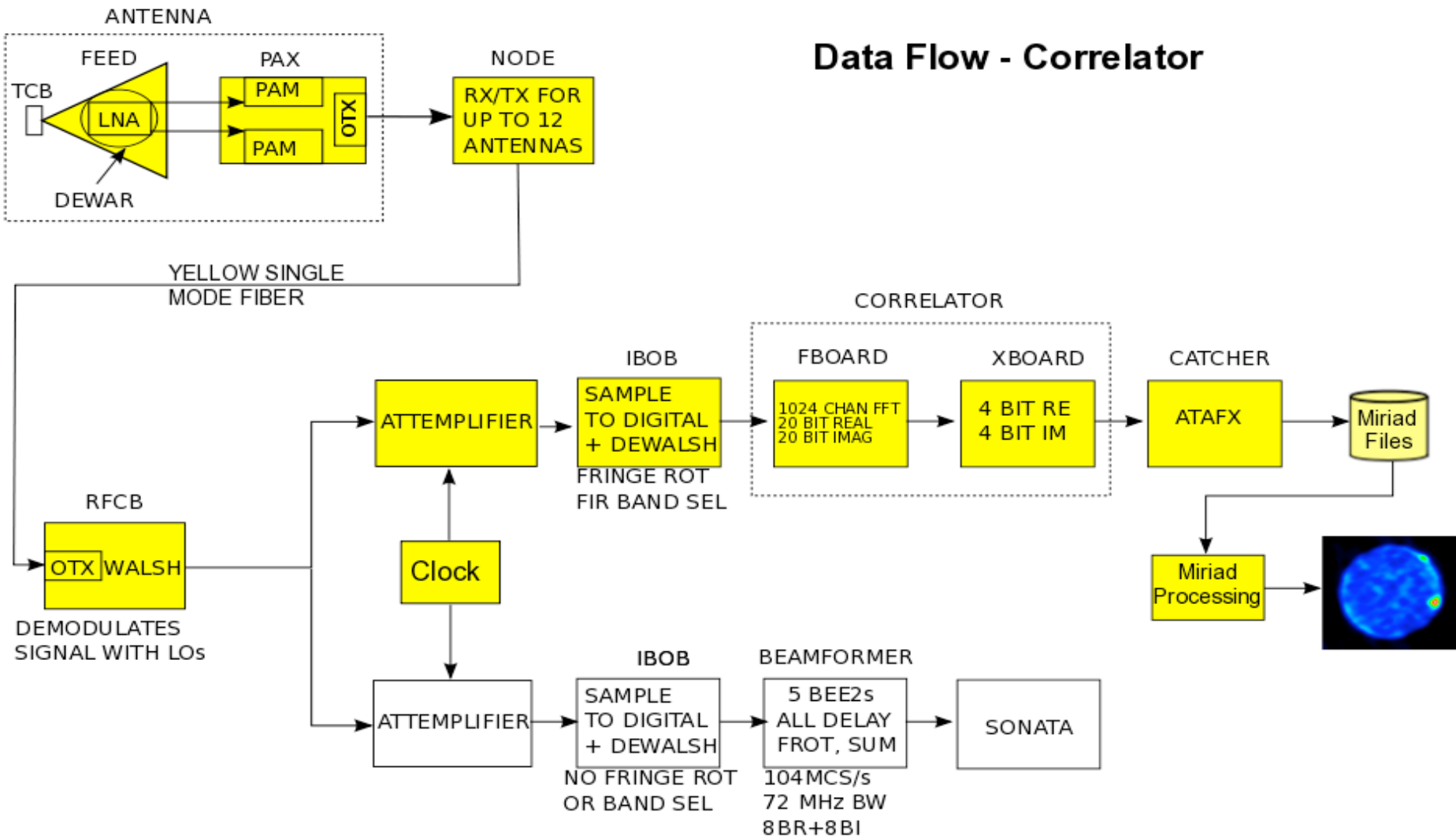
Jon Richards – The SETI Institute

ANTENNA

FEED

PAX

NODE

TCB

PAM

PAM

LNA

OTX

RX/TX FOR UP TO 12 ANTENNAS

DEWAR

YELLOW SINGLE-MODE FIBER

CORRELATOR

ATTEMPLIFIER

IBOB

FBOARD

XBOARD

CATCHER

SAMPLE TO DIGITAL + DEWALSH

FRINGE ROT FIR BAND SEL

1024 CHAN FFT
20 BIT REAL
20 BIT IMAG

4 BIT RE
4 BIT IM

ATAFX

ATTEMPLIFIER

IBOB

BEAMFORMER

DAC

PRELUDE

SAMPLE TO DIGITAL + DEWALSH

NO FRINGE ROT OR BAND SEL

5 BEE2s
ALL DELAY
FROT, SUM

104MCS/s
72 MHz BW
8BR+8BI

35 / 50 MHz ANALOG BW

RFCB

OTX WALSH

DEMODULATES SIGNAL WITH LOs

FLY'S EYE

BAPP

SONATA

CLOCK

PPS

GPS

Rb

FSC

WALSH CLOCK

PPS

10 MHz

409 kHz

DISK RECORDER

FFT
BANDSEL
PACKETIZE

One Data Path Branches to Two

From Antennas → OTX WALSH → To Correlator / To SonATA
RFCB
DEMODULATES SIGNAL WITH LOs
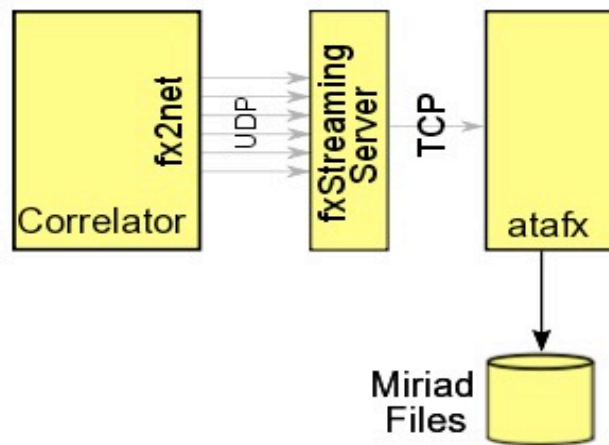
- Signal comes in from antennas

- Signal is demodulated

- Walshing applied to the signal

- Signal is then fed to
  - Correlator
  - SonATA

Data Flow - Correlator

ANTENNA

FEED   PAX   NODE

TCB

LNA

PAM

PAM

OTX

RX/TX FOR
UP TO 12
ANTENNAS

DEWAR

YELLOW SINGLE
MODE FIBER

CORRELATOR

IBOB   FBOARD   XBOARD   CATCHER

ATTEMPLIFIER

SAMPLE
TO DIGITAL
+ DEWALSH

1024 CHAN FFT
20 BIT REAL
20 BIT IMAG

4 BIT RE
4 BIT IM

ATAFX

Miriad
Files

FRINGE ROT
FIR BAND SEL

RFCB

OTX WALSH

Clock

DEMODULATES
SIGNAL WITH LOs

Miriad
Processing

IBOB   BEAMFORMER

ATTEMPLIFIER

SAMPLE
TO DIGITAL
+ DEWALSH

5 BEE2s
ALL DELAY
FROT, SUM

SONATA

NO FRINGE ROT
OR BAND SEL

104MCS/s
72 MHz BW
8BR+8BI

(Image of the sun by Colby Gutierrez-Kraybill, Oct 02, 2009)
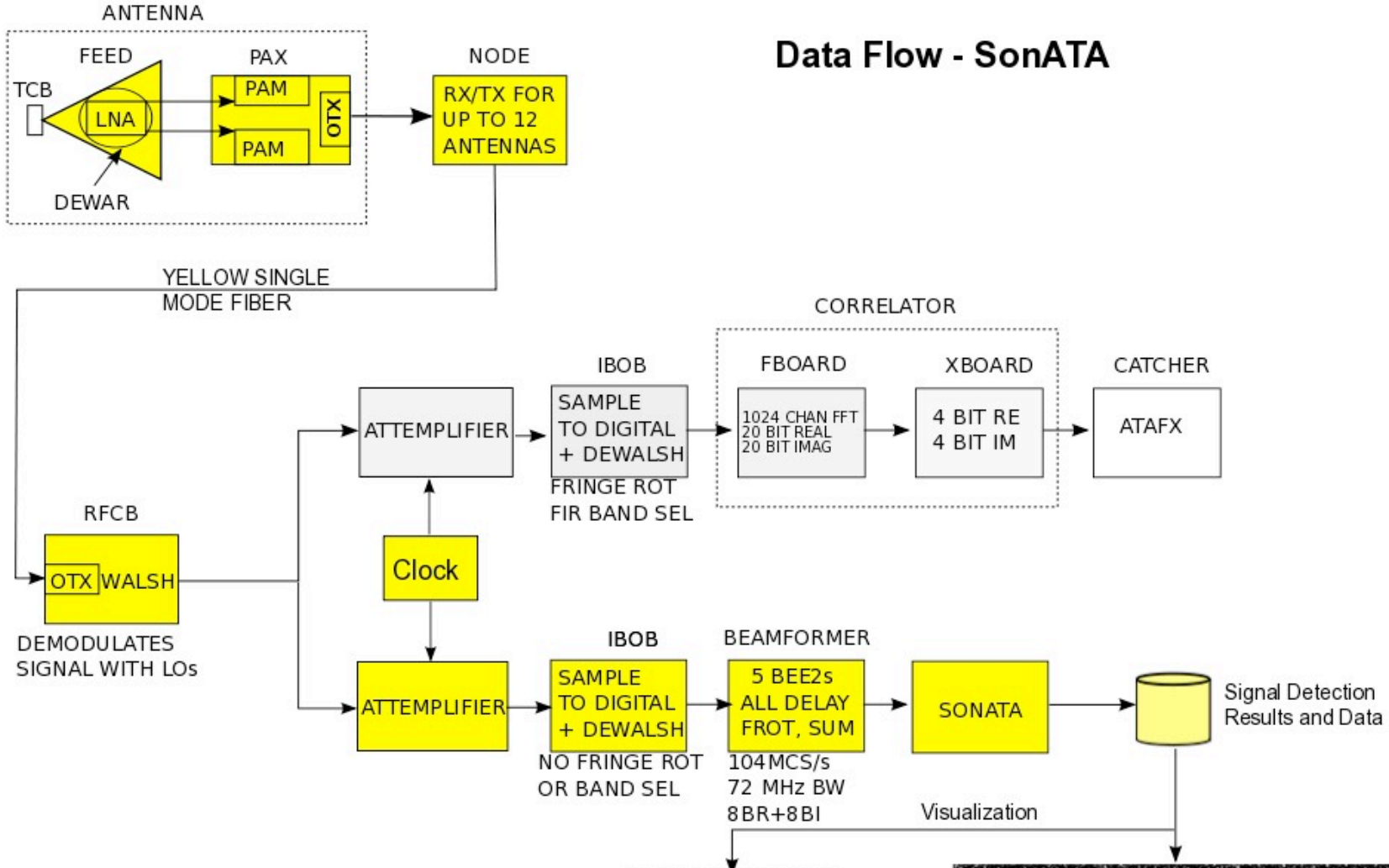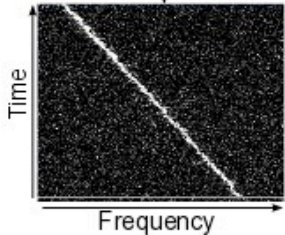
atafx – The Catcher

- fxStreamingServer collects the baseline data
- One UDP socket per baseline
- One fxStreamingServer per correlator
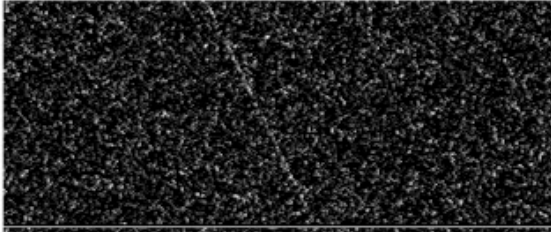- atafx simply reads data and packages it as a Miriad file

Data Flow - SonATA

SonATA = **SETI on** the **ATA**

(Rosetta spacecraft - observed Aug 04, 2010)

Voyager spacecraft

SonATA Data Flow

Beamformers — 104.8576MHz data in time stamped UDP packets of complex integer samples (8-bit real, 8-bit imaginary)

256-point DFB (Digital Filter Bank) to produce 256 channels of 0.4096MHz,

X Channelizers — Channels

Y Channelizers — Channels

The DFB introduces oversampling of 25%, so a channel is 0.54613333MHz.

DXs   DXs   DXs   DXs

The DX performs a second DFB to subchannelize the channel into 1024 subchannels of 0.54613333e6 / 1024 = 533.3333 Hz each. This DFB also introduces 25% oversampling, so each subchannel is 533.3333 / .75 = 711.1111111 Hz. Oversampled subchannels are discarded, the remaining 768 are analyzed or signals.

Archiver

Signal analysis reports and selected DX subchannel signal data