Mark5 OS & Software Development

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Objective

- State of Mark5's OS
- Mark5A/B Application Software
  - SDK9
  - Version Info
- Maintenance
- Mark5C Software / Status

State of Mark5's OS

- Debian Lenny and Squeeze (under test)
  - Latest OS distribution supported
  - Linux kernel 2.6.26 (lenny) 2.6.32 (squeeze)
  - Requires Conduant SDK9.X

- Debian Etch
  - Latest OS distribution no longer supported
  - Last patch available on Jan 2011
  - Required for real-time e-VLBI
    - More on this in a few slides

State of Mark5's OS

- Why have sites upgraded their OS's
  - Security concerns / maintainability
    - Mark5 is connected to a network
  - Performance improvements
    - Linux kernel network stack improvements
      - Network interface cards (NICs) support
        » 1 Gbps / 10 Gbps NIC
    - Other subsystems
      - Disk
      - Raid, etc
  - New motherboard support
    - Old distributions do not support chipsets
  - Bug fixes / capabilities Streamstor controller card
    - Large Module SATA support

Mark5 Application Software

- Mark5A application
  - Converted to support SDK9.2
  - Testing on Mark5A / 5B / 5B+
  - Notes
    - Mark5B and Mark5B+ application
      - DIMinio (case sensitive)
        - » dimino will point to old software if installed
      - Match the latest command set supported

Mark5 Application Software

- Mark5A (cont)
  - e-VLBI bug
    - Disk2net no longer works
      - Under investigation
      - New version expected shortly
  - Mark5B+
    - errors with configuration of IO board

Mark5 Application Software

- What it is:
  - One debian package (NEW)
    - Mark5A/5B/5B+ application
      - mark5_2.3.1-i386.deb
      - Same code, post install script creates proper command to start application
    - streamstor_9.2.1-i386.deb
  - Installed / maintained through a standard package manager
    - synaptic (apt-get) / aptitude
    - dpkg

Upgrade Approach

- Debian mirror at Haystack
  - Crashed / replaced
  - Unavailable at this time

- For Mark5 systems
  - Download deb package from Haystack website
    - Note the distribution you are installing on
  - Perform following commands:
    - dpkg -i streamstor_9.2.1-i386.deb
    - dpkg -i mark5_2.3.1-i386.deb

Upgrade Approach (cont)

- For Mark 5B/5B+ systems
  - Perform following commands:
    - dpkg -i streamstor_9.2.1-i386.deb
    - dpkg -i mk5bio_1.0.6-i386.deb
    - dpkg -i mark5_2.3.1-i386.deb

SDK 9.2 Upgrade

- New method to updated firmware for newer controller cards
  - ssflash -u sdk9.2.ssf
  - For new controller cards Amazon
    - Mark5B+ systems
  - Handout in class for how after installing deb package to perform firmware upgrade

What's Next

- Presently 1 stable Debian OS distro's - Squeeze
- Support for Squeeze
  - thru May 2014
  - Debian supports second distribution for 1 year
    - After release of new distribution - Wheezy
      - Expected Weekend of May 4th / 5th
- Linux kernel 2.6.32 (Squeeze)
  - Not Mark5 Application dependent
  - Conduant / Jungo driver dependent
- 64 bit kernel support
  - Jungo / SDK dependent
  - Available with SDK9.3
    - Under test

SDK Information

SDK Version	Shared Library version number	cc5A/cc5B linked library	Debian Package version
9.3	libwdapi1110	-lwdapi1110	streamstor_9.3.1-i386.deb
9.2	libwdapi1031	-lwdapi1031	streamstor_9.2.1-i386.deb
9.1	libwdapi1021	-lwdapi1021	streamstor_9.1.0-i386 .deb
9.0	libwdapi1011	-lwdapi1011	streamstor_9.0.0-i386 (5c)
8.3beta	libwdapi1001	-lwdapi1001	streamstor_1.2.2-i386 .deb
8.3	libwdapi1001	-lwdapi1001	streamstor_1.2.1-i386.deb
8.2	libwdapi921	-lwdapi921	streamstor_1.1.4-i386.deb
8.1	libwdapi910	-lwdapi910	NA
7.6	libwdapi801	-lwdapi801	NA
6.X	libwdapi521	-lwdapi623	NA

Maintenance

- Recommend signing up for
  - **debian-security-announce mailing list**
    - http://lists.debian.org/debian-security-announce/
  - Informs the users about security problems by posting security advisories about "all" Debian packages on this list.

- Alternative
  - Update the package list weekly
  - Upgrade the required packages if any

Mark5 OS and e-VLBI

- Real-time eVLBI issues related to Mark5's
  - Jive5A
  - Discovered by JIVE (Harro Verkouter)
  - At issue CPU usage over PCI bus transfers with small block size
    - Inhibits corner turning feature to maximize channel bandwidth
  - OS (kernel) / SDK9 dependent
    - Good OS: Debian Etch / Lenny
    - Bad OS: Debian Squeeze

Mark5C

Software

- DRS Version 0.9.9 official released
  - 2Gbps in 1 bank mode / 4Gbps in 2 bank mode
  - Mark5B / VDIF data support
  - Support hardware / software correlation
- DRS Version 0.9.14 under test
  - Address full disk bug
    - Presently requires drs restart
  - Other minor bugs in command set
  - Start up with out disk in system

Mark5C Software Utilities

- SDK 9.3 officially released
  - Verifying operations with DRS 1.0 release
- FuseMk5a has incorporated Mark5C functionality
- SSErase
  - 2 bank mode support?
  - Powers that be recommended against in case of error during conditioning
  - Added capability for write only test
- Difx support
  - Direct reading of disk modules in 2 bank mode??
  - With FuseMk5 initial path

Mark5C Features (cont)

- There is no 1pps
  - No timing or synchronization

- Recording starts immediately after command is issued
  - 2 Gbps there is not problem gating using the 5C
    - Note :
      - 50% probability to start on non - Mark5B header
      - scan_check problems
  - 4Gbps delayed response to record=off command
    - Daughter board is at max clocking capacity

packet – Set/get packet acceptance criteria

Command syntax: packet = <DPOFST> : <DFOFST> : <length> : <PSN Mode> : <PSNOFST> ;
Command response: !packet = <return code>;

Query syntax: packet? ;
Query response: !packet? <return code> : <DPOFST> : <DFOFST> : <length> : <PSN Mode> : <PSNOFST> ;

Purpose: Set / get the packet acceptance criteria.

Settable parameters:

| Parameter	Type	Allowed values	Default	Comments
< DPOFST >	int	≥ 0	0	payload byte offset from beginning of payload to first recorded data
< DFOFST >	int	≥ 0	0	payload byte offset to beginning of recording
< length >	int	> 0	5008	number of bytes to record per packet (see Note 1)
< PSN Mode >	int	0 | 1 | 2	0	Packet Serial Number (PSN) monitor mode (see Note 2)
< PSNOFST >	int	≥ 0	0	payload byte offset from beginning of payload to PSN (for PSN monitor mode 1 or 2)

M onitor-only parameters:

Parameter	Type	Values	Comments
< DPOFST >	int	≥ 0	payload byte offset from beginning of payload to first recorded data
< DFOFST >	int	≥ 0	payload byte offset to beginning of recording
< length >	int	> 0	number of bytes to record per packet (see Note 1)
< PSN Mode >	int	0 | 1 | 2	Packet Serial Number (PSN) monitor mode (see Note 2)
< PSNOFST >	int	≥ 0	payload byte offset from beginning of payload to PSN (for PSN monitor mode 1 or 2)

Notes:

1. The length of data to be recorded must be a multiple of 8 bytes.

2. PSN-monitor 0 mode will disable packet serial number checking and record all data in the order received. PSN-monitor mode 1 will replace invalid packets with the specified fill pattern and guarantee order. PSN-monitor mode 2 will prevent packets from being written to disk if the most significant bit is set.

Mark5C Data Payload Definition and Parsing
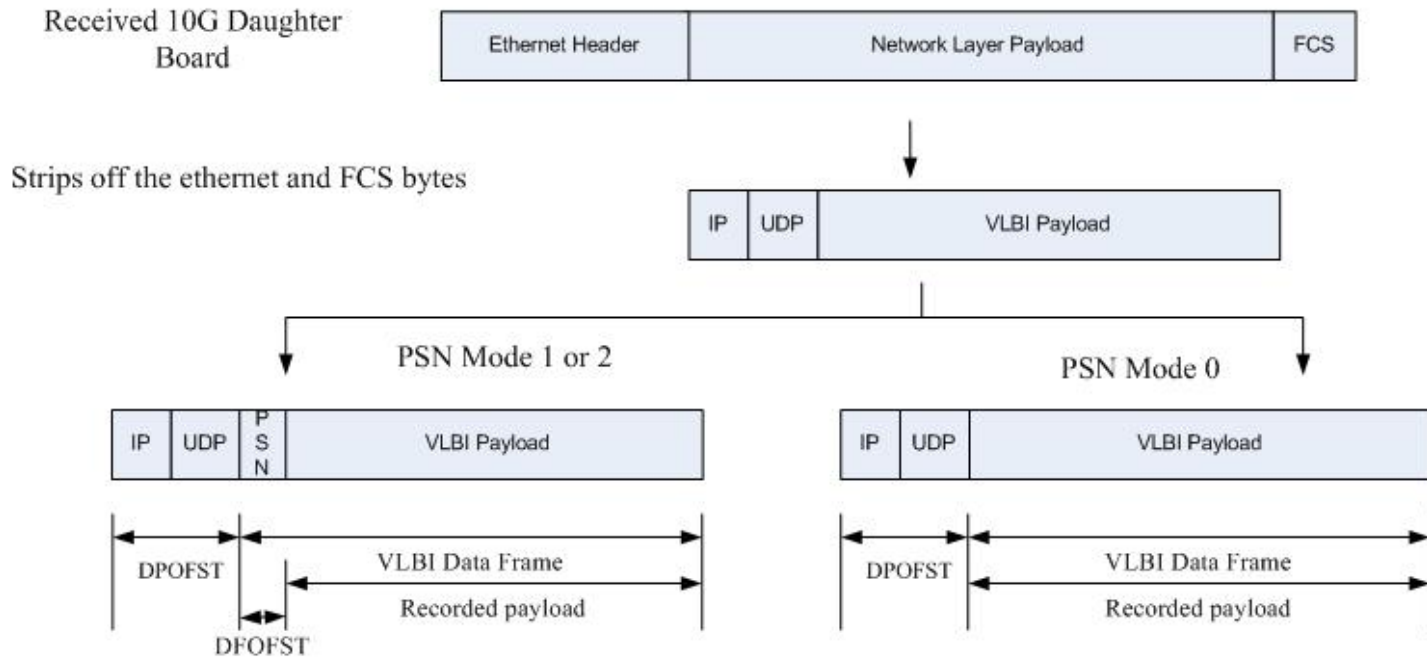
- The "packet" command from the Mark5C command set specifies how to treat the incoming data:

  packet = <DPOFST> : <DFOFST> : <length> : <PSN Mode> : <PSNOFST>;

- DPOFST – Data payload offset – number of bytes into the received packet to find the start of the VLBI Data Frame.
- DFOFST – VLBI Data Frame offset – number of bytes to add to DPOFST to find the start of the data to be recorded.
- Length – VLBI Data Frame length in bytes
- PSN Mode –
  - 0 - "Does not" guarantee order or correct for missing packets, it simply records what is received in the order it is received.
  - 1 - Guarantees order and corrects for missing packets by inserting fill pattern by verifying the 32 bit PSN number
  - 2 - Guarantees order and corrects for missing packets by inserting fill pattern, but discards packets with the most significant bit of PSN being set to 1.
- PSNOFST – Packet Serial Offset – Since the PSN can be the first word in the VLBI Data Frame or embedded in a VLBI header (e.g. word 5 of the vdif header) specifies the number of bytes from DPOFST to locate the PSN.

Mark5C User Directory

- Is not backward compatible with 5A/5B
- Has support for
  - 5B data (0.9.9)
  - VDIF Data (0.9.9)
    - If there is a need for bank mode with VDIF support
      - an early version can be released
- New data structure
  - Describing the meta data of the scans recorded
- Impact is to hardware correlators

Field System Support

- When will the mark5C be integrated into the field system?
  - Under development / test
  - Normal operations expected June 2013
    - Mark5C commands
    - RDBE commands
  - Release for standard operations

  - After testing with broadband development system

Questions ?