ESRIN/ERS EXPLOITATION

LBR TRANSCRIBED RAW DATA EXABYTE FORMAT

NOTES

1) Reference to p.82

Of the two formats described the transcription format is the one applicable to the PAF's.

2) Reference to p.85

Table 23 should read table 24.

3) Tape Label

It is the same as specified for ERS-1 in doc.A3

4) pp.28 and 29

They have been added as they are mentioned on p.85

Change Record

Issue	Date	Sheet	Description of change
0/1	30/6-93	All	Draft Issue
1/0	3/11-93	1	Baseline documents added
		1-2	LRDPF context added
		6	Reference to A-8 added
		13-14	Data Output application layer details updated Removed periods in integer numbers to not confuse with real numbers
		16	Added details about timing and command intervals
		17	Added explanation about definition details
		18-20	Command overview with command numbers added
		21-50	Command definition fields updated for all commands
		23,26,31,32,33, 37	Included transaction diagrams
		24-25	c_ftp command revised and updated c_abort_ftp added
		27-30	All transcription commands revised and upadted
		34	Comments to c_input command updated to included the basic results of the command
		36	Field heading corrected
		37	c_fdp_report and m_show_device_label commands added
		40	c_transmit and c_archive command contents are updated
		41-53	New command responses added
		47-48	New data types added
		49	Product type list and param_tbl_head updated
		50	fd-_com_st added. fdp_ingest_mum included
		51-55	Error handling section added
		57	Added LRDPF products overview

Change Record

Issue	Date	Sheet	Description of change
		58	Updated table 5 for ATSR-1 and MW
		66,67	Updated table 8 and 9 for MW
		69-80	Corrected table references
		72-73	Clarified EATC2 product contents
		74,80	Updated descriptions for extracted MW products
		75	Updated table 15 for MW
		77	Corrected table 17 fields
		81	Added change requirement on product channel
		82-90	Exabyte& CCT formats added
		91-95	Added hardcopy formats
		96	File name changed
		All	Document reference number corrected
1/1	1/12-93	See change bars	Updates according to ESA comments received on fax: - DPE/OM/SNC93-RH50, dated 11-NOV-93 - DPE/OM/SNC93-RH55, dated 24-NOV-93
1/2	15/12-93	See change bars	1. Updates according to ESA comments received on fax: DPE/OM/SNC93-RH59, dated 13-DEC-93 2. Changes in sizes on LRFSI to host DMA transfer (page 15) 3. SPH of EGOC and EMWC changed 4. Corrected field byte numbers in dierctory files for transcribed exabytes and archived exabytes

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LIST OF ACRONYMS

AMI	Active Microwave Instrument
ASCII	American National Standard Code for Information Interchange
ATSR	Along Track Scanning Radiometer
ATSR-1	ATSR instrument on ERS-1
ATSR-2	ATSR instrument on ERS-2
ASTR/MW	Along Track Scanning Radiometer and Microwave Sounder
BDDN	Broad Band Data Dissemination Network
CCITT	International Telegraph and Telephone Consultative Committee
CCT	Computer Compatible Tape
CD	Compact Disc
CEOS-WGD	Committee on Earth Observation Satellites - Working Group on Data
CMS	Control and Monitoring System
CTRS	Conventional Terrestrial Reference System
DMA	Direct Memory Access
DPMC	Data Processing, Monitoring and Control Facility
DSR	Data Set Record
EATI1	Extracted ATSR-1 Instrument header product
EATI2	Extracted ATSR-2 Instrument header product
EATC2	Extracted ATSR-2 Calibration product
EDC	Error Detection Control
EEP	Extracted Ephemeris Product
EGH	Extracted General Header product
EGOC	Extracted GOME Calibration product
EGOI	Extracted GOME Instrument header product
EMWC	Extracted MicroWave Calibration product
EMWI	Extracted MicroWave Instrument header product
ERAC	Extracted Radar Altimeter Calibration product
ERAI	Extracted Radar Altimeter Instrument header product
ERS-1	European Remote Sensing Satellite 1
ERS-2	European Remote Sensing Satellite 2
EWAC	Extracted WAve Calibration product
EWAI	Extracted WAve Instrument header product
EWIC	Extracted WInd Calibration product
EWII	Extracted WInd Instrument header product
FD	Fast Delivery
FDP	Fast Delivery Processor
FMA	Fore, Mid, Aft
FS	Frame Synchronizer

GH	General Header
GOME	Global Ozone Monitoring Experiment
HR	High rate
I/F	Interface
IDHT	Instrument Data Handling and Transmission
IEEE	Institute of Electrical and Electronics Engineers
IH	Instrument Header
LR	Low Rate
LRDPF	Low Rate Data Processing Facility
MPH	Main Product Header
MW	Microwave
ND-LRDPF	Norsk Data LRDPF implementation
PB	Playback
PCD	Product Confidence Data
RA	Radar Altimeter
RATSR	Raw ATSR-1 Data product
RT	Realtime
SPH	Special Product Header
SWH	Significant Wave Height
TBC	To Be Confirmed
TBD	To Be Defined
TTL	Transistor - Transistor Logic
URA	User (FD) Radar Altimeter product
UTC	Universal Time, Coordinated
UWI	User (FD) Wind Scatterometer product

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1 Introduction

1.1 Purpose

This document defines the required changes to the LRDPF external interfaces in context with the development of the Re-Hosted LRDPF.

Baseline documents for the required changes are A-3 and A-10.

1.2 Scope

The following interfaces are discussed:

- LRFSI to LRDPF host
- DPMC/CMS to LRDPF commands and data types
- New LRDPF products and LRDPF to DPMC product channel
- LRDPF to FTP File Server (e.g BDDN)
- Tape Media formats
- Hardcopy Report formats and Tape label formats

1.3 Context

Figure 1 shows the LRDPF Re-Host context diagram.

This context diagram shows the Re-Hosted LRDPF including its externals and related interfaces. Note that the externals groups into two categories; real externals to the system (marked R) and the system external devices.

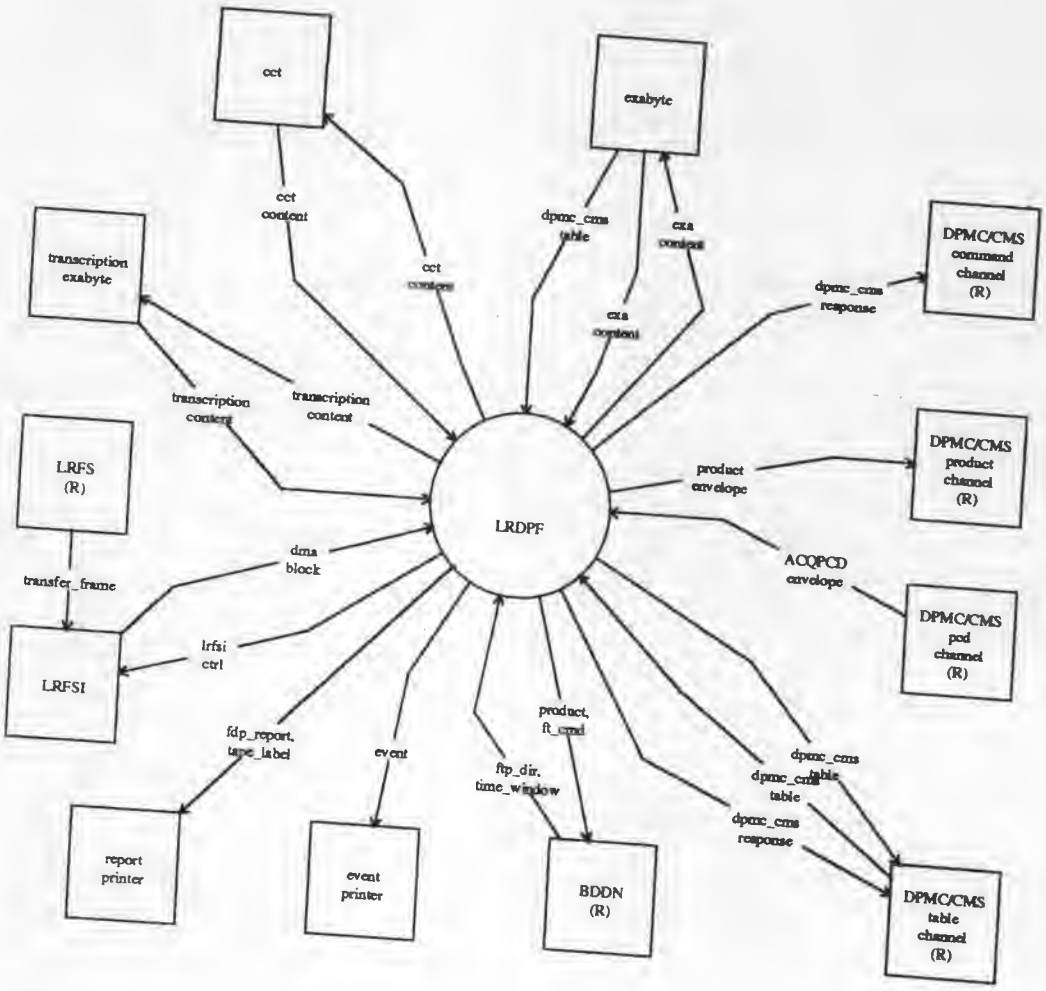

FIGURE 1. LRDPF Context Diagram

FTP File Server Description

This external represents a generic file server to which files are sent using the ftp protocol.

DPMC/CMS_command_channel Description

The DPMC/CMS command channel is the logical interface for the transport of control and monitor commands from the DPMC/CMS to the Re-Hosted LRDPF and transport of responses back to the DPMC/CMS.

DPMC/CMS_pcd_channel Description

The DPMC/CMS pcd channel is the logical interface for the transportation of acquisition PCD's from the DPMC/CMS to the Re-Hosted LRDPF.

DPMC/CMS_product_channel Description

The DPMC/CMS product channel is the logical interface for the transport of products from the Re-Hosted LRDPF to the DPMC/CMS. This interface is realized as a DMA link running DRV11 protocol.

DPMC/CMS_table_channel Description

The DPMC table channel is the logical interface to the DPMC/CMS for the exchange of processing LUTs. This logical channel is together with the pcd channel and the command/control channel realized on one physical X25 connection running on 2400 baud RS-232.

LRFSI Description

The LRFSI is the LRDPF Low Rate Frame Synchronizer Interface providing the LRDPF host with DMA blocks of instrument source packets tagged with PCD information.

LRFS Description

The LRFS is the LABEN LR frame syncronizer providing the LRFSI with transfer frames.

cct Description

The cct external refers to CCT as media for archiving LRDPF products. Any product shall be archived to this media.

event_printer Description

The event printer is a local line-printer where all system events are printed.

report_printer Description

The report printer is a local printer where distribution reports, transcription reports and tape labels (only for stand alone operation) are printed.

transcription_exabyte Description

The transcription exabyte external is a set of exabyte drives dedicated for the transcription of extracted calibration data products. As a baseline two drives plus one backup drive is foreseen. However, stthere are no specific restrictions (other than system constraints) regarding both the number of devices configured for transcription and the data volume capacity of each device.

exabyte Description

This exabyte external is one or several exabytes for archiving any product generated in the LRDPF system.

2 Documents

2.1 Applicable Documents

The following documents take precedence over this document in the event of a conflict:

A-1	RH-RS-SPT-GS-0001	25/5/93	LRDPF Re-Host System Requirements Document
A-2	ER-IS-ESA-GS-0001	20/2/90	ERS-1 Satellite to Ground Segment Interface Specification, Issue 2C
A-3	ER-IS-EPO-GS-0201	2/12/92	ERS-1 Ground Stations Products Specifications, Issue 2/4
A-4	ER-IS-RAL-PL-2001	1/4/92	Payload ATSR-2 Interface Specification Issue 1
A-5	ER-RP-DSF-SY-0006	18/12/87	Wind Scatterometer Ground Processing requirements up to σ^0 Triplets, Issue 4
A-6	ER-RP-DSF-SY-0007	11/2/93	Radar Altimeter Ground Processing Requirement, Issue 5g
A-7	ER-SA-ESA-SY-1121	26/2/93	Wind Scatterometer Processing Requirements From σ^0 triplets to dealiased wind, Issue 1.0
A-8	RH-DOC-1/93	5/88	FM 92 GRIB Binary Data Representation
A-9	ER-ST-EPO-GS-0202	8/10/90	ERS-1 LBR Raw Data On Optical Disk File Structure Description, Issue 4/0
A-10	EA-IS-MDA-SY-0002	16/11/90	Fast-Delivery Processing Chain LRDPF to CMS Interface Specification, Issue 2/0
A-11	PSS-05-0	21/2/91	ESA Software Engineering Standards, Issue 2
A-12	ER-TN-ESA-GO-0096	29/8/91	GOME Science Packet Description, Issue 1
A-13	PF-TN-ESA-GS-0006	22/12/92	ENVISAT - PPF Orbit Propagator Software (PPFORB) Interface and Installation Guide, Issue 1.0
A-14	ER-TN-ESA-GS-0017	16/3/87	DPMC/SAR/LRDPF-MMCC Time Handling and Processing, Issue 1.0
A-15	ER-IS-MDA-GS-0108		Frame Synchronizer to Low Rate Data Processing Facility Interface Specification
A-16	ER-IS-DSF-GS-0010		ERS-1 Kiruna Station User Interface Specification.

A-17	ER-IS-DSF-SY-0010	5/3/90	Satellite to Ground Segment Interface Specification. Dornier System, Issue 9.
A-18	ER-RS-ESA-GS2102	8/4/93	Re-Host Low Rate Data Processing Facility (LRDPF) Baseline Requirements Specification
A-19	ER-IS-ESA-GS-0002	19/11/93	ERS-2 Satellite to Ground Segment Interface Specification Issue 1.0 DRAFT

2.2 Reference Documents

R-1	DPE/OM/PL93-018		Minutes of Meeting, FD System Change Requirements for ERS-2.
R-2	EK-DR11W-UG-002		DR11-W DMA Module User's Guide.
R-3	RFC 791		IP STANDARD DOCUMENT
R-4	RFC 793		TCP STANDARD DOCUMENT
R-5	RFC 854		TELNET STANDARD DOCUMENT
R-6	RFC 959		FTP STANDARD DOCUMENT
R-7	RH-TN-SPT-SY-0003	24/6/93	Technical Note on LRFSI analysis, Issue 2.0

4.4.2 New Transcription commands

This section defines new commands related to the transcription of Extracted Calibration Data Products to Exabyte.

Figure 4 shows the transaction diagram for transcription commands.

4.4.2.1 c_configure_transcription

- This command configures the transcription function. The configuration allocates each product type to a logical Exabyte id. The logical id is locally mapped to a physical device name through a configuration file.
- Fields:

	Type	Occurs	Bytes
fdp	fdp	1	1
drive	drive_id	1	1
transcription_list	prod_type_list	1	50
device_label	device_label_m	1	16

1) transcription_list[i] =1 indicates that product type "i" shall be transcribed to the device specified in "drive". Only extracted calibration data product types and General Header (EGH) products are valid.
2) The c_configure_transcription shall be rejected from the LRDPF if a c_initialize_transcription is active or queued for execution.
3) There will be issued one c_configure_transcription per device
4) The LRDPF transcription configuration shall be maintained through machine reboots.

4.4.2.2 c_initialise_transcription

- This command initiates the transcription to Exabytes. The command includes an interval (station_start_time -> station_stop_time) where the command shall remain active.
- Fields:

	Type	Occurs	Bytes
fdp	fdp	1	1
acq_start_time	utc_time_m	1	8
acq_stop_time	utc_time_m	1	8
station_start_time	utc_time_m	1	8
station_stop_time	utc_time_m	1	8

1) The Re-Hosted LRDPF will on reception of this command initiate the transcription by mounting Exabytes.
2) The acq_start_time and acq_stop_time defines the acquisition interval from which the raw data shall be transcribed.
3) Note that each c_initialise_transcription command corresponds to one set of Exabytes with transcribed products.
4) A c_initialise_transcription shall be rejected if another c_initialise_transcription is active or queued for execution.
5) Station_start_time and station_stop_time defines the interval where this command is active. When the station_stop_time is reached, the current c_transcription will continue to output all product files to exabyte(s), write the directory file(s) and finally dismount device(s).

5.1 Products Overview

Table 5 summarize all products generated by the LRDPF including the products defined in document A-3.

Product name	Product number identifier	Status
RATSR	0	UNCHANGED
UWI	8	UNCHANGED
URA	9	UNCHANGED
EWAC	13	UNCHANGED
EWIC	14	UNCHANGED
ERAC	15	UNCHANGED
EWAI	17	UNCHANGED
EWII	18	UNCHANGED
ERAI	19	UNCHANGED
EGH	20	UNCHANGED
EEP	21	UNCHANGED
EGOC	34	NEW
EGOI	35	NEW
EATI2	36	NEW
EATI1	37	NEW
EATC2	38	NEW
EMWC	39	NEW

TABLE 5. LRDPF Products

5.1.1 Use of Spare Fields

All spare fields shall be set to zero. This applies to bit fields as well.

5.2 Raw Data Products

The Re-Hosted LRDPF shall input from HDDT both Real-Time and Playback X-band telemetry from all ERS-1 and ERS-2 Low Rate Data Sources in all modes of operation. This telemetry is defined in document A-2.

The new advanced ATSR-2 also contains raw data from the Infrared (IR), Microwave Sounder (MS) and the Global Ozone Monitoring Experiment (GOME) instruments.

Table 6 shows data volumes per orbit.

Instrument	Instrument Average Data Generation Rate (kbps[1])	Raw Data Vol. per Orbit[2] (MByte)
AMI Wave	369.7	305.7
AMI Wind	200.7	165.6
RA	25.6	21.1
GOME	42.7	35.2
ATSR-1	213.3	176.0
ATSR-2	362.7 (LR) 725.3 (HR)	299.2 (LR) 598.4 (HR)
MW	1.5	1.2
General IDHT Headers	3.1	1.7

1. kilobits per sec, nominal instrument operation mode, see A-2.
2. continuous instrument operation for 110 minutes.

TABLE 6. Data Volume per Orbit for LR Raw Data

5.3 Product Format

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

1. Main Product Header (MPH) Record.
2. Specific Product Header (SPH) Record (optional).
3. Data Set Record (DSR)

The record layout in described in Table 7.

Main Product Header Record
Specific Product Header Record (optional)
Data Set Record
...
Data Set Record

TABLE 7. Product Records Lay-out

The MPH has a single 176-byte record with an identical format for all products. The format of the MPH record is given in Table 8. The MPH contains information applicable to all processing chain products.

The SPH is optional. The number of data set records varies by product type.

All products have a product data set, consisting of one or more DSRs. Length of each DSR and number of records is determined by the product type and is given in the MPH.

Data Types used in the tables:

- 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

Field No.	No. of Bytes	Data Type	Byte Position	(Page 1 of 5) Description	Units
1	17	A/I	1-17	**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: Byte 1: originator of logical schedule (for ESA internal use only) e.g.: "I" = MMCC/EECF - Immediate Command "M" = MMCC(/EECF - Logical Schedule "J" = Local operator - Immediate Command "K" = Local operator - Logical Schedule 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	
2	1	I1	18	**Type of Product:** **ATSR Raw Data:** 0 = ATSR-1 Data (RATSR) **User Fast Delivery Products:** 1 = AMI Image 16 bit (UI16) 2 = AMI Image 8-bit (UI8) 3 = AMI Image Noise Statistics and Drift Calibration (UIND) 4 = AMI Image Chirp Replica (UIC) 5 = AMI Wave (UWA) (see also field 12) 6 = AMI Wave Noise Statistics and Drift Calibration (UWAND) (see also field 12) 7 = AMI Wave Chirp Replica (UWAC) 8 = AMI Wind (UWI) 9 = Radar Altimeter (URA) **Intermediate Products:** 10 = AMI Wave Mode Intermediate (IWA) (see also field 12) 11 = AMI Image Mode Intermediate (II16) **Extracted Raw Data Products:** 12 = AMI Image Calibration Data (EIC) 13 = AMI Wave Calibration Data (EWAC)	

Field No.	No. of Bytes	Data Type	Byte Position	(Page 2 of 5) Description	Units
2	1	I1	18	14 = AMI Wind Calibration Data (EWIC) 15 = Radar Altimeter Calibration Data (ERAC) 16 = AMI Image Instrument Headers (EII) 17 = AMI Wave Instrument Header (EWAI) 18 = AMI Wind Instrument Headers (EWII) 19 = Radar Altimeter Instrument Headers (ERAI) 20 = General Headers (EGH) 21 = Ephemeris Data (EEP) 22 = Text Product (TP) 30 = VI product (VMP) 31 = VIC product (VMP) 32 = VWA product (VMP) 33 = VWAC product (VMP) **New products:** 34 = GOME Calibration Data (EGOC) 35 = GOME Instrument Header (EGOI) 36 = ATSR-2 Instrument Header (EATI2). 37 = ATSR-1 Instrument Header (EATI1) 38 =ATSR-2 Calibration Data (EATC2) 39=MW Calibration Data (EMWC)	
3	1	I1	19	Spacecraft ID 1 = ERS-1 2 = ERS-2	
4	24	A	20-43	UTC time[1] 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" (See Note 2)	
5	1	I1	44	Station ID, where data was processed 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)	

Field No.	No. of Bytes	Data Type	Byte Position	(Page 3 of 5) Description	Units
6	2	B	45-46	**Product Confidence Data** bit 1 PCD Summary Flag 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 the bit is set. bit 2-3 SPARE bit 4-5 Downlink Performance and X-band acquisition chain. This value summarized the PCD snapshots rel. to the products. 0 = performance better than MMCC/ EECF-supplied minimum threshold 1= performance equal to or worse than threshold 2 = performance unknown bits 6 - 7 HDDT Summary. This value summarizes the PCD snapshots rel. to the product. Same as for bits 4 and 5. bits 8 -9 Frame Synchronizer. Same as for bits 4 and 5. bit 10 - 11 FS to Processor I/F The LRDPF and SARFDP reads the status of the FS interface. 0 = no parity error detected 1 = at least one parity error detected 2 = performance unknown 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. 0 = lower than threshold 1 = greater than threshold 2 = performance unknown 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.	

Field No.	No. of Bytes	Data Type	Byte Position	(Page 4 of 5) Description	Units
6	2	B	45-46	0 = less than threshold. 1= greater than threshold. 2 = performance unknown. bit 16 Existence of Auxiliary Data 0 = auxiliary data and/or chirp correctly extracted 1 = not all auxiliary data extracted[2]	
7	24	A	47-70	UTC time when MPH was generated; Format as in field 4.	
8	4	I4	71-74	Size of Specific Product Header Record in Bytes	
9	4	I4	75-78	Number of Product Data Set Records	
10	4	I4	79-82	Size of each Product Data Set Record in Bytes	
11	1	B	83	Subsystem that generated the product. 0 = SARFDP 1 1 = SARFDP 2 2 = LRDPF 3 = VMP 4 = LRDTF	
12	1	B	84	OBRC flag used for SAR products only bit 1 - 2 0 = not used 1 = OGRC data 2 = OBRC data	
13	24	A	85-108	UTC reference time. Time relation used to convert from satellite to ground, used together with the next two fields.	
14	4	I4	109-112	Reference binary time of satellite clock (32-bit unsigned integer)	
15	4	I4	113-116	Step length of satellite clock in nanoseconds	
16	8	I2	117-124	Processor software version used to generate product. Format as defined by MMCC/EECF. 8 bytes = 4 words of integer*2	
17	2	I2	125-126	Threshold table version number.	
Field No.	No. of Bytes	Data Type	Byte Position	(Page 5 of 5) Description	Units

18	2	B	127-128	Spare	
19	24	A	129-152	UTC time of ascending node state vector	
20-25	24	6I4	153-176	Ascending node state vector in earth-fixed reference system	
20	4	I4	153-156	State vector; X	10^{-2}m
21	4	I4	157-160	State vector; Y	10^{-2}m
22	4	I4	161-164	State vector; Z	10^{-2}m
23	4	I4	165-168	State vector; X velocity	10^{-5}m/s
24	4	I4	169-172	State vector; Y velocity	10^{-5}m/s
25	4	I4	173-176	State vector; Z velocity	10^{-5}m/s

1. Field 4, UTC 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.

2. For 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 8. Main Product Header for all products

5.6 Extracted Data Products

Extracted data products represents raw data over specific areas and are used for instrument calibration and monitoring, e.g. pass over an active transponder. The data are not processed in the Ground Stations, but passed on to the MMCC or EECF via CCT/Exabyte or dedicated link.

5.6.1 Extracted Calibration Data Products

Seven Extracted Calibration Data Products planned for ERS-1/ERS-2 of which four are new:

1. Extracted Wave Calibration (EWAC).
2. Extracted WInd Calibration (EWIC).
3. Extracted Radar Altimeter Calibration (ERAC).
4. Extracted GOME Calibration (EGOC) (new).
5. Extracted ATSR-1 Calibration (RATSR).
6. Extracted ATSR-2 Calibration (EATC2) (new).
7. Extracted MicroWave Calibration (EMWC) (new).

The Specific Product Header and Data Set Records for the new products are presented in Table 9.

Instrument/ Product	SPH Size (Bytes)	DSR Size (Bytes)	No. of DSR per Product	Product Size[1] (Bytes)
EWAC	4 480	4 332	299	1 299 924
EWIC	282	7 864	1	8 322
ERAC	282	3 136	1	3 594
EGOC	303	8 004	1	8 483
RATSR	282	4 004	1	4 462
EATC2	282	6 804	1 (LR) 2 (HR)	7 262 (LR) 14 066 (HR)
EMWC	315	900	1	1391

1. Including MPH of 176 Bytes.

TABLE 9. Extracted Calibration Data Product Sizes

The extracted calibration data products will in the Re-Hosted LRDPF be transcribed to Exabyte. In nominal operations it is expected that extracted calibration data products are generated for all raw data ingested. Table 10 shows the total product sizes per orbit.

Note: Specifications on how to generate the Specific Product Header for Extracted Calibration Data products are found in document A-3.

Instrument/ Product	Product Size[1] (Bytes)	Number of Products per Orbit[2]	Total Product size per orbit (MBytes)
EWAC	1 299 924	236	307
EWIC	8 322	7 021 x 3 (F, M, A)	175
ERAC	3 594	6 735	24
EGOC	8 483	4 400	37
RATSR	4 462	44 000	196
EATC2	7 262 (LR) 14 066 (HR)	44 000	320 (LR) 619 (HR)
EMWC	1391	1375	1.9

1. Including MPH of 176 Bytes.
2. Continuous instrument operation for 110 minutes.

TABLE 10. Data Volume per Orbit for Extracted Data Products

5.6.1.1 Extracted Wave Calibration (EWAC) Data.

EWAC is described in detail in document A-3, and there are no additions or amendments for ERS-2.

5.6.1.2 Extracted WInd Calibration (EWIC) Data.

EWIC is described in detail in document A-3 and there are no additions or amendments for ERS-2.

5.6.1.3 Extracted Radar Altimeter Calibration (ERAC) Data.

ERAC is described in detail in document A-3 and there are no additions or amendments for ERS-2.

5.6.1.4 Extracted GOME Calibration (EGOC) Data.

EGOC is a new product for specified time intervals as commanded by the CMS (c_gen_egoc).

One product includes:

- Main Product Header, see Table 8.
- Specific Product Header: One General Header frame is stored in the SPH as shown in Table 11. 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 consists of one source packet. See Table 12.

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	256	S	1-256	PF Data. This field is identical to the first 256 bytes of the "Source Data Field" of the General Header Source Packet, see A-3.
2	1	S	257	Ephemeris IS. This field is identical to the Ephemeris ID byte field of the "Source Data Field" of the General Header Source Packet, see A-3.
3	1	B	258	Spare - binary zero
4	24	S	259-282	Ephemeris data (subcommutated). This field is identical to the subcommutated, 24 bytes of Ephemeris Data of the "Source Data Field" of the General Header Source Packet, see A-3.
5	1	B	283	Product Confidence Data Product Padding flag 0 = product DSR not padded 1 = product DSR padded (padding of the product DSR occurs in the event of missing frames containing GOME science data. The corresponding fields of the DSR are padded with BB hexadecimal)

6	20	B	284-303	Product Confidence Data PCD reported at ATSR Source Packet level (1 GOME Science Packet is sub-commutated over10 ATSR-1/ATSR-2 SourcePackets). 1 byte PCD for each GOME 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 Frames only. 0 = lower than threshold. 1 = greater than threshold. 2 = performance unknown.

TABLE 11. Specific Product Header for EGOC

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	4	I4	1-4	Data record number, set to 1.
2	8 000	S	5-8004	One complete GOME Science Packet, see A-12. (The DSR is padded in the event of missing frames containing GOME science data. The corresponding parts of the DSR are padded with BB hexadecimal).

TABLE 12. Data Set Record for EGOC

5.6.1.5 Extracted ATSR-1 (RATSR) Data.

Raw ATSR (RATSR) is described in detail in document A-3 and there are no additions or amendments for ERS-2.

5.6.1.6 Extracted ATSR-2 (EATC2) Data.

This new product includes one (LR) or two (HR) ATSR-2 source packets and one General Header Source Packet.

One product includes:

- Main Product Header, see Table 8.
- Specific Product Header, see Table 13.
- 1 Product Data Set Record in Lo-Rate
  2 Product Data Set Records in Hi-Rate.
  The EATC2 data set record is defined in Table 14.

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	256	S	1-256	PF Data. This field is identical to the first 256 bytes of the "Source Data Field" of the General Header Source Packet, see A-3.
2	1	S	257	Ephemeris IS. This field is identical to the Ephemeris ID byte field of the "Source Data Field" of the General Header Source Packet, see A-3.
3	1	B	258	Spare - binary zero
4	24	S	259-282	Ephemeris data (subcommutated). This field is identical to the subcommutated, 24 bytes of Ephemeris Data of the "Source Data Field" of the General Header Source Packet, see A-3.

TABLE 13. Extracted Calibration Data Products SPH

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	4	I4	1-4	Data record number
2	6 800	S	5-6804	One complete ATSR-2 Source Packet, see A-2.

TABLE 14. Product Data Set Record for EATC2

5.6.1.7 Extracted MW (EMWC) Data.

This new product contains MW data subcommutated over 32 ATSR source Packets and one General Header Source Packet.

One product includes:

- Main Product Header, see Table 8.
- Specific Product Header, see Table 13.
- Product Data Set Record, see Table 16.

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	256	S	1-256	PF Data. This field is identical to the first 256 bytes of the "Source Data Field" of the General Header Source Packet, see A-3.
2	1	S	257	Ephemeris IS. This field is identical to the Ephemeris ID byte field of the "Source Data Field" of the General Header Source Packet, see A-3.
3	1	B	258	Spare - binary zero
4	24	S	259-282	Ephemeris data (subcommutated). This field is identical to the subcommutated, 24 bytes of Ephemeris Data of the "Source Data Field" of the General Header Source Packet, see A-3.
5	1	B	283	Product Confidence Data Product Padding flag 0 = product DSR not padded 1 = product DSR padded (padding of the product DSR occurs in the event of missing frames containing MW science data. The corresponding fields of the DSR are padded with BB hexadecimal).

6	32	B	284-315	Product Confidence Data PCD reported at ATSR Source Packet level (1MW Science Packet is sub-commutated over 32 ATSR-1/ATSR-2 SourcePackets). 1 byte PCD for each 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 MW Frames only. 0 = lower than threshold. 1 = greater than threshold. 2 = performance unknown.

TABLE 15. Specific Product Header for EMWC

Field No.	No. of Bytes	Data Type	Byte Position	Description
1	4	I4	1-4	Data record number, set to 1.
2	896	S	5-900	One complete MW science packet consisting of: 12 byte ATSR SP header 2 bytes H/L Rate Packet ID (*) 4 bytes Synch protocol (**) 2 bytes Previous Pkt Error Code (*) 8 Bytes MW data Sub-commutated over 32 ATSR source packets (see A-2) (The DSR is padded in the event of missing frames containing MW science data. The corresponding parts of the DSR are padded with BB hexadecimal)

(*) Zero fields for ERS-1

(**) Zero fields for ERS-2

TABLE 16. Data Set Record for EMWC

7 Tape Formats

7.1 Introduction

7.1.1 Formats Overview

Two Formats are described here:

- Transcription Format.
- Archiving Format.

Exabyte tape is the nominal physical medium for transcription. CCT is the nominal medium for and archiving. Exabytes used are 8mm cartridge tapes with 5 GByte storage capacity.

The CCT archive format is described in document A-3, appendix A.

7.1.2 Data Types Used

The following data types are used:

- A: ASCII (1 byte).
- I2: 2 byte integer in DEC format.
- I4: 4 byte integer in DEC format.

7.1.3 Use of Spare Fields

All spare fields shall be set to zero. This applies to bit fields as well.

7.2 Transcription Exabyte Format

7.2.1 Transcription Exabyte File Layout

This section defines the Exabyte format for transcribed Exabytes. Table 22 shows the file layout on the Exabyte.

FILE	Contents
Tape Header File	1. Tape Label 2. Reel Counter 3. Tape type EOF
Production Information File	1. Production Date (UTC) 2. Satellite id 3. C_INITIALISE_TRANSCRIBE command 4. C_CONFIGURE_TRANSCRIPTION command EOF
Extracted product file 1	MPH, SPH, DSR, IRG MPH, SPH, DSR, IRG .... EOF
Extracted product file 2	As for product file 1
Extracted product file N	As for product file 1
Directory File	Number of extracted product files Descriptor for each product file: - Number of non-zero products in file - Number of total products in file - MPH of first and last product in file - Raw Data Availability - Acquisition and ingestion PCD monitor EOF
	(EOF)[1]

1. if > 1 physical volume, end of each successive physical volume by 2 X EOF, end of last physical volume by 3 x EOF.

TABLE 22. Transcription Exabyte Contents

7.2.2 File Formats

7.2.2.1 Tape Header File

The Tape Header File Format is detailed in Table 23.

Field Number	Number of Bytes	Data Type	Byte Position	Description
1	8	A	1-8	Tape label. Copied to all reels generated from the same command. Also printed on the paper label. This is the tape_id field provided in the device_label field of a c_archive command or a c_configure_transcription command
2	2	I2	9-10	Reel counter. First reel=1
3	1	B	11	Tape type where: 'A' = Archive tape 'T' = Transcription tape
4	4	I4	12-14	Spare

TABLE 23. Tape File Header Format

7.2.2.2 Production Information File for Transcribed Exabyte

The Production Information File is detailed in Table 23.

Field Number	Number of Bytes	Data Type	Byte Position	Description
1	8	utc_time_m[1]	1-8	Production date
2	4	I4	9-12	Satellite id
3	33	c_initialise_ transcription[2]	13-45	Command from DPMC/CMS
4	68	c_configure_ transcription[3]	46-113	Command from DPMC/CMS that configured this exabyte
5	87	B	114-200	Spare field

1. The utc_time_ m structure is detailed in A-10.
2. c_initialise_transcription structure is defined in section 4.4.2.2.
3. c_configure_transcription structure is defined in section 4.4.2.1.

TABLE 24. Production Information File Format (Transcribed Exabyte)

7.2.2.3 Product Files

The Product File structure is detailed in Table 25. The field sizes will depend on which product type (i.e RATSR, EATC2, EWIC, ERAC, EWAC, EMWC or EGOC) the file is containing. The product file will contain N extracted calibration data products for a specific product type. The first MPH will have to be read in order to determine the actual product type.

Field Number	Number of Bytes	Data Type	Byte Position	Description
1	176	MPH[1]	1-176	First Product MPH
2	--	SPH	177->	First Product SPH
3	--	DSR	---	First Product DSR(s)
4	176	MPH	---	Second Product MPH
5	--	SPH	---	Second Product SPH
6	--	DSR	---	Second Product DSR(s)
...	...	....	....	.....
N-2	176	MPH	---	Last Product MPH
N-1	--	SPH	---	Last Product SPH
N	--	DSR	---	Last Product DSR(s)

1. The MPH, SPH and DSR structures are detailed in A-3.

TABLE 25. Product Files

7.2.2.4 Directory File for Transcribed Exabyte

The Directory File structure is detailed in Table 26.

Field Number	Number of Bytes	Data Type	Byte Position	Description
1	4	I4	1-4	Number of extracted product files
2	4	I4	5-8	Total product data volume
3	4	I4	9-12	Product file 1: Number of non-zero products
4	4	I4	13-16	Product File 1: Total number of products
5	176	MPH[1]	17-192	Product File 1: MPH of first product
6	176	MPH	193-368	Product File 1: MPH of last product
7	28	7 I4	369-396	Product File 1: Raw Data availability for each Instrument type (4x7 bytes)
8	4	I4	397-400	Product File 1: Acquisition PCD monitor.
9	4	I4	401-404	Product File 1: Ingestion PCD monitor.
10	104	B	405-508	Product File 1: Spare Field
11-18	500	---	509-1008	Product File 2: Field 3-10 repeated for product file 2
. . ..	500	. . . . .	. . . . .	. . . . .
-----	500	---	-----	Product File N: Field 3-10 repeated for last product file

1. The MPH structure is detailed in A-3.

TABLE 26. Directory File Format (Transcribed Exabyte)