CHDO 090, MM TIS Packet Secondary, Turbo-era

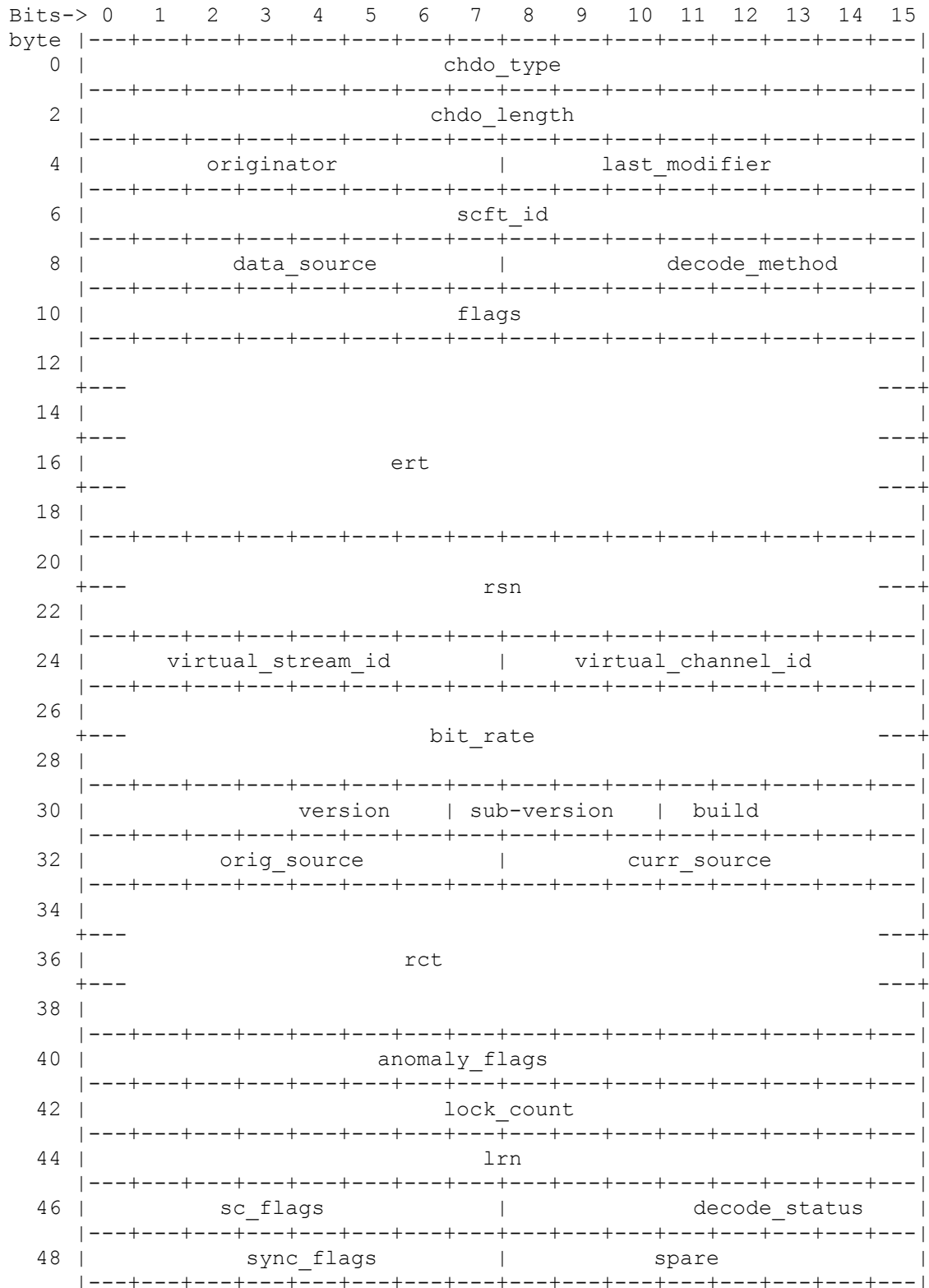| CHDO Number	090
Name/Purpose	Multi-Mission TIS Packet Secondary, Turbo-era Data
Usage	TIS puts this CHDO on all packets extracted from frames with secondary CHDO 079. This CHDO will not keep most of the information from CHDO 079 intact, but it will keep enough to allow tracing back to the original frame for analysis purposes. Note - all acronyms are in the glossary of the parent module of this sub-module: 820-013, 0172-Telecomm-CHDO.
Creation Date	Submitted to DSN August 14, 2003
CHDO Dependencies	This CHDO is created from CHDO 069, and also uses information from CHDO 078.

Change Log

Rev.	Check if Minor Rev.	Issue Date	Affected Sections	Change Summary
		8/14/2003		Initial submittal to DSN, from SFOC/AMMOS. Initial changes not tracked under current system: 8/14/2003 - added retransmission bit 10/29/03 - Changed because CHDO 89 removed entirely, so this CHDO serves both frame types (CCSDS version 1 and 2) 11/04/03 - moved retransmission bit to byte 10 bit 6 12/12/03 - added mcfc_inc field back in, was in 89, now needs to be in here also. Removed sec_hdr_bit_invalid flag, no longer needed re CR 8370 change
A		5/15/2005		2/1/05 - CHDO 71 mentioned above should be CHDO 79 instead. 7/30/04 CR 8562 (AMMOS V29.0 B7) added field "offset" to bytes 68-69

This document has been reviewed for export control, and does NOT contain controlled technical data.

Rev.	Check if Minor Rev.	Issue Date	Affected Sections	Change Summary
B		5/31/2007		*retransmission* bit moved from byte 10 bit 6, to byte 10 bit 1, CR #101041 *ert_ext_res_units* added into byte 10, bit 6, CR# 101041 *lock_count and lrn* description changed to refer to parent document, not a substantive change Changed DSN, TTACS, and AMMOS to DTT, TTI, and TTD, respectively, due to JPL re-organization. Referred lock_count and lrn to parent module.
C	x	7/30/2010	scft_id, data_source, virtual_channel_id, lrn, relay_scft_id	changes in explanations only, no significant change

```
Bits-> 0   1   2   3   4   5   6   7   8   9   10  11  12  13  14  15
byte |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
   0 |                           chdo_type                           |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
   2 |                           chdo_length                         |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
   4 |           originator           |          last_modifier        |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
   6 |                            scft_id                            |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
   8 |          data_source           |          decode_method        |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  10 |                             flags                             |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  12 |                                                               |
     +---                                                         ---+
  14 |                                                               |
     +---                                                         ---+
  16 |                              ert                              |
     +---                                                         ---+
  18 |                                                               |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  20 |                                                               |
     +---                                                         ---+
  22 |                              rsn                              |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  24 |       virtual_stream_id        |       virtual_channel_id      |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  26 |                                                               |
     +---                          bit_rate                       ---+
  28 |                                                               |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  30 |           version       | sub-version   |   build             |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  32 |          orig_source           |          curr_source          |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  34 |                                                               |
     +---                                                         ---+
  36 |                              rct                              |
     +---                                                         ---+
  38 |                                                               |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  40 |                         anomaly_flags                         |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  42 |                          lock_count                          |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  44 |                              lrn                              |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  46 |          sc_flags              |          decode_status        |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
  48 |          sync_flags           |            spare              |
     |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
```

3

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50 |          frame_hdr_error_flag      |              mcfc              |
   |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
52 |                           relay_scft_id                       |
   |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
54 |                                                               |
   +---                                                         ---+
56 |                             pub                               |
   +---                                                         ---+
58 |                                                               |
   |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
60 |                           pass_number                         |
   |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
62 |      frame_extract_count         |            spare           |
   +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
64 |                                                               |
   +---                          vcfc                           ---|
66 |                                                               |
   +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
68 |                           offset                              |
   +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
70 |                                                               |
   +---                          spare                          ---+
72 |                                                               |
   |---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---|
74
```
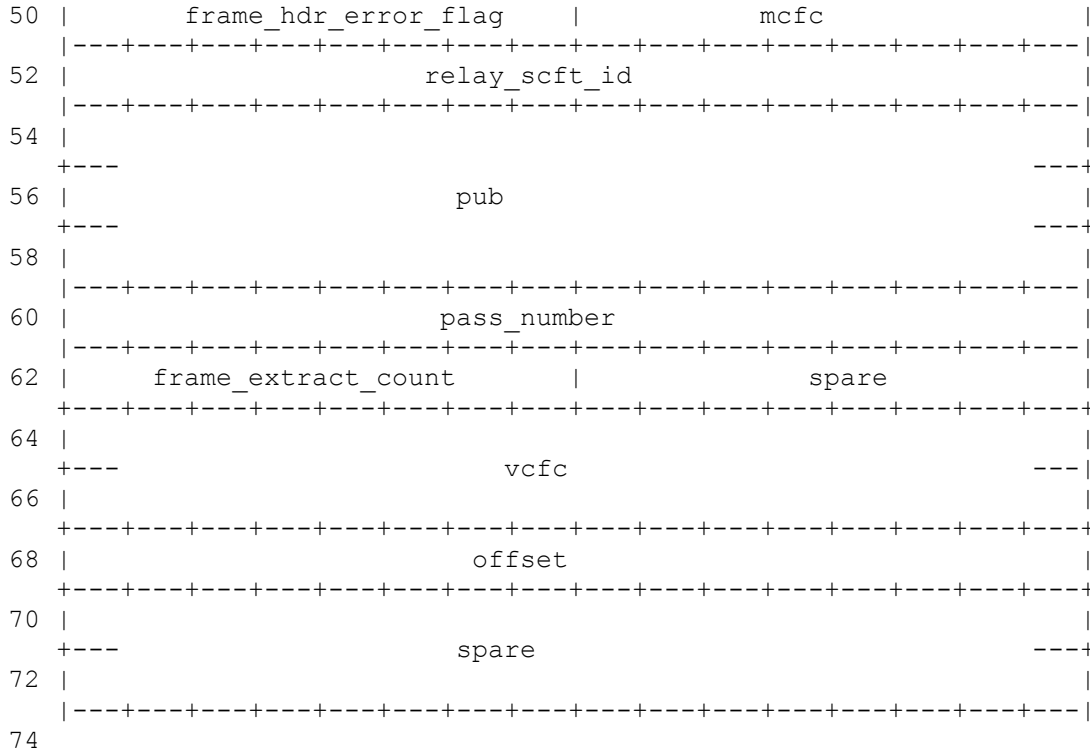
Byte Offset	Field ID Definition	Format	Units	Range or Value
0 - 1	*chdo_type* Type of this secondary CHDO	binary unsigned integer	N/A	90
2 - 3	*chdo_length* Length of this secondary CHDO; (indicates the length, in octets, of the value field of the secondary CHDO);	binary unsigned integer	bytes	70
4	*originator* Originator identifier; The complete set of values for this field can be found in 820-013, 0172-Telecomm-CHDO. 48=DTT 00=TTI 114=SIM	binary unsigned integer	N/A	48, 00, 114

Byte Offset	*Field ID* Definition	Format	Units	Range or Value
5	*last_modifier* Last modifier identifier; value = 117(TIS). The complete set of values for this field can be found in 820-013, 0172-Telecomm-CHDO. 117=TIS	binary unsigned integer	N/A	117
6 - 7	*scft_id* See CHDO 078, Bytes 6-7. If TIS forces the spacecraft ID of the parent frame, this will reflect that force, and field scid_force will be set. The definitions of this number are in 820-013, OPS-6-21-4 (table 4)	binary unsigned integer	N/A	0-1023 (if version 1) or 0-255 (if version 1)
8	*data_source* See CHDO 078, Byte 10. The definitions of this number are in 820-013, OPS-6-21-47 (table 47)	binary unsigned integer	N/A	0-255
9	*decode_method* Type of decoding used for this frame or the extracted packet's parent frame. Decoding method is specific to the mission and the data type. For list of values see field "decode_method" in 0172-Telecomm-CHDO.	binary unsigned integer	N/A	0-4
10-11	*flags*			
Bit 0	*data_val* Set to 1 if this is an anomaly record, and there is no data in the data CHDO. (Explanation of anomaly records is in 820-013, 0172-Telecomm-CHDO. If set, the field "anomaly_flags" will have at least one bit set.	binary unsigned integer	N/A	0,1

Byte Offset	*Field ID* Definition	Format	Units	Range or Value
Bit 1	*retransmission* When the parent frame contributing bit 1 (first bit) of this packet has the retransmission flag bit set in secondary CHDO 069, then this bit is set to one (1), otherwise it is zero.	binary unsigned integer	N/A	0,1
Bits 2-3	*spare*			0,1
Bit 4	*ert_ref_point* Earth Received Time (ERT) reference point; 0 = the ERT refers to the trailing edge of the last received telemetry bit in the SFDU 1 = the ERT refers to the leading edge of the first received telemetry bit in the SFDU binary unsigned integer. TIS does not use or change this field.	binary unsigned integer	N/A	0,1
Bit 5	*ert_extended_resolution* ERT extended resolution field status; 0 = the ERT extended resolution field is reserved and its value should be ignored 1 = the ERT extended resolution field is valid binary unsigned integer. TIS uses this field to determine how to process ERT.	binary unsigned integer	N/A	0,1
Bit 6	*ert_ext_res_units* Defines units of the 2-byte ERT extended resolution field : 0 = microseconds of millisecond 1 = tenths of microseconds of millisecond	binary unsigned integer	N/A	0,1

Byte Offset	Field ID / Definition	Format	Units	Range or Value
Bit 7	*ert_status* ERT status; 0 = ERT is valid 1 = ERT is known to be invalid binary unsigned integer. TIS does not use or change this field. If this field is set to 1, the ERT of this data and all data extracted from it will be invalid.	binary unsigned integer	N/A	0,1
Bits 8-15	*spare*			
12 - 19	*ert* Earth received time; the format of this field is defined in 820-013, 173-Telecomm-Time, 6- or 8-byte GDR binary time format. See CHDO 078, Bytes 14-21. The bit flag "ert_extended_resolution, if set, means this will be the 8-byte. If clear, this will be the 6-byte format. TIS will always adjust time of frames to be leading edge of the first bit, if possible. It is possible that the resolution of the time and the bit rate will be such that leading vs trailing edge will not change the time at all, and in that case, TIS will not bother trying to adjust from trailing edge to leading edge. However, DTT can put either leading edge of first bit or trailing edge of last bit, so TIS will always change it to the first bit, in any case.	binary unsigned integer	varies within field, see ref'nce	N/A

Byte Offset	Field ID Definition	Format	Units	Range or Value
20 - 23	*rsn* See CHDO 078, bytes 22-25. Record sequence number; binary unsigned integer. This is the *rsn* of the parent frame providing the first bit of this packet.	binary unsigned integer	N/A	0-4294967 295
24	*virtual_stream_id* Virtual stream identifier; value range 0 to 255; binary unsigned integer. (Refer to 820-013, 0161-Telecomm for details about the virtual stream.) TIS does not change or use this field.	binary unsigned integer	N/A	0-255
25	*virtual_channel_id* Virtual channel identifier; binary unsigned integer. (Refer to Refer to 820-013, 0161-Telecomm for details about the virtual stream.) The virtual channel ID is obtained from the spacecraft data by DTT if this data has gone through DTT, or by TIS during TTI processing. TIS may change this field if it was set by the DTT but TIS re-synced the data, if for some unusual reason it differed (this field is taken by both DTT and TIS from the CCSDS frame primary header). This is the ID of the parent frame of this packet. Maximum is 7 (CCSDS frame version1) or 63 (CCSDS frame version 2)	binary unsigned integer	N/A	0-varies
26 - 29	*bit_rate* See CHDO 078, Bytes 38-41. TIS does not change this field. TIS uses this field to calculate the ERT if necessary. In DTT turbo-decoded data, TIS does not change the ERT.	IEEE Float	bit per second	almost infinite, but always positive
30-31	*version_build* See 820-013, 0172-Telecomm-CHDO, field "AMMOS Version/Build".	binary unsigned integers	N/A	see ref doc

Byte Offset	*Field ID* Definition	Format	Units	Range or Value
32	*orig_source* Indicates the original input path of the data causing this record's creation. This field is not changed by TIS. Valid values are defined in 820-013, 0172-Telecomm-CHDO	binary unsigned integer	N/A	0-255
33	*curr_source* Indicates the current input path of the data causing this record's creation. This field may be changed by TIS according to the input data's current source. Valid values are defined in 820-013, 0172-Telecomm-CHDO	binary unsigned integer	N/A	0-255
34-39	*rct* Record Creation Time. This field contains the system clock time when the record was created by TIS. For the format see 820-013, 0173-Telecomm-TIME, 6-byte GDR format	binary unsigned integers	varies within field, see ref'nce	N/A
40-41	*anomaly_flags* These flags are used to indicate an end in the sequence of normal sequential data of this record type. On normal good data, all flags are set to 0. An anomaly record is typically generated by copying the last normal record's entire SFDU header (label + CHDOs), and by setting the appropriate flags indicating the anomaly's cause. Anomaly records contain a null data CHDO. When any of these flags are set, the data_val flag in field "flags" is also set, and the data length is set to 0. (These records have no data, just the SFDU header.) See anomaly_flags in 820-013, 0172-Telecomm-CHDO	binary unsigned integer	N/A	

Byte Offset	*Field ID* Definition	Format	Units	Range or Value
42-43	*lock_count* See 820-013, 0172-Telecomm-CHDO for explanation of this counter, section "lock count".	binary unsigned integer	N/A	0-65525
44-45	*lrn* See 820-013, 0172-Telecomm-CHDO for explanation of this counter, see section "logical record number".	binary unsigned integer	N/A	0-65535
46	*sc_flags*			
Bit 0	*relay* =1 if this data was relayed through another spacecraft =0 if not	binary unsigned integer	N/A	0,1
Bits 1-2	*frame_type* MER etc. would use these 2 bits for the frame type of the parent frame. Mission-specific meaning.	binary unsigned integer	N/A	0-3
Bits 3-7	*Spare*			
47	*decode_status* See 820-013, 0172-Telecomm-CHDO, field "decode status". In general, packets will not be made from frames where decoding or CRC/checksum checking failed, but in extreme cases, it may be requested by a mission.	binary unsigned integer	N/A	0-5
48	*sync_flags* Frame synchronization status flags.			
Bit 0	*spare*			
Bit 1	*spare*			
Bit 2	*scid_force* Indicates whether the spacecraft ID (*scft_id*)was overridden by an operator-specified value. 0 = Not overridden 1 = The spacecraft identifier code has been overlaid with a new TIS-operator-entered spacecraft ID value.	binary unsigned integer	N/A	0,1
Bits 3-6	*spare*			

Byte Offset	Field ID / Definition	Format	Units	Range or Value
Bit 7	*tds_suspect_sclk_flag.* This is set by TDS to indicate whether TDS considers the SCLK valid or an anomaly. 0 = SCLK is valid 1 = SCLK is suspect (by TDS standards). TDS sets this when loading data, when SFDUs have been queued up due to a time regression and the input stream ends. The bit is set in each queued SFDU which are all then flushed to the last open spooler. In TDM data this is set when SCLK is not in reference, but this does not apply to packet data.	binary unsigned integer	N/A	0,1
49	*spare*			
50	*frame_hdr_error_flag* As defined in the Packet Frame Synchronization requirements, these eight 1-bit fields are defined as follows:	binary unsigned integer	N/A	0,1
Bit 0	*codeword_valid* 0 = valid codeword, 1 = invalid codeword.	binary unsigned integer	N/A	0,1
Bit 1	*transfer_frame_version* 0 = Transfer frame version is valid. 1 = Transfer frame version is invalid.	binary unsigned integer	N/A	0,1
Bit 2	*scid_correct* 0 = S/C ID correct (matches expected value for this mission) 1 = incorrect.	binary unsigned integer	N/A	0,1
Bit 3	*spare*	binary unsigned integer		
Bit 4	*vcfc_inc* 0 = Virtual Channel Frame Count increments correctly, 1 = error - vcfc does not increment by 1 since immediately previous frame in this virtual channel.	binary unsigned integer	N/A	0,1

Byte Offset	Field ID Definition	Format	Units	Range or Value
Bit 5	*sec_hdr_bit_valid* Secondary header means the CCSDS telemetry packet header, all packets except idle (fill) packets require a secondary CCSDS header. 0 = Secondary Header flag valid, 1 = Secondary Header flag invalid.	binary unsigned integer	N/A	0,1
Bit 6	*packet_order_valid* the CCSDS packet header flag "packet order" should be zero. 0 = Packet Order flag valid (set to zero) 1 = Packet Order flag invalid (set to 1)	binary unsigned integer	N/A	0,1
Bit 7	*invalid_vc* Invalid virtual channel (only for missions which require a VC check) 0=valid 1=invalid	binary unsigned integer	N/A	0,1
51	*mcfc* master channel frame count, of parent frame supplying bit one of this packet. This field is unused if parent frame type is AOS or CCSDS version 2.	binary unsigned integer	N/A	0,1
52-53	*relay_scft_id* Spacecraft ID of last spacecraft relaying this data (scft_id of this data is in normal position in byte 6). See 820-013, OPS-6-21-4 (Table 4) for valid values.	binary unsigned integer	N/A	0-65535

Byte Offset	*Field ID* / Definition	Format	Units	Range or Value
54-59	*pub* An ASCII string comprising six project-unique bytes (characters), entered into the TIS subsystem by user control directive. TIS places into these bytes whatever the user has entered. This field is handy for testers to mark the data, sometimes with a test number, an ATLO step number, etc etc.	ASCII	N/A	N/A
60-61	*pass_number*	binary unsigned integer	N/A	0-65535
62	*frame_extract_count* number of frames this packet was made from. maximum is 30 for MMT due to CHDO length field constraints (16 bits)	binary unsigned integer	frames	0-255
63	*spare*			
64-67	*vcfc* virtual channel frame count from the parent frame containing bit 1 of this packet. If the parent frame of this packet was not an AOS frame, the vcfc will be 0-255, and right-justified in this field. If an AOS frame, max value is 24 bit max value.	binary unsigned integer	N/A	0-16777215
68-69	*offset* Offset of first byte of this packet into parent frame, in bytes, with byte zero being the first byte of the frame's data area (i.e. not including the telemetry frame header).	binary unsigned integer	N/A	0-64767
70-73	*spare*			