Mark 6 Summary

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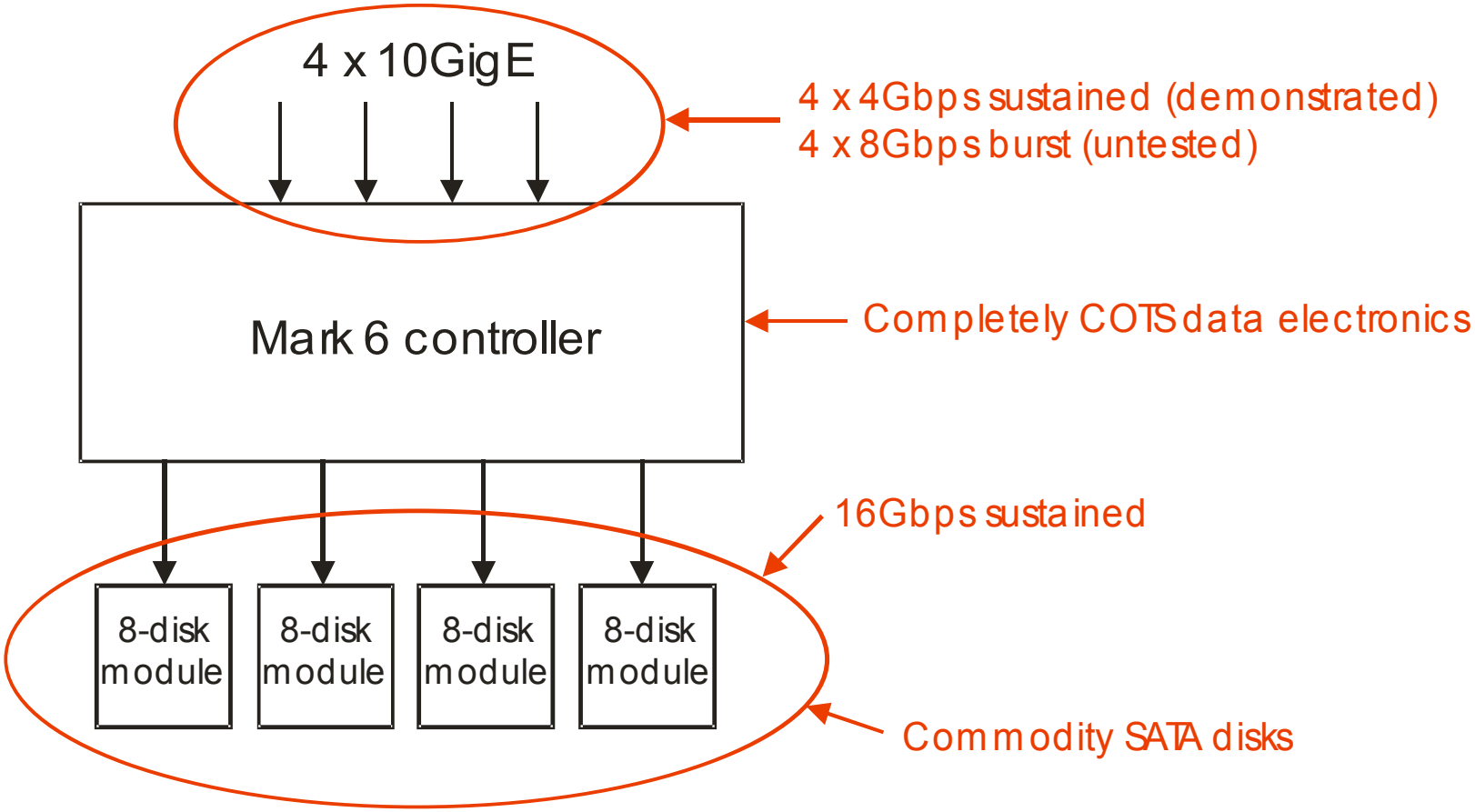
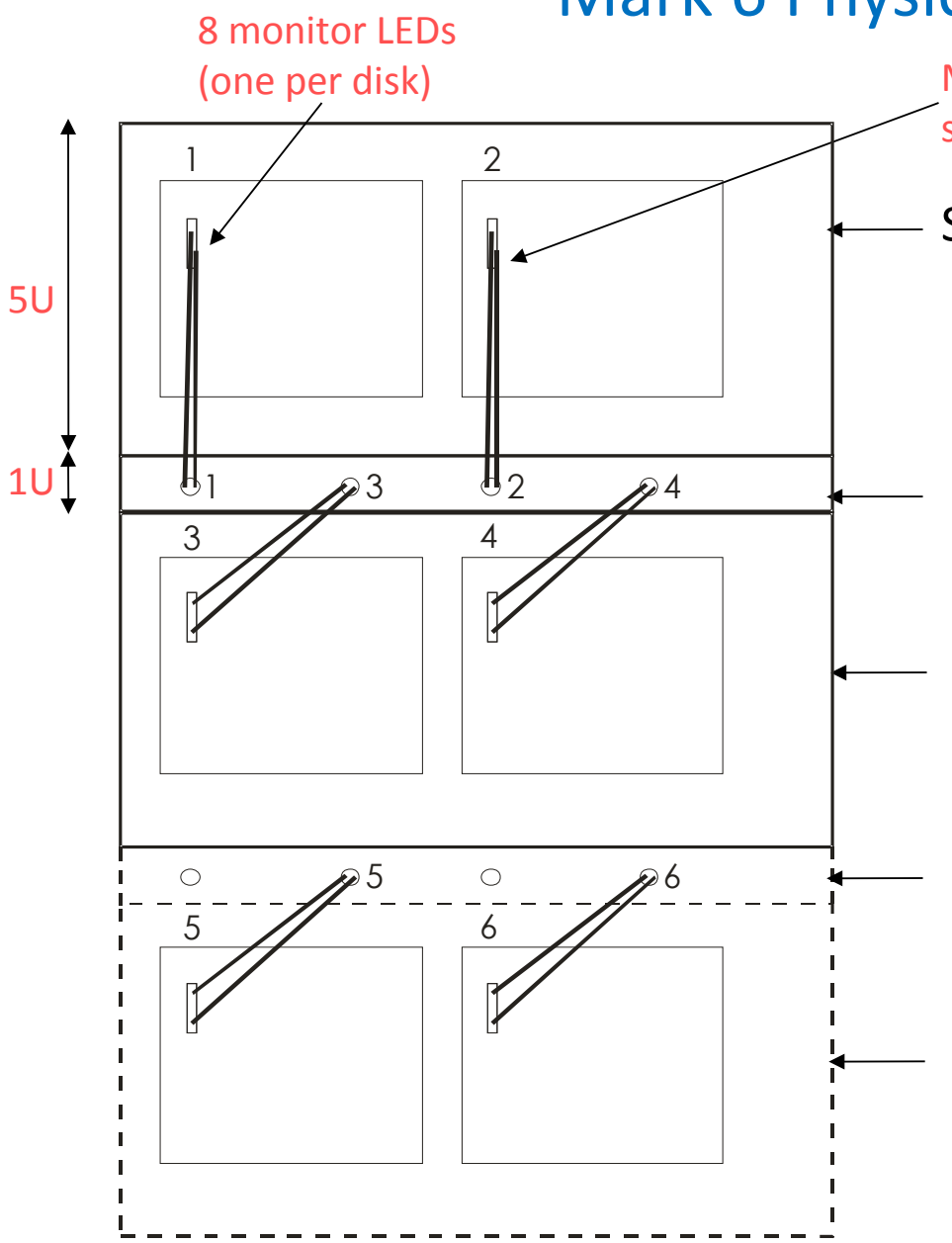
Mark 6 goals

- 16Gbps sustained record and playback capability
- >=32Gbps burst-mode capability
- General Ethernet packet recorder
  (can be straight-forwardly adapted to other interfaces as well)
- Based on inexpensive high-performance COTS hardware
- Easily upgradeable on Moore's Law curve
- Linux OS (Debian Squeeze 6.0.3) w/open-source software
- Playback as standard Linux files
- e-VLBI support
- Smooth transition from Mark 5
- Preserve as much investment in existing Mark 5 systems and disk libraries as possible

Basic Mark 6 System



Mark 6 Physical Layout



System chassis
- Mark 5/6 enclosure (w/data electronics)
- Power supply
- Chassis backplane kit
- Data-electronics hardware

Retractable cable panel
(for easy management of
eSATA data cables)

Expansion chassis (needed for 16Gbps)
- Mark 5/6 enclosure (no data electronics)
- Power supply
- Chassis backplane kit

(Optional) 2nd cable panel

(Optional) 2nd Expansion chassis

Mark 5 SATA Drive Module Upgrade to Mark 6

New Front Panel

Connectors for two eSATA cables

8x LED (1 per drive)

Re-use Handle from old Module

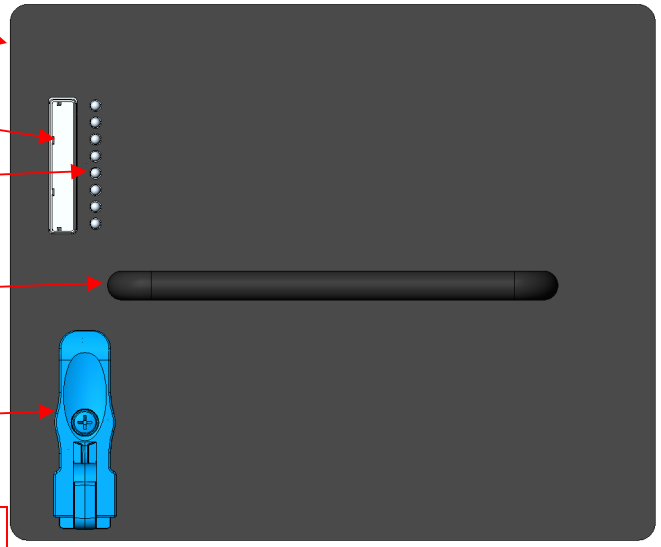
New Latch provided (pre-installed on new Panel)

Cooling slots

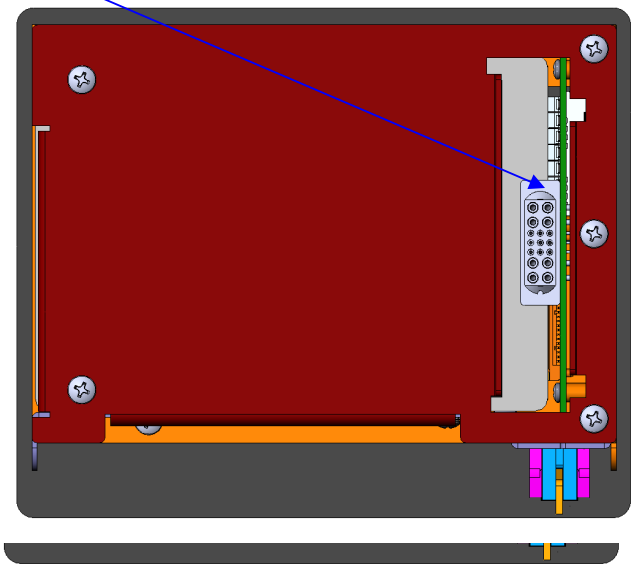
New PCB and power connector

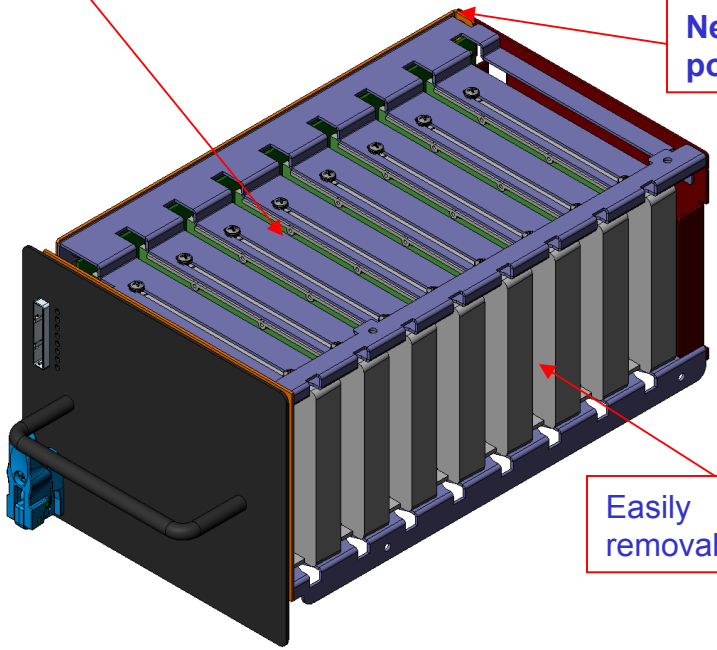
Easily removable disks

Front Panel



Rear Panel





Prototype Mark 6

Mark 6 control strategy

- Up to 6 modules accommodated at one time
  - Can be organized in ‘groups’ of 1-4 modules depending on requirements
- Basic Control strategy:
  - User creates ‘groups’ of modules from initialized disk modules
  - A module ‘group’, once created, acts as a single recording/playback entity
  - A module ‘group’ can be dissolved only by re-initializing modules within group

Example operation

- Operator pre-fills Mark 6 slots with combination of existing groups, or initialized (and erased) modules
- FS requests group of *n* modules for recording
  - Mk6 creates ‘ready’ group, either from an existing suitable group or a new group created from pool of initialized modules
- FS records scans, monitoring fill level of group
- When available space on group is no longer sufficient, FS puts current ‘ready’ volume off-line, constructs new ‘ready’ volume, and proceeds
- etc……

dimino6 VSI-S commands

group	Manage module groups auto, new, open, close, protect, erase, dismount
input_stream	Define input data stream add or delete
mod_init	Initialize disk module
record	Recording on/off
gsm	Set/get Group State Mask (NRAO specific)
gsm_mark	Set GSM (NRAO specific)

dimino6 VSI-S queries

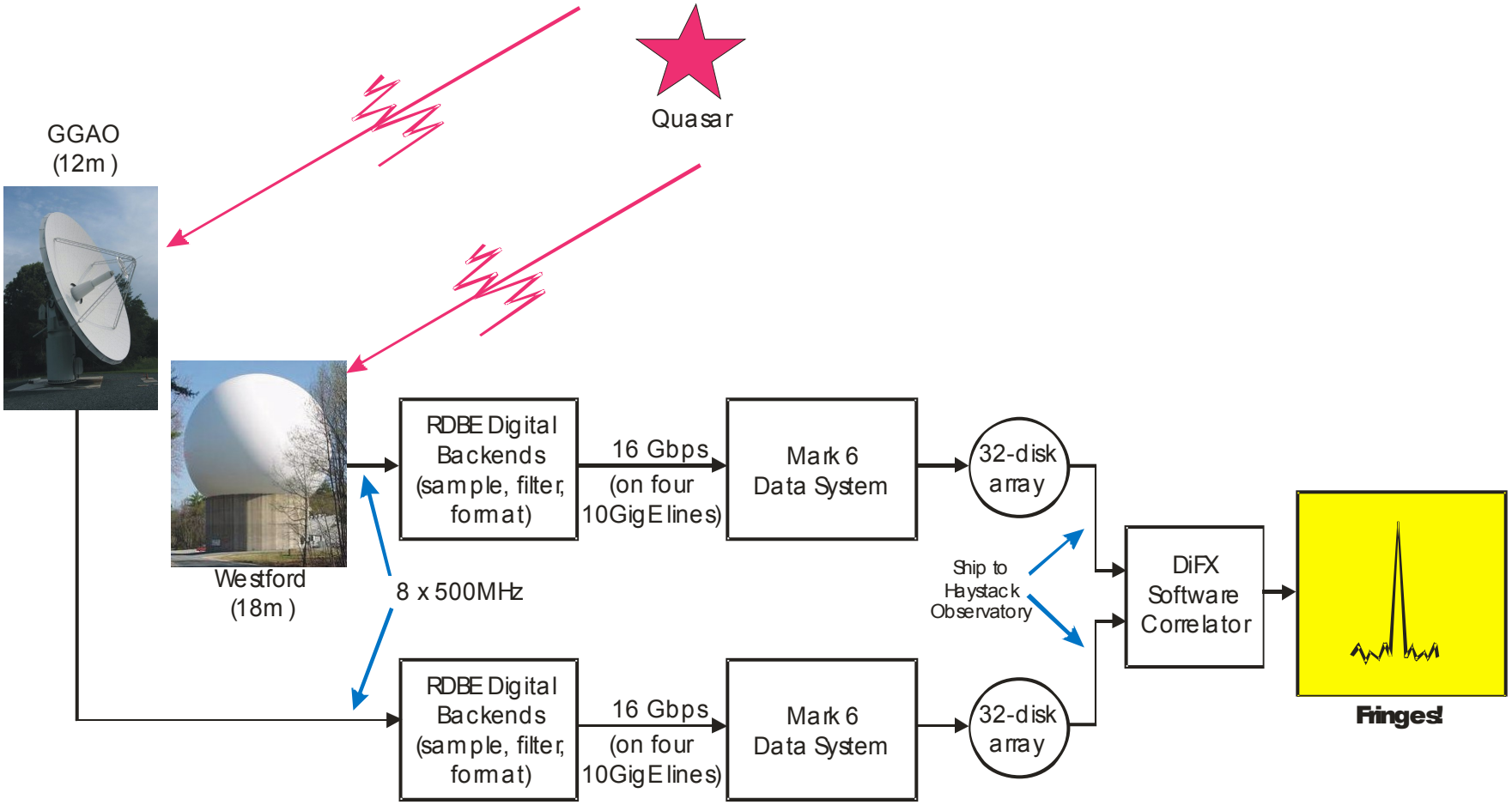
disk_info?	Get info about individual disks within a module serial#'s, model#'s, vendors, usage, size
msg?	Get ASCII message associated with *dimino6* return code
mstat?	Get module status
rtime?	Get remaining record time on ‘open’ group
scan_check?	Quick check of data in recorded scan
scan_info?	Get summary info for recorded scan
status?	Get detailed system status
sys_info?	Get Mark 6 system info

Module Serial Number (MSN)

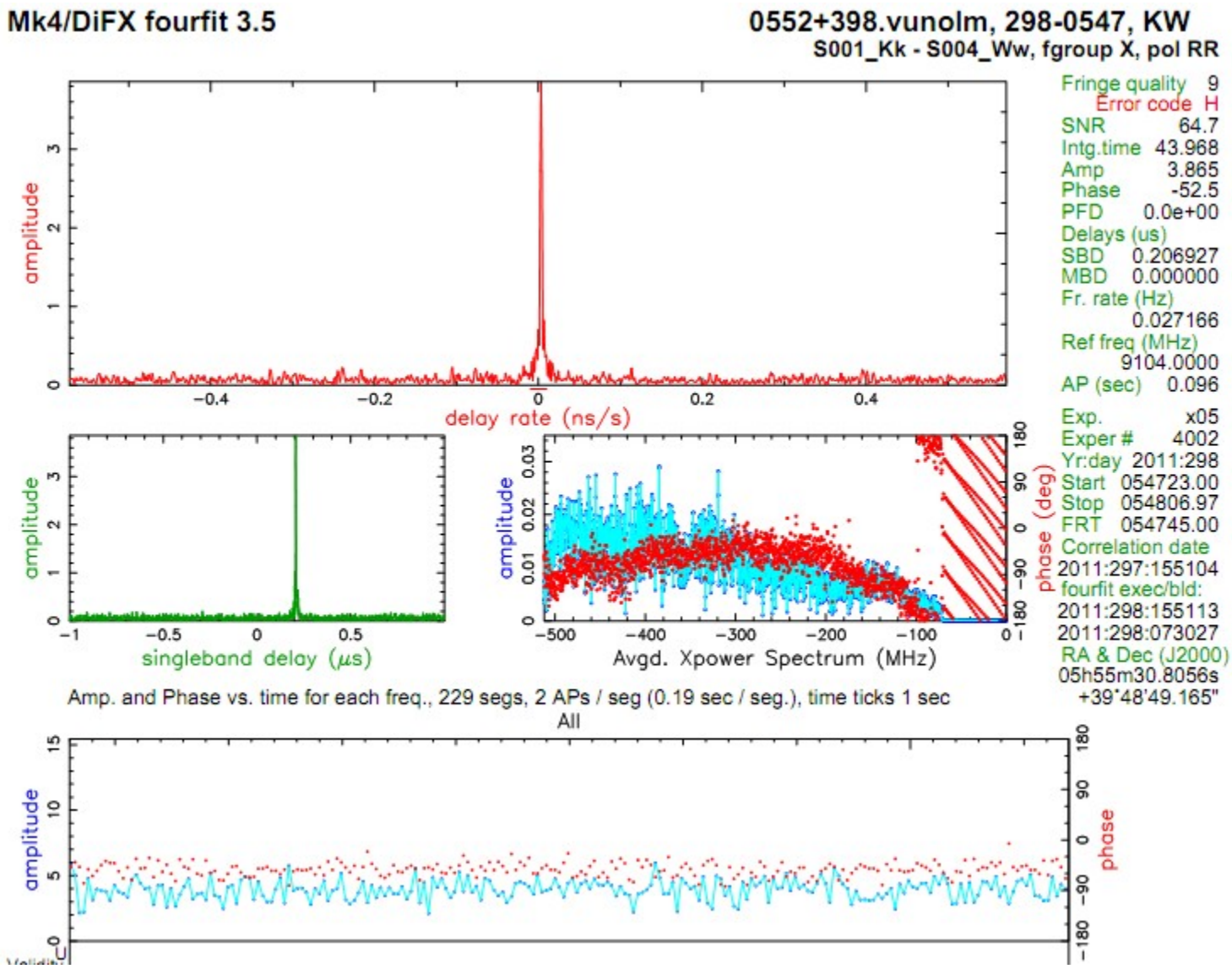
- Mark 6 Module Serial Number is called ‘MSN’
- The nomenclature ‘VSN’ used as shorthand for Mark 5 Module Serial Numbers is an archaic holdover from tape and makes no logical sense.
- Seems unlikely that anyone will be confused for very long since the word ‘volume’ is used nowhere else in current VLBI vocabulary, and ‘MSN’ makes much more logical sense!

16 Gbps VLBI demonstration with Mark 6

24 October 2011

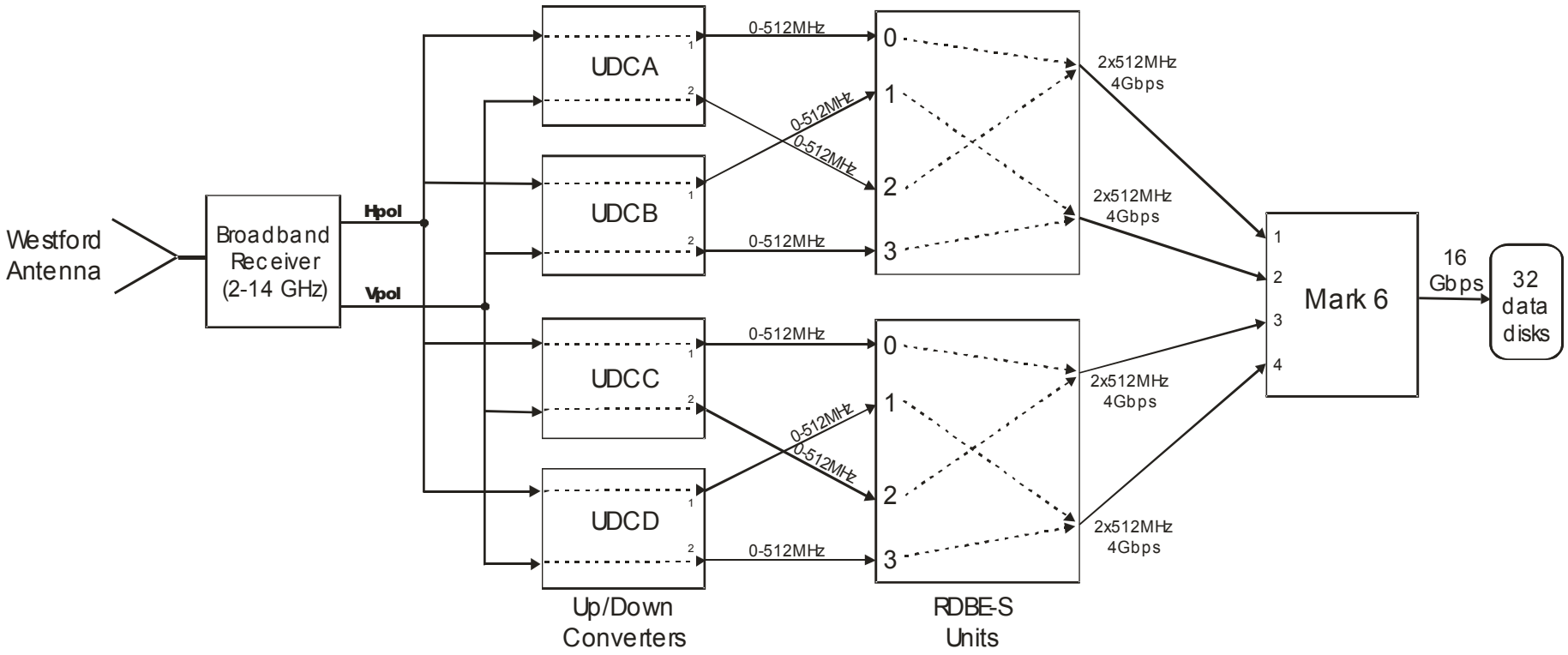


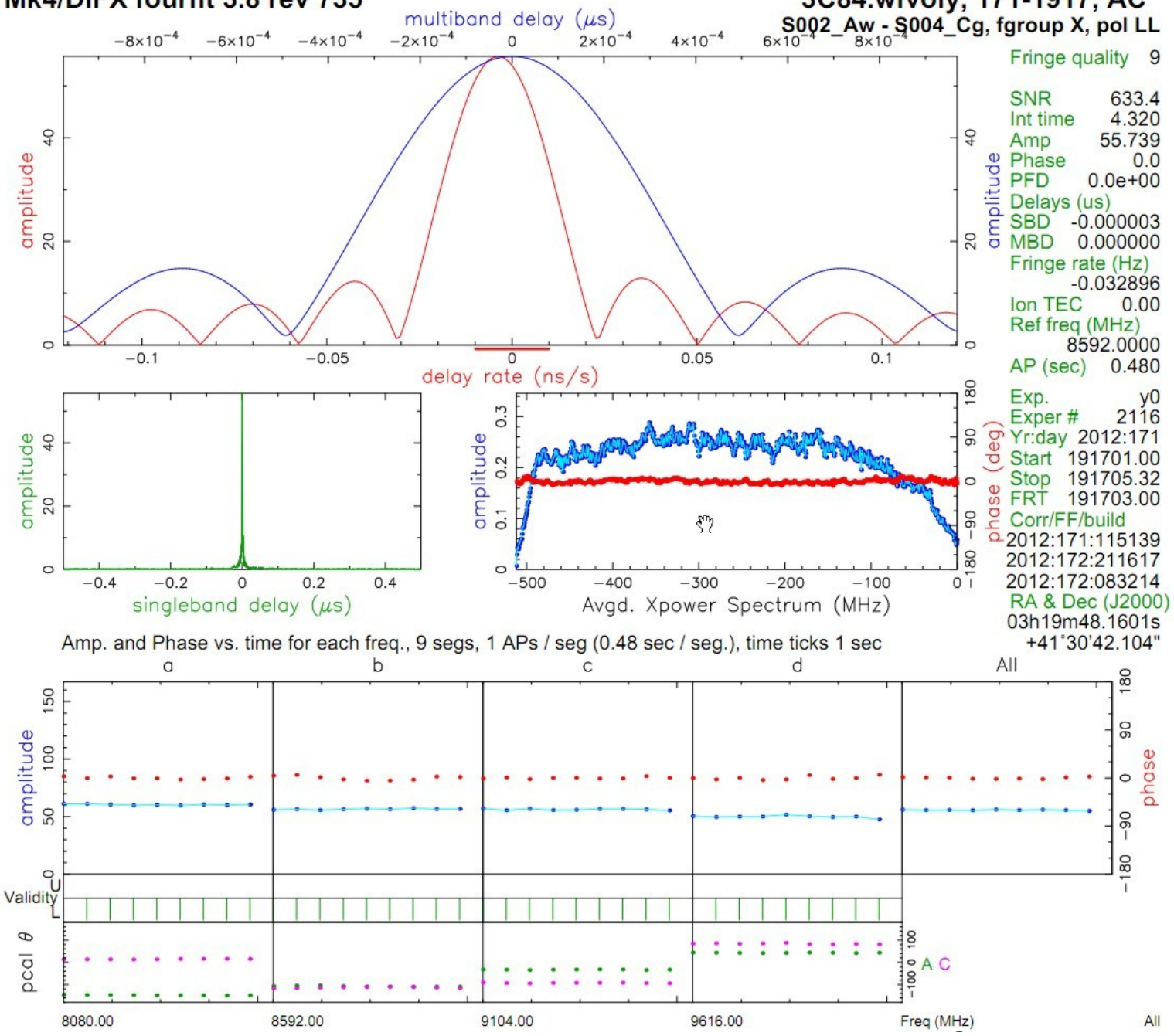
Correlation results (single 500MHz channel)

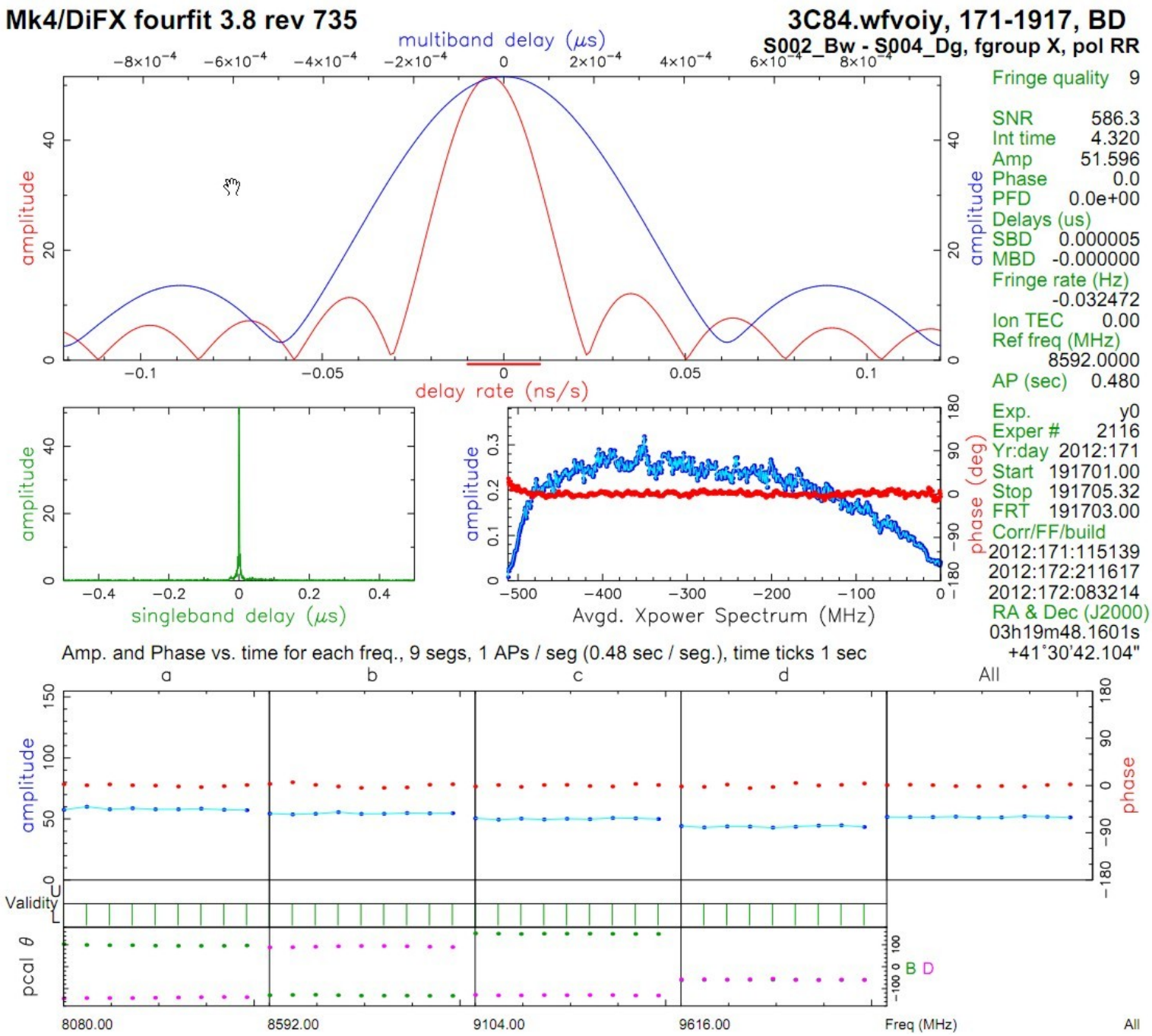


4GHz Bandwidth VLBI demonstration with Mark 6 (16Gbps; Westford/GGAO)

20 June 2011




Mk4/DiFX fourfit 3.8 rev 735
3C84.wfvoiy, 171-1917, AC
S002_Aw - S004_Cg, fgroup X, pol LL
multiband delay (μs)
amplitude
delay rate (ns/s)
singleband delay (μs)
Avgd. Xpower Spectrum (MHz)
phase (deg)
Fringe quality 9
SNR 633.4
Int time 4.320
Amp 55.739
Phase 0.0
PFD 0.0e+00
Delays (us)
SBD -0.000003
MBD 0.000000
Fringe rate (Hz)
-0.032896
Ion TEC 0.00
Ref freq (MHz)
8592.0000
AP (sec) 0.480
Exp. y0
Exper # 2116
Yr:day 2012:171
Start 191701.00
Stop 191705.32
FRT 191703.00
Corr/FF/build
2012:171:115139
2012:172:211617
2012:172:083214
RA & Dec (J2000)
03h19m48.1601s
+41°30'42.104"
Amp. and Phase vs. time for each freq., 9 segs, 1 APs / seg (0.48 sec / seg.), time ticks 1 sec
a
b
c
d
All
Validity
pcal θ
A C
8080.00
8592.00
9104.00
9616.00
Freq (MHz)
All


Mk4/DiFX fourfit 3.8 rev 735
3C84.wfvoiy, 171-1917, BD
S002_Bw - S004_Dg, fgroup X, pol RR
multiband delay (μs)
amplitude
delay rate (ns/s)
Fringe quality 9
SNR 586.3
Int time 4.320
Amp 51.596
Phase 0.0
PFD 0.0e+00
Delays (us)
SBD 0.000005
MBD -0.000000
Fringe rate (Hz)
-0.032472
Ion TEC 0.00
Ref freq (MHz)
8592.0000
AP (sec) 0.480
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Amp. and Phase vs. time for each freq., 9 segs, 1 APs / seg (0.48 sec / seg.), time ticks 1 sec
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All
Validity
pcal θ
B D
8080.00
8592.00
9104.00
9616.00
Freq (MHz)
All

Conduant prices (preliminary)

- Mark 6 system chassis (complete, w/electronics); ~$10K
  final motherboard yet to get determined
- Mark 6 expansion chassis (complete) $2675
- Cable tray $55
- Data cable (each) $85 each

- Mark 5-to-Mark 6 system-chassis upgrade kit (DIY) ~$8K
  (w/o power supply; can re-use 850W PS)
- Mark 5-to-Mark 6 expansion-chassis upgrade kit (DIY) $675

- Mark 6 module (empty) $495
- Mark 5-to-Mark 6 module upgrade kit (DIY) $250

Project late 2012 availability for complete Mark 6 system

Questions?

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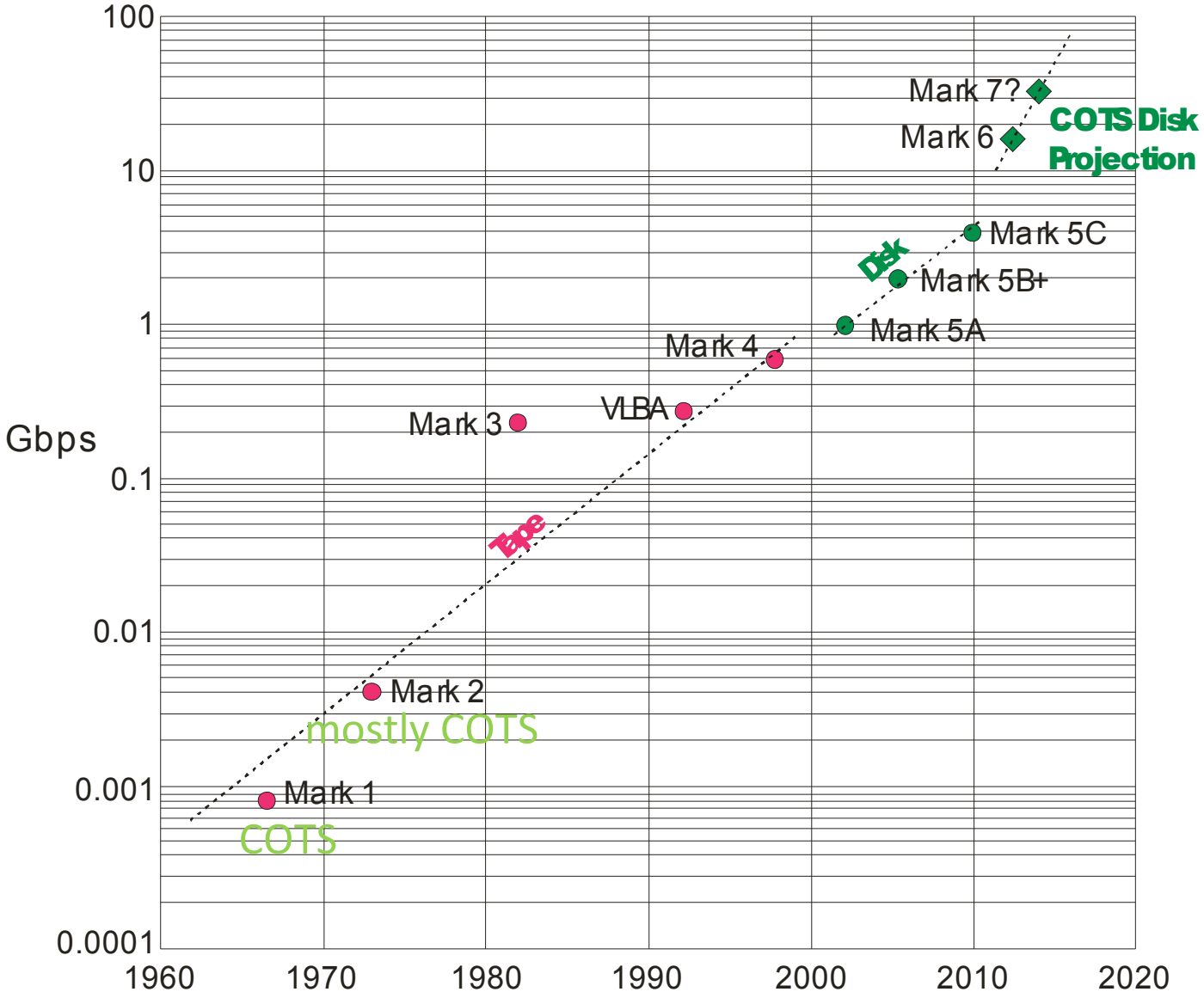
Recording rate capability vs. time



Recording-rate cost vs. time