Update on Proposed New HRIT DCS File Format

Presented by

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Background

- **Original LRIT/HRIT File Format from 2003-2005**
  - **Uses mix of ASCII and binary fields.**
  - **Provides the DAPS error message statistics.**
    - **Major deficiency is DAPS frequency resolution.**
      - **+/- 500 Hz with 50 Hz resolution.**
      - **Current CS2 transmitter limit is +/- 125 Hz**
- **New format proposed at September 2017 TWG.**
- **Proposed format updated based on TWG feedback and presented to STIWG in November.**
- **In December NOAA did an Outreach to the DCS Community looking for input and feedback for the updated proposal – minimal response.**
  - **Really hoping for manufacturer feedback.**

Possible Areas of Confusion

- **Proposal is to only change HRIT file format.**
  - **As messages are received by NOAA, the DADDS collects the messages into files.**
  - **Each file contains a File Header followed by one or more DCS Messages.**
  - **Header information for each message is included before the actual DCP message data.**
  - **The DCP message data is included as received.**
- ***Proposal does not change …***
  - ***Format of the actual DCS Message***
  - ***The format of any other DCS message dissemination protocol; DAMS-NT, DOMSAT, DDS (LRGS/OpenDCS).***
- **Reception equipment/software must parse file to extract DCP messages and re-format them into another DCS protocol.**

Reason for Suggesting Change

- **Current LRIT/HRIT format uses DAPS era Message Quality Statistics.**
  - **The DAPS message quality fields were specified in the 1980's (over 30 years ago) and are generally accepted to be inadequate today.**
- **New format can convey more/better information with fewer header bytes.**
- **Higher data rate of HRIT vs LRIT offers transition opportunity with the potential for both formats to be included for a limited time, but ...**
  - **subject to NOAA approval**
  - **with varying priorities; i.e. latencies**
  - **utilization of HRIT growing so may not be available in the future**

Updated Recommendations & Comparison

Proposed Format 1

Field Name	*Bytes*	*Format*
Block Identifier	1	Integer Unsigned
Message Block Length	2	Integer Unsigned
Sequence Number	3	Integer Unsigned
Message Flags/Baud	1	Bit Mapped
Message ARM Code	1	ASCII Char (G,?,M,T,W, etc.)
Corrected Address	4	Hexadecimal
Original Address	4	Hexadecimal
Carrier Start	7	BCD
Message End	7	BCD
Signal Strength X10	2	Integer Unsigned
Frequency Offset X10	2	Integer Signed
Phase Noise X100	2	Integer Unsigned
Good Phase X2	1	Integer Unsigned
Channel	2	Integer Unsigned
Spacecraft	1	ASCII Character (E,W)
Source Code	2	ASCII Characters
Source Secondary	2	TBD
Message Data	Var	ASCII or Pseudo-Binary
Block CRC	2	Hexadecimal

Overhead Total: 46

Proposed Format 2

Field Name	*Bytes*	*Format*
Block Identifier	1	Integer Unsigned
Message Block Length	2	Integer Unsigned
Sequence Number	3	Integer Unsigned
Message Flags/Baud	1	Bit Mapped
Message ARM Flag	1	Bit Mapped
Corrected Address	4	Hexadecimal
Carrier Start	7	BCD
Message End	7	BCD
Signal Strength X10	2	Integer Unsigned
Frequency Offset X10	2	Integer Signed
Phase Noise X100	2	Integer Unsigned
Good Phase X2	1	Integer Unsigned
Channel/Spacecraft	2	Integer Unsigned/Bit Mapped
Source Code	2	ASCII Characters
Source Secondary	2	TBD
Message Data	Var	ASCII or Pseudo-Binary
Block CRC	2	Hexadecimal

Overhead Total: 41

- **Two proposed formats: Format 1 is based off initial proposal with the addition of the Source Secondary and the Block CRC.**

Proposed Format 2

- **Replaces the ARM character code with ARM flag bits.**
  - **Eliminates to need to send multiple informational messages - doesn't happen too often, but it is possible (e.g. a corrected address with a message out of window).**
- **Eliminates the Received Address:**
  - **If it is a corrected address this is noted in the ARM flags.**
  - **When the address is valid or uncorrectable the Received Address and Corrected Address are identical and therefore redundant.**
  - **Since only 1 or 2 bits can be corrected, not sure the Received Address has any value when it is corrected.**
- **Combines the Channel and Spacecraft fields.**
- **Missed Messages are a different Block type with a reduced header.**
  - **Since several fields cannot be filled in for Missed Messages (e.g. Signal Strength, Frequency Offset, etc.) these are omitted.**
  - **No message data field is present since no message was received.**

Transition Comments

- **Would be nice if both formats could be transmitted during a defined transition period.**
  - **Could be supported by LRIT/HRIT file type designation in primary header. Current DCS file type is 130 (0x82); requires a new DCS file type for the new format.**
  - **Alternate suggestion is to utilize a different Type field in the file header.**
  - **Format identification approach is still under consideration.**
  - **Initial period (3-6 months) old format would have priority.**
  - **Second period (3-6 months) new format would have priority.**
- **Utilization requirements:**
  - **Presently DCS accounts for ~4% of the HRIT transmission.**
  - **Transmitting 2 streams would double utilization to 8%.**
  - **Fill accounts for 15-20% (but varies and long periods of no fill occur).**
- **Dual streams during transition still to be approved by NOAA.**

Other DCS Protocols & Improved Stats

- **No formal proposal to update other protocols; discussions only.**
- **DOMSAT – Ku Band Rebroadcast**
  - **Slated to be shutdown in May 2019 ⇒ no reason to update.**
- **DAMS-NT – DRGS Standard Output**
  - **Also used by Microcom LRIT/HRIT receiver.**
  - **Data source for DDS servers at WCDA, NSOF, EDDN, etc.**
  - **Protocol can be updated and preserve backward compatibility.**
    - **Ingest systems would have to be updated to make use of the improved message statistics, but …**
    - **Legacy ingest systems would ignore extra data until updated.**
- **DDS – DCS Data Service**
  - **Used by LRGS, OpenDCS, DAMS-NT Client and other software packages to transfer DCS data over networks and the Internet.**
  - **Can be updated and preserve backward compatibility.**
  - **Since all DCS messages are received by a DRGS, DAMS-NT protocol would have to be updated before improved statistics could flow to DDS servers.**