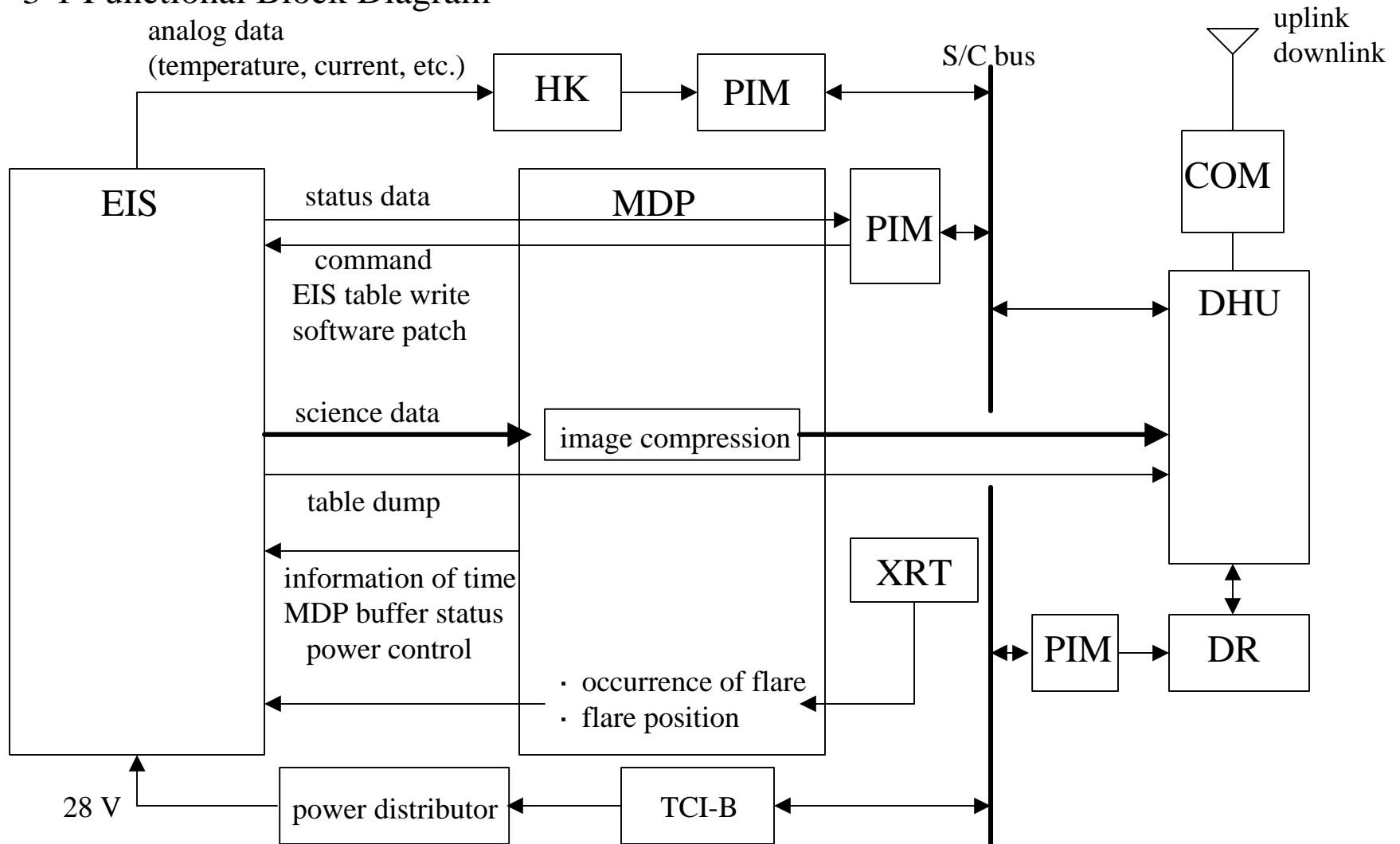
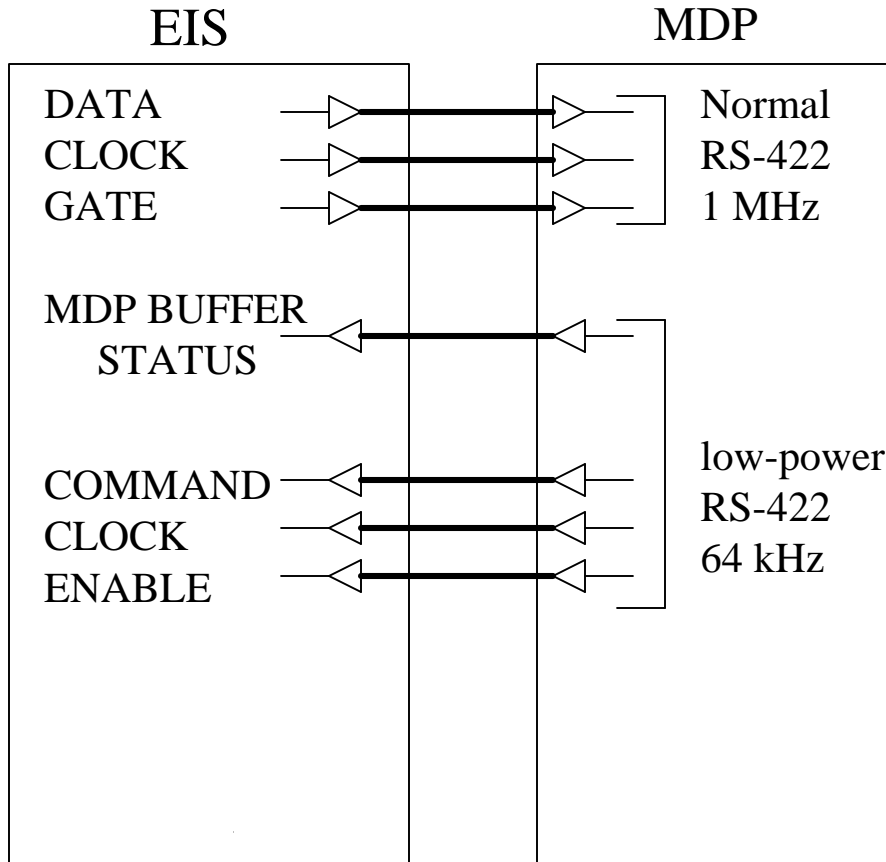


EIS/Solar-B: 3. Electrical Interface to MDP

3-1 Functional Block Diagram

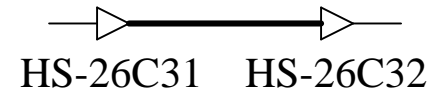




Power control interface ?

All electrical interface lines between EIS and MDP are digital interface lines.

differential RS-422 line interface

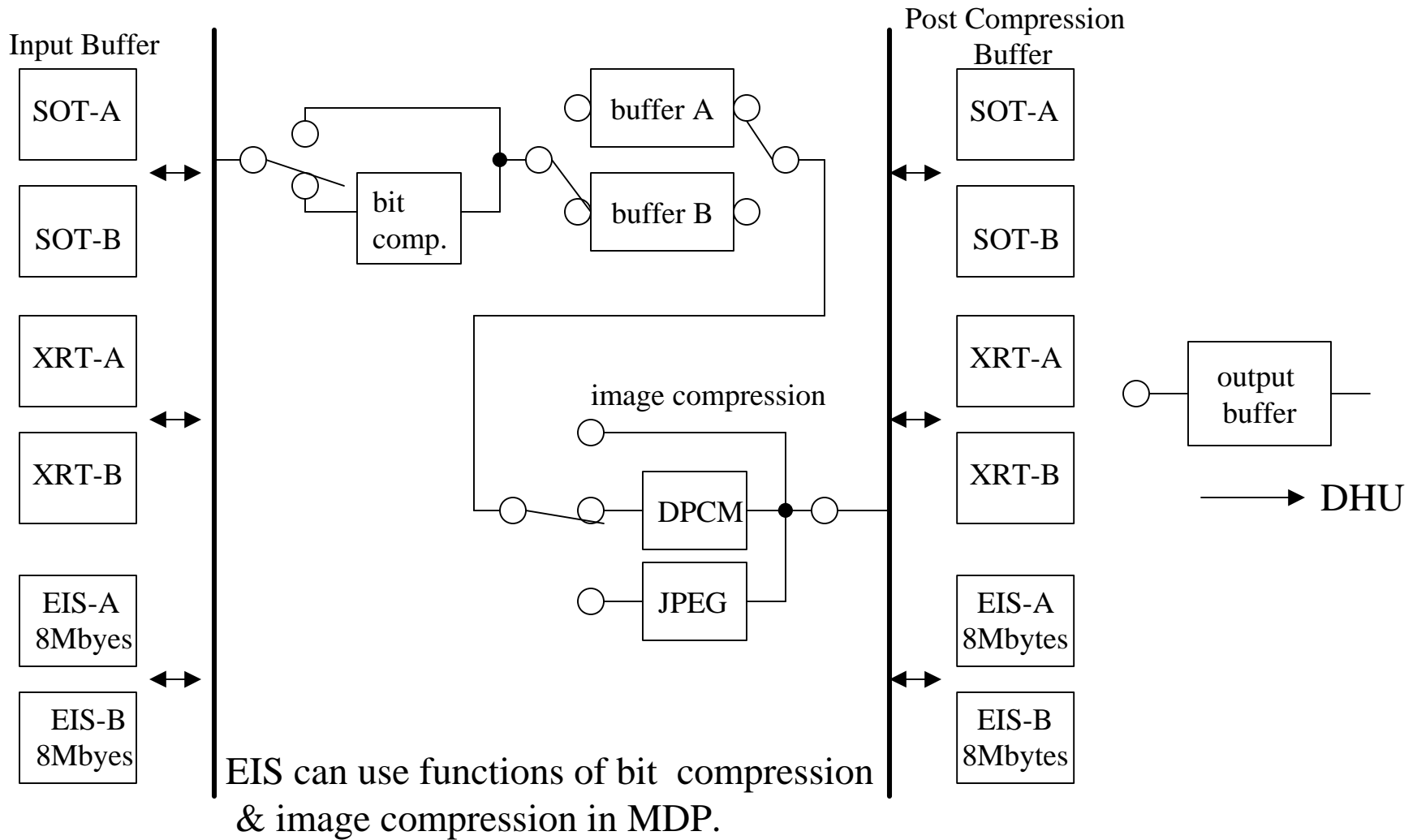


‘MDP Buffer Status line is used

1: for safe exchange of ‘input buffer’ in MDP.

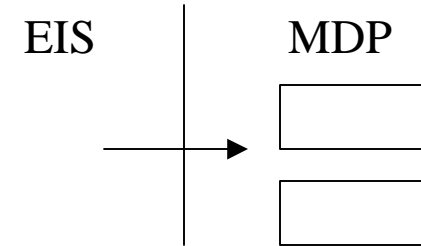
2: when post compression buffers become almost full.

EIS/Solar-B: 3-3 Flow of image data processing in MDP



EIS/Solar-B: 3-4 Data Lines

- Data line: normal differential RS-422 line, 1Mbps
 - Science data (spectrum or image)
 - Status data (~1 sec interval; Report of shutter & scan mirror motions will be required.)
 - Dump data of EIS observation table
 - Dump data of EIS compression table



MDP knows kind of data by looking at the header part after the data are transferred.

12 bits data flow in this data line.

maximum transfer speed: 1 Mbps (TBD)

- EIS Input Buffer in MDP: 1. double buffer system 2. buffer size: 8 Mbytes/buffer
- Concept of Data Format: fixed-length header + variable-length data
maximum image size in a single packet = 256 kpixel

science data: header + 12 bits CCD image data

The number of pixels in the image data is a multiple of 8.

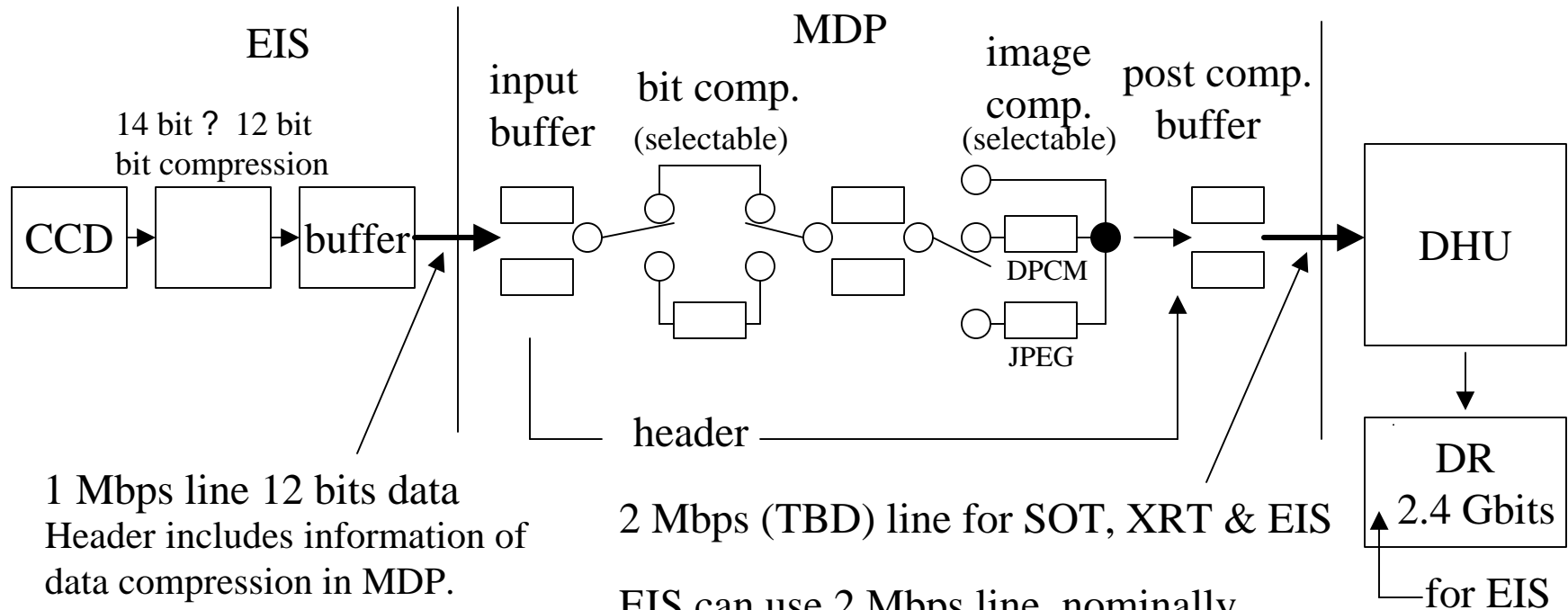
Is this OK ?

other data : header + 12 bit data (Upper 4 bits are all 0. Is this OK ?)

EIS can send data to MDP at any time when a status of MDP buffer status line is READY.

EIS/Solar-B:

3-5 Data Compression



1 Mbps line 12 bits data
Header includes information of data compression in MDP.

2 Mbps (TBD) line for SOT, XRT & EIS

EIS can use 2 Mbps line nominally for 0.5 s every 6 seconds.

→ max. 167 kbps, but DR for EIS will become full in a short time.

Capacity of DR will be ~3 Gbits, but only downlink 2.4 Gbits during the KSC/DSN contacts.

EIS/Solar-B: 3-6 Command Lines

Command line: low-power differential RS-422 line, 64 kbps

MDP contractors would like to know:

1. list of commands required for EIS operation
2. how ICU reads commands from MDP (Please explain it.)
3. response time for a command
4. size of buffer ?
5. whether there is some restriction for the data format or not.

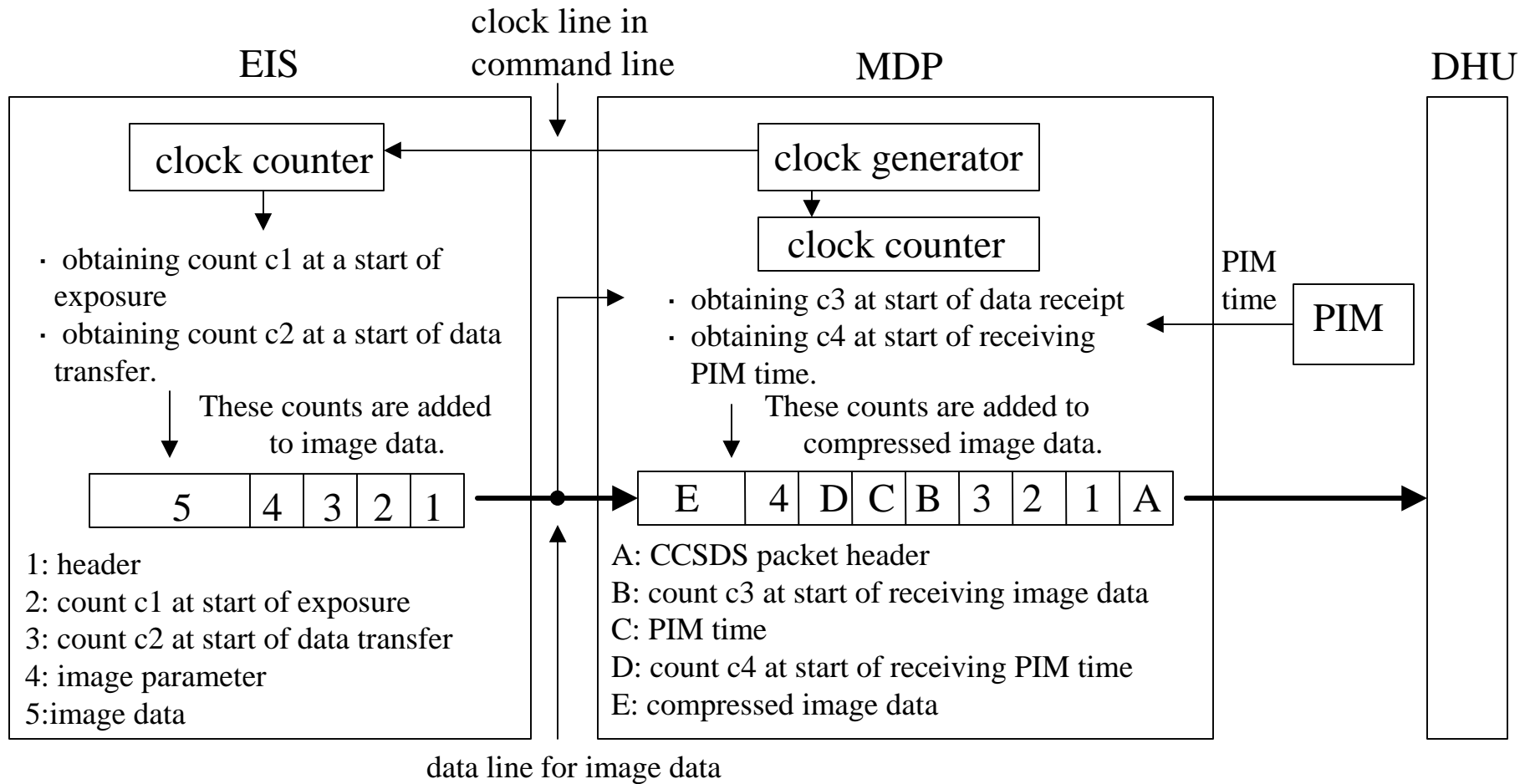
Command answer back: receipt of command → put the command data into status data for confirmation

EIS/Solar-B: 3-7 Counter-plan for Errors

- When some error happens in EIS-CPU due to SEU,
 - does EIS side request anything to MDP ?
 - or
 - does EIS side deal with the error by itself ?

- When some error happens in MDP due to SEU,
 - does EIS side request anything to MDP backup system for safety ?
 - or
 - does EIS side deal with the error by itself ?

EIS/Solar-B: 3-8 Management Plan of Time



In case of data except for science data, EIS only put counter value at start of data transfer.

EIS/Solar-B: Appendix. Radiation Environment of MDP

Solar-B: launch window: 2004 orbit: sun-synchronous orbit
 operation period: 5 years altitude: 600 km, inclination: 97.79 deg

Results of total-dose evaluation in case of Solar-B orbit by MHI
3 mm thickness Al shield is assumed.

- a) trapped proton: 1.37×10^2 rad/year
- b) trapped electron: 9.35×10^2 rad/year
- c) galactic cosmic ray: 3.52×10^2 rad/year
- d) flare - normal: 7.27×10^2 rad/year
- e) 90% worst : 4.39×10^3 rad/year

Total dose for 5 years:

$$(a + b + c + d) \times 5 \text{ years} = 9.01 \times 10^3 \text{ rad}$$

$$(a + b + c + e) \times 5 \text{ years} = 2.73 \times 10^4 \text{ rad}$$

The following is a baseline of flare detection.

- Detection of flares is done by XRT.
- 8×8 on-chip summation image covering the whole XRT field of view will be used for flare patrol.
- The flare patrol image will be taken every ~ 30 sec (TBD).
- Information on flare detection is sent to EIS by MDP.
 1. Flare detection
 2. Flare location in XRT CCD coordinate; X=0-255, Y=0-255 (TBD)
- Duration of flare mode TBD

