ATM-DB SDS Readout Specification
E. Hazen – 5 October 2006

This document describes a proposed readout protocol for the ATM Ethernet daughterboard. It is taken in large part from presentations by M. Shiozawa and Hayato.

SDS (sparse data scan) refers to the automatic transfer of data from ATM FIFO via TKO read to SiTCP transmit FIFO. It will be the primary means of data readout for the ATM in normal operation.

SDS can be started by 4 methods:

- Periodic timer (programmable period ~ 1ms)
- Trigger counter (every n G_TRIG from ATM)
- ATM FIFO Threshold (dedicated signal from ATM)
- UDP command (write bit in control register)

Once started, SDS logic will perform TKO read operations with (F=0 SA=0). As long as TKO Q=1, data is transferred to DB FIFO for TCP transmission via SiTCP. SDS will stop when one of the following occurs:

- TKO Q=0
- DB FIFO becomes full
- UDP command (write bit in control register)

When SDS is enabled (any bit set in SDS enable register) or SDS transfer is in progress, TKO single action with F=0 or F=8 by UDP are prohibited. Any attempt to perform single action with F=0 or F=8 should return an error status (bit 2='1' in TKO status register). Other TKO single action may be performed during SDS.

Note that when SDS is not enabled, TKO single action with F=0 may be used to read ATM FIFO.

SDS should support very large transfers. ATM FIFO holds ~ 1M words. TKO transfer is faster than Ethernet, and data can accumulate very fast during burst from a rare phenomenon (i.e. supernova). Data should be buffered in SDRAM (8M x 16 words) as required.

At start and end of each SDS, a specific header value should be inserted in data stream.
SDS Control Registers on Daughterboard

SDS Enable Mask

- bit x  Timer
- bit x  Trigger count
- bit x  ATM FIFO threshold

SDS Control

- bit x  Master reset
  - Terminate SDS in progress, clear FIFO
- bit x  Start SDS (momentary, write '1')
- bit x  Stop SDS (momentary, write '1')
- bit x  Clear SDS counters (momentary, write '1')
- bit x  Clear SDS errors (momentary, write '1')
- bit x  Master SDS enable

SDS Status (read- only)

- bit x  SDS busy (transfer in progress)
- bit x  DB FIFO almost full
- bit x  DB FIFO was full at least once since last clear errors
- bit x  Last SDS start by timer
- bit x  Last SDS start by count
- bit x  Last SDS start by ATM FIFO threshold
- bit x  Last SDS start by 'Start SDS' command
- bit x  Last SDS stop by Q=0
- bit x  Last SDS stop by 'Stop SDS' command
- bit x  Last SDS stop because FIFO is full

SDS Timer

- bits 15- 0  SDS start period in 100us units (100us to 6.5s)

SDS Trigger Counter

- bits 15- 0  SDS start after n+1 G_TRIG from ATM
  (0 = every trigger)

SDS word count

- bits 31- 0  Count number of SDS words transferred
  Count includes header and trailer words
  stop counting at all 1's

SDS burst count

- bits 15- 0  Count number of SDS bursts
  Burst = series of TKO reads with F=0 where Q=1
  stop counting at all 1's

SDS words in transmit FIFO

- bits 31- 0  Count of number of words currently in transmit FIFO

SDS header value
bits 15-0  Value to be inserted in data stream at start of SDS
SDS trailer value
bits 15-0  Value to be inserted in data stream at end of SDS