

Product Format

Each product, with the exception of the raw data products stored on HDDT, has the same structure. This product structure consists of three parts. Figure 2 shows the product structure.

Product Structure

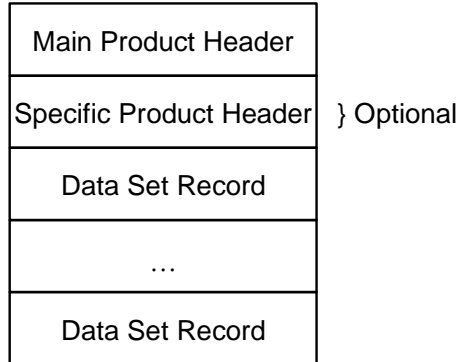


Figure 2 Product structure

The MPH has a single 176-byte record with an identical format for all products. The format of the Main Product Header record is given in Table 5. The Main Product Header contains information applicable to all processing chain products.

The specific product header is optional. The number and length of the record varies by product type.

All products have a product data set, consisting of one or more records. Length and number of records is determined by the product type and is given in the Main Product Header.

Data Types

Table 2 shows the simple common data types in the ERS Ground station products. There are two important complex data types as well: the prod_type_list and the utc_time_m. The first specifies a list of product types for a command, the second gives the time in two integers.

Table 2 Data types in the ERS Ground station products

Data Type	Meaning
I1	1-byte unsigned integer
I2	2-byte integer in DEC format
I4	4-byte integer in DEC format
A	ASCII
B	1 byte or bits (flags)
S	Special format, as defined in description field

Data type prod_type_list

The prod_type_list data type is an array of 50 Bytes. Each byte indicates one product type. Several product types can be indicated. Table 3 shows the indices for each product type. The processing subsystems read this list from the parameters in the commands and interprets which products they have to process, e.g., transcrib_list [15] = 0 in the C_Config_Trans command means that product type 15, ERAC, will be transcribed.

Main Product Headers

Table 5 MPH for all products, except HDDT products

Field	Bytes	Type	Description
1	17	A/I	<p>Product identifier (for ESA internal operational use only), i.e. a set of characters and integers which form a unique identifier. The set of 17 Bytes is defined as follows:</p> <p>Byte 1: Originator of logical schedule (for ESA internal use only) e.g.:</p> <p>I: MMCC/EECF, Immediate Command M: MMCC/EECF, Logical Schedule J: Local operator, Immediate Command K: Local operator, Logical Schedule</p> <p>Byte 2-5: Sequential Counter of Logical Schedule Byte 6-9: Unique Identification or Schedule Offset Byte 10-13: Not used, set to 0 Byte 14-17: Sequential Number of Currently Generated Product</p>
2	1	I1	Type of Product, see Table 3
3	1	I1	<p>Spacecraft</p> <p>1: ERS-1 2: ERS-2</p>
4	24	A	<p>UTC time⁷ of subsatellite point at beginning of product. Format in ASCII: DD-MMM-YYYY hh:mm:ss.ttt For example: 30-JAN-1987 14:30:27.123</p>
5	1	I1	<p>Station ID, where data was processed</p> <p>1: Kiruna Station (KS) 2: Fucino Station (FS) 3: Gatineau Station (GS) 4: Maspalomas Station (MS) 5: EECF Station (ES) 6: Prince Albert Station (PS)</p>
6	2	B	<p>Product Confidence Data</p> <p>bit 1 PCD Summary Flag</p> <p>0: product correctly generated 1: at least one of the remaining 15 bits of the PCD in the MPH is set. In particular the specific header flags are not read when this bit is set.</p> <p>bit 2 - 3 spare</p> <p>bit 4 - 5 Downlink Performance and X-Band acquisition chain. This value summarizes the PCD snapshots rel. to the products.</p> <p>0: performance better than MMCC/EECF-supplied minimum threshold 1: performance equal to or worse than threshold 2: performance unknown</p>

- ⁷UTC time at beginning of product, has the following meaning: for SAR it is the time of the first processed range line i.e. 0.4 to 0.48 sec before the zero doppler time of the first line of the product; for UWI it is the time of the first line of nodes; for URA it is the time of the first data set record.

Table 5 MPH for all products, except HDDT products

Field	Bytes	Type	Description
			<p>bit 6 - 7 HDDT Summary. This value summarizes the PCD snapshots rel. to the product.</p> <p>0: performance better than MMCC/EECF-supplied minimum threshold</p> <p>1: performance equal to or worse than threshold</p> <p>2: performance unknown</p> <p>bit 8 - 9 Frame Synchronizer. This value summarizes the PCD snapshots rel. to the product.</p> <p>0: performance better than MMCC/EECF-supplied minimum threshold</p> <p>1: performance equal to or worse than threshold</p> <p>2: performance unknown</p> <p>bit 10 - 11 FS to Processor I/F The LRDPF and SARFDP reads the status of the FS interface.</p> <p>0: no parity error detected</p> <p>1: at least one parity error detected</p> <p>2: performance unknown</p> <p>bit 12 - 13 Checksum Analysis on LR Frames. The percentage of source packets, featuring a checksum error, and used in the actual product is compared to a MMCC/EECF given threshold.</p> <p>0: lower than threshold</p> <p>1: greater than threshold</p> <p>2: performance unknown</p> <p>bit 14 - 15 Quality of Downlinked Formats and Source Packets. The RA product is based on using 80 consecutive source packets. The percentage of erroneous ones is determined and compared to a MMCC/EECF given threshold.</p> <p>1: greater than threshold</p> <p>2: performance unknown</p> <p>bit 16 Existence of Auxiliary Data.⁸</p> <p>0: auxiliary data and/or chirp correctly extracted</p> <p>1: not all auxiliary data extracted</p>
7	24	A	UTC time when MPH was generated; Format as in field 4.
8	4	I4	Size of Specific Product Header: Record in Bytes
9	4	I4	Number of Product Data Set Records
10	4	I4	Size of each Product Data Set Record in Bytes
11	1	B	<p>Subsystem that generated the product.</p> <p>0: SARFDP 1</p> <p>1: SARFDP 2</p> <p>2: LRDPF</p>

⁸For the LRDPF it has the meaning that at least one auxiliary data field in a source packet header is corrupted and for the SARFDP it means that the chirp could not be extracted from the input raw data. For UWI and URA this flag is always set to zero.

Table 5 MPH for all products, except HDDT products

Field	Bytes	Type	Description
			3: VMP 4: LRDTF
12	1	B	OBRC flag used for SAR products only bit 1 - 2 0: not used 1: OGRC data 2: OBRC data
13	24	A	UTC reference time. Time relation used to convert from satellite to ground, used together with the next two fields.
14	4	I4	Reference binary time of satellite clock (32-bit unsigned integer)
15	4	I4	Step length of satellite clock in nanoseconds
16	8	I2	Processor software version used to generate product. Format as defined by MMCC/EECF. 8 bytes = 4 words of integer x 2
17	2	I2	Threshold table version number.
18	2	B	Spare
19	24	A	UTC time of ascending node state vector
20-25	24	6I4	Ascending node state vector ⁹ in earth-fixed reference system
20	4	I4	State vector; X in 10 ⁻² m
21	4	I4	State vector; Y in 10 ⁻² m
22	4	I4	State vector; Z in 10 ⁻² m
23	4	I4	State vector; X velocity in 10 ⁻⁵ m/s
24	4	I4	State vector; Y velocity in 10 ⁻⁵ m/s
25	4	I4	State vector; Z velocity in 10 ⁻⁵ m/s

Product Quality Control

In case there is a loss of data between products, null products may be generated. The interval of null products is determined by the PCD update rate (nominally 2.5 seconds) during ingestion. In terms of satellite time, the interval of null products will be:

Low Rate Real-time data: 1.25 seconds

Low Rate Playback data: 17.1 seconds

High Rate data: 0.078 seconds

This variation is due to the difference between record speed and the speed of reproduction of data for ingestion.

SAR FDP Input Data Error Handling

The SAR FDP has two basic schemes for minimizing the effects of bit errors in the high-rate and low-rate data:

⁹ Product types which don't need valid orbit state vectors, e.g., UWAND and extracted products, for production, may contain invalid state vectors since these are not verified during production.

ATSR-2 Calibration Data (EATC2)

<i>Description:</i>	This product contains one low rate or two high rate ATSR-2 source packets and one General Header Source Packet.
<i>Satellite Source:</i>	ATSR-2
<i>Originating Subsystem:</i>	LRDPF
<i>Production Generation:</i>	ATSR products are generated on request from Rutherford Appleton Laboratory for an MMCC/EECF specified start and stop time.
<i>Command:</i>	C_GEN_EATC2
<i>On-Line Storage Specification:</i>	None
<i>Throughput:</i>	All data collected in one orbit, 320 Mbytes in low rate or 620 Mbytes in high rate per orbit.
<i>Format</i>	<p>One product includes.:</p> <ul style="list-style-type: none"> • Main Product Header: See See Table 5. • Specific Product Header: General Header information is stored in the SPH as shown in Table 30 if the datation (byte 12 to 15) falls within the interval of 0.15 seconds preceding the ATSR source packet contained in the DSR of the product. <p>All ATSR products have the same size. If there is no General Header available, the General Header portion of the SPH is padded with zeroes. Note that a General Header packet is received only for every 6th to 7th RATSRS product.</p> <p>The General Header packet is not available for the first RATSRS product resulting from the C_GEN_RATSRS command, unless the times of the General header and RATSRS packets are identical.</p> <ul style="list-style-type: none"> • One Product Data Set Record: The product data set consists of one record with one ATSR source packet as specified in Table 32.
<i>Media:</i>	Transcription Exabyte, see Section ‘The LRDPF Transcription Exabyte Format’ on page 108.

Table 32 Data Set Record for EATC2

Field	Bytes	Type	Description	Units
1	4	I4	Data set record number. This number is always 1.	
2	6800	S	One complete ATSR-2 Source Packet identical to the downlinked format, see Document A-1.	

GOME Calibration Data (EGOC)

<i>Description:</i>	This product contains one raw GOME source packet and one General Header source packet.
<i>Satellite Source:</i>	GOME ³⁵

³⁵The GOME instrument is available on ERS-2 only. One GOME source packet is multiplexed as ten GOME science packets interleaved in the ATSR-2 data stream.

<i>Originating Subsystem:</i>	LRDPF
<i>Production Generation:</i>	Products are extracted for MMCC/ EECF-defined start and stop times. Up to five commands defining different time intervals can be submitted by the MMCC/ EECF per orbit.
<i>Command:</i>	C_GEN_EGOC
<i>On-Line Storage Specification:</i>	One day
<i>Throughput:</i>	All data collected in one orbit, approximately 37 Mbytes per orbit.
<i>Format</i>	One product includes: <ul style="list-style-type: none">• Main Product Header: See See Table 5.• Specific Product Header: One General Header frame is stored in the SPH as shown in Table 33. If there is no General Header available the General Header portion of the SPH is padded with zeroes.• One Product Data Set Record: The product data set consists of one source packet. See Table 34.
<i>Media:</i>	Transcription Exabyte, see Section ‘The LRDPF Transcription Exabyte Format’ on page 100.
<i>Comment on Product Confidence:</i>	Padding of the product data set record occurs in the event of missing frames containing GOME science data. The corresponding fields of the data set record will be padded with “BB” hexadecimal.

Table 33 Specific Product Header for EGOC and EMWC

Field	Bytes	Type	Description	Units
1	256	S	PF Data. This field is identical to the first 256 bytes of the "Source Data Field" of the General IDHT Header Source Packet, see Document A-1.	
2	1	S	Ephemeris ID. This field is identical to the Ephemeris ID byte field of the "Source Data Field" of the General IDHT Header Source Packet, see Document A-1.	
3	1	B	Spare - binary zero	
4	24	S	Ephemeris data(sub-commutated). This field is identical to the sub-commutated, 24 bytes of Ephemeris Data of the "Source Data Field" of the General IDHT Header Source Packet, see Document A-1.	
5	1	B	Product Confidence Data: Product padding flag. 0: Product data set record not padded 1: Product data set record padded	
6	EGOC: 20 EMWC: 32	B	Product Confidence Data: PCD reported at ATSR Source Packet level. One byte PCD for each GOME or MW frame. bit 1 - 2: The percentage of frames with checksum error compared to MMCC/EECF specified threshold. bit 3 - 4: Quality of downlinked formats and source packets compared to MMCC/EECF specified threshold. bit 5 - 8: Spare All analysis performed on GOME or on MW frames only. 0: Lower than threshold 1: Greater than threshold 2: Performance unknown	

Table 34 Data Set Record for EGOC

Field	Bytes	Type	Description	Units
1	4	I4	Data set record number. This number is always 1.	
2	8000	S	One complete GOME Source Packet identical to the downlinked format, see Document A-1.	