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XMM-Newton SSC to SOC Interface Control Document for SSC Data Products

Revision History

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Issue 1.0	15-7-1997	Julian Osborne (Editor)	First formal release
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XMM-Newton SSC to SOC Interface Control Document for SSC Data Products

XMM-SOC-ICD-0006-SSC

Issue 4.0

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Agreed by F. Jansen (ESAC):   ....

Agreed by M. Watson (SSC):   ....

Contents

1   Acronym list

ASCII	American Standard Code for Information Interchange
CCD	Charge Coupled Device
CD-ROM	Compact Disk - Read-Only Memory
DEC	Declination
DTS	Data transfer system
EPIC	European Photon Imaging Camera
FITS	Flexible Image Transport System
FOV	Field Of View
FTS	File Transfer System
GNU	Gnu's Not Unix
HTML	Hyper-Text Markup Language
ICD	Interface Control Document
ID	IDentifier
ISO	International Organisation for Standardization
MOS	Metal Oxide Semiconductor
ODF	Observation Data File
OM	Optical Monitor
OSW	OM Science Window
PN	Positive-Negative
PNG	Portable Network Graphics
PS	PostScript
PPS	Pipeline Processing System
PRS	Processing Report File
RA	Right Ascension
RGS	Reflection Grating Spectrometer
SAS	Science Analysis System
SDF	Slew Data File
SOC	Science Operation Centre
SSC	Survey Science Centre
URL	Uniform Resource Locator
XID	X-ray IDentification programme
XMM	X-ray Multi-Mirror
XSA	XMM-Newton Science Archive

2 Applicable and reference documents

2.1 Applicable documents

A-1 XMM-SOC-ICD-0007-DPD XMM Interface Control Document Top Level File Transfer System (FTS) - Issue A6, 1999 Jan 27

A-2 XMM-SOC-ICD-0023-GC Keyword Specification for File Ingestion into AMS ICD - issue 1.3, 27 April 2001

2.2 Reference documents

R-1 XMM-SOC-ICD-0004-SSD Interface Control Document: Observation and Slew Data Files - Issue 2.13, 2008 Sep 29

R-2 Definition of the Flexible Image Transport System (FITS), Hanisch, R. J. et al, 2001, A&A, 376, 359-380: (http://fits.gsfc.nasa.gov/)

R-3 SSC-LUX-SP-0004 Specifications for Individual SSC Data Products - issue 4.0

3 Introduction

One of the main roles of the SSC within the XMM project is the creation of a variety of data products from the XMM-Newton observations.

There are 3 major classes of SSC data product:

- PPS products

- The XMM-Newton catalogues

- XID products

The PPS products are the results of pipeline processing of individual pointed observation data file sets (ODFs). The PPS products include summary information, calibrated cleaned event lists, the positions and brightnesses of detected sources, high-level data products (e.g. images, spectra and timeseries), catalogue cross-correlation information, quality information and an executable log file. XMM-Newton also acquires data during slews between pointed observations. As of 2010-11-08 these slew data sets (SDFs), which are scientifically valuable, are processed by the SSC pipeline; previously, slew data were processed by a dedicated pipeline at the XMM-Newton SOC. As of March 2012, responsibility for routine pipeline processing (including slew data) was transferred from the SSC to the XMM-Newton SOC. However, during 2011-2013, the SSC developed an enhanced pipeline to be used for the bulk reprocessing of all XMM-Newton pointed data, to form the basis of the 3XMM catalogue. This document revision reflects the changes related to the 3XMM pipeline processing.

The XMM-Newton pointed and slew catalogues collate and list the primary characteristics of all sources detected by XMM-Newton up to the cut-off date of the relevant catalogue. The XMM-Newton catalogues are re-issued at intervals to account for the continuously increasing sky area covered by XMM-Newton in orbit and improvements in processing and calibraton. At the current time five versions of the catalogue of pointed observations have been released: 1XMM (2003), 2XMMp (2006), 2XMM (2007), 2XMMi (2008) and 2XMMi-DR3 (2010). The 3XMM catalogue is due for release in mid 2013)

Access to the catalogues and catalogue documentation is available from

http://xmmssc-www.star.le.ac.uk/Catalogue.

Other sites hosting the catalogue and/or associated products include

- LEDAS (http://www.ledas.ac.uk/),

- XSA (http://xmm.esac.esa.int/xsa/) through searchable interface,

- OAS (http://amwdb.u-strasbg.fr/2xmmidr3/home),

- GSFC (http://heasarc.gsfc.nasa.gov/W3Browse/xmm-newton/xmmssc.html) and

- Vizier at CDS (http://vizier.u-strasbg.fr/).

Non-proprietary data, as processed by PPS tools (and subsequently screened by the SSC), is used to create the XMM-Newton catalogue.

Similarly, there have been five releases of the XMM-Newton slew catalogue: XMMSL1 (May 2006), xmmsl1d1 (August 2007), xmmsl1d2 (April 2008), xmmsl1d3 (July 2009), xmmsl1d4 (April 2010) and xmmsl1d5 (June 2011). The current slew catalogue and information about its contents and construction can be found at

- http://xmm.esac.esa.int/external/xmm_products/slew_survey/xmmsl1d_ug.shtml

The slew catalogue and documentation can also be downloaded from

- http://xmm.esac.esa.int/xsa/

it is searchable through the XSA interface.

In earlier versions of this document (2.1), intended XMM-Newton XID programme products were also described. However, in 2008 the XID project took the decision to release it's programme products through a dedicated public XID programme results database. Initial datasets started to become available through this XID results database at OAS (http://xcatdb.u-strasbg.fr/xidresult/) in July 2010. Details and product descriptions for this are also available there or will be added in the near future.

SSC data products are delivered to the SOC as product group files which contain the individual product files for all pipeline-processed exposures of an observation. The group files, and other files sent to the SOC, are described in this ICD. However, only one of the constituent files of the product groups is controlled by this ICD. That file serves the sole purpose of linking together the constituent files of the group, it is not a scientific product. Configuration control of the other constituent files is provided by the SAS and SSC configuration control boards. These files are described in [R-3]

PPS products are made available to the SOC within 30 working days of SSC receipt of the necessary ODFs and SDFs in normal circumstances (typically less than 2 weeks). As noted above, XMM-Newton catalogues and some supporting products are provided to the SOC at the time of release.

This document also specifies the SSC-specific aspects relating to the file transfer system operating between the SSC and the SOC, as covered by the FTS ICD [A-1].

The data products described here are stored in the XSA located at the SOC. Access to these data products is via the XSA for both XMM-Newton principal guest observers, and, after the proprietary period has elapsed, archival researchers from the whole scientific community. The XSA contents can be browsed using a web browser, allowing SSC product group files (and individual product files) to be downloaded via the internet.

4   File Types

This ICD describes files of various types. They, and their relationships, are summarized here.

4.1   PIPE file

This is the file which wraps up all the files for a DTS transmission from the SSC to the SOC. It is a GNU `tar` file. It contains the deliverable files and a transaction details file.

4.2   Transaction details file

Contained in the PIPE file, it includes keyword – value pairs to identify the PIPE file.

4.3   Processing report file

This is an ascii file that is delivered separately from the PIPE files, for all ODFs that are put into the SSC pipeline. Its purpose is to provide a summary of processing and information on errors, where relevant, even when processing fails, as a means of feedback to the SOC about the status of processing of all ODFs received from the SOC. This feature was introduced for the first time in April 2009.

4.4   Deliverable files

These are the files which are the direct concern of this ICD. They are contained in the PIPE file. There are two types of deliverable file: product group files and the PPS run message file.

4.4.1   Product group files

These are GNU `tar` files in which the individual data product files, and the index file, are collected together. They contain PPS product files.

4.4.2   PPS run message file

This is a plain ASCII file, designed to be sent to the Guest Observer as part of the notification that their XMM-Newton data is ready. It will be the last constituent file of the PIPE `tar` file. This file is only present when the product group files contain PPS product files.

4.5   Index file

There is at least one file present in all product group files: this is the index file. It is in HTML format and includes links to all the other files in the product group file in which it sits.

4.6 Data product files

These are the individual results files of the SSC processing, which are contained in the deliverable `tar` files. They may be in a variety of scientific, graphical, or text formats, and are described in [R-3]. Many files will be compressed with GNU `gzip`, but not those for which this would cause browser problems. Some may contain external or internal URLs; external URLs will be limited to reference data, not bulk XMM-Newton data, and internal URLs will assume all targets are in the same directory. These files are not described in this ICD, configuration control being provided by the SAS and SSC configuration control boards.

5   SSC to SOC product transport

The transport of the SSC products to the SOC makes use of the data transfer system (DTS). There is no formal documentation on the DTS but, as implemented by the SSC, it aims to fulfill the criteria described in the FTS document [A-1].

The FTS ICD requires that transfered files be contained in a 'wrapper' file (here called the PIPE file), with GNU `tar` being the wrapping mechanism. Each PIPE file must contain, in addition to the files to be transfered, a single 'transaction details' file. This file contains information relating to the particular instance of file transfer and it contains a list of keyword – value pairs for each of the constituent files. The format of the transaction details file is specified in the FTS ICD, and is described below; it allows the description of an arbitrary number of files.

SSC-generated files are delivered to the SOC via the DTS as PIPE `tar` files containing the deliverable files (in general themselves `tar` files), and the associated transaction details file.

A DTS transmission of PPS products consists of the complete set of available deliverable files for a single XMM-Newton observation. Should it be necessary to transmit a new set of files of an observation (e.g. following re-processing), the entire set of files are again transmitted.

In addition, a processing report file is delivered, separately, to the SOC whenever a PIPE file is delivered. It is also delivered even when a PIPE file containing the data is not delivered because, for instance, processing fails. In this latter case, it conveys information about the failure via error messages, providing feedback to the SOC about the processing status and enabling them to forewarn the PI about possible issues or delays in delivering data to them.

5.1   The filename of the transported file

The PIPE `tar` file containing the deliverable files and transaction details file has a file name of the form:

$$\text{ffff\_sordes\_txxxxxxxxxxxxxx\_vvvvvv.XMM}$$

In the case of the SSC transmissions to the SOC, the file name fields have the following values:

Field	Meaning	Value or *format*	Note
ffff	File type ID	`PIPE`	
sor	Originating FTS node	`SSC`	
des	Destination FTS node	`XR1`	
t	Data type ID	`D`	
xxxxxxxxxxxxxx	File-specific (not used by DTS)	`__`*zzzzzzzzzz*`__`	1
vvvvvv	Version number	`ssssss`	2
XMM	Project name	`XMM`	

Notes:
1 *zzzzzzzzzz* takes the value of the observation number PPPPPPOOLL defined in [R-1] for pipeline products.

2 Until the inception of the processing report file (PRS) procedure in pipeline 07000001_20090303.144400, the SSC did not make use of the version number scheme, fixing it to 00001. However, the advent of the PRS required a further unique identifier to be included so as to permit a PIPE file to be completely associated with its PRS. This was necessary because a PRS can be generated more than once if, for example, a first processing run on an ODF failed and only the PRS was delivered (a second, successful processing would yield a PRF name whose other fields would be identical to those in the first run). For all processings since the start-up of the SAS-8 based pipeline (version 07000001_20090303.144400), the version number has therefore been set to a unique, sequential, SSC-pipeline-generated processing run sequence number. In files generated prior to this point the version number is 00001. As of the cat9.0 pipeline (00000004_04_cat9.0_20121220.153800), this field has become a 6-digit field.

5.2   The Transaction Details File

The transaction details file contained in the PIPE file has the same file name as the PIPE file but with the extension `.TDF`, rather than `.XMM`. It is an ASCII file of up to 133 characters per record (including record terminator).

There is one transaction details file in the PIPE file. It contains one transaction block for each file in the PIPE file (excluding itself of course). As shown below, each transaction block has an arbitrary number of header-type records in the source details block, followed by an arbitrary number of catalogue records in the catalogue details block. For DTS transmissions that include PPS products, the last transaction block relates to the PPS run message file.

Transaction Details File Structure
`TRANSACTION_START`
`SOURCEDETAILS`
`KEYWORD=value`
...
`ENDSOURCEDETAILS`
`CATALOGUEDETAILS`
`KEYWORD=value`
...
`ENDCATALOGUEDETAILS`
`TRANSACTION_START`
...
...

Notes on all records are provided in [A-1]. The keyword values in the source details block for pipeline products are mostly defined in [A-2], and are reported in the table below.

Keyword	Meaning	Value or *format*	Note
SUBSYSTEM	subsystem_name	`PPS`	
ROLE	user role	`SSC`	
USERNAME	user name		1
ACTION	action	`INSERT`	
DIT	data item type	`PIPEPROD`	
TOOLNAME	task name	*10 chars max.*	
VERSION	task version number	*s.rrr.mmm.nnn*	2
DATEPRODUCED	date produced (UTC)	*yyyy-mm-ddThh:mm:ssZ*	3
REMARK	comment	*"comment"*	

Notes:

1 Not given here for security reasons

2 See [A-1]

3 Keyword value is terminated by the character 'Z', unlike the FITS standard [R-2]

Each catalogue details block contains keyword – value pairs for a single deliverable file. In each block there exists a keyword, `PIPEPROD_FP`, whose value identifies the deliverable file to which the other keywords in that section relate - the value is delimited by single quote marks. The filenames of the deliverable files are specified in section 6.4; they are unique, and so may be used as primary keywords to index the relevant XSA database table. The catalogue details, i.e. keyword names are specified in section 8.

5.3 The filename of the processing report file

The PRF file has exactly the same name as the PIPE file (section 5.1) but the .XMM extension string is replaced by .ASC.

5.4 The processing report file

The processing report file is a simple ascii file, divided into blocks of information relating to the ODF, the SSC pipeline and the processing run (sequence), pipeline modules used and ignored and module error reports, where relevant. Each block starts with a `BEGIN <blockname>` and ends with an `END <blockname>` tag. As blocks of information are hierarchical, blocks are nested and the in- and out-of-block nesting levels are indicated by one or more +/- signs in front of the BEGIN/END block names. The outline structure follows:

```
Processing Report File structure
+BEGIN SSC ODF PIPE PROCESSING REPORT CREATED : yyyy-mm-ddThh:mm:ss


++BEGIN ODF
KEYWORD : value
 ...
--END ODF


++BEGIN PIPELINE
  KEYWORD : value
 ...
--END PIPELINE


++BEGIN SEQUENCE
  KEYWORD : value
 ...
--END SEQUENCE


++BEGIN APPENDIX: PCMS MODULE REPORTS
+++BEGIN PCMS MODULE COMPLETE
  ... list of modules run to completion
---END PCMS MODULE COMPLETE


+++BEGIN PCMS MODULE IGNORED
  ... list of moudles ignored
---END PCMS MODULE IGNORED


+++BEGIN PCMS MODULE EXCEPTION
  ... module where exception (failure) occurred
---END PCMS MODULE EXCEPTION


+++BEGIN PCMS EXCEPTION REPORT FOR MODULE <pipeline module instantiation>
  ...details from pipeline run-time log
---END PCMS EXCEPTION REPORT FOR MODULE <pipeline module instantiation>


--END APPENDIX: PCMS MODULE REPORTS
-END SSC ODF PIPE PROCESSING REPORT
```

The PCMS exception block is only present when an exception occurred. This block contains a text extract of the key (error) parts of the pipeline module log triggered by the exception. Keywords appearing in the blocks are shown below

Block	Keyword	Meaning	Value or *format*	Note
ODF	ODF ID	ODF identifier	(number > 0)	
ODF	REV	XMM-Newton revolution	SSC	
ODF	OBSID	XMM-Newton observation id	*10 digit number*	
ODF	VERSION	ODF version	up to 2 digit number	
ODF	FLUSHED	forcibly flushed	0=no, 1=yes	1
PIPELINE	PIPELINE ID	pipeline identification number		
PIPELINE	NAME	pipeline name		
PIPELINE	CLASS	use of pipeline	prod	2
PIPELINE	VERSION	pipeline version number	up to 2 digit number	3
PIPELINE	PIPELINE-CONFIGURATION	unique pipeline configuration	nnnnnnnn_yyymmdd.mmmmmm	4
PIPELINE	COMMENT	manual comment		
SEQUENCE	SEQUENCE ID	unique processing sequence-number	*5 digit number*	4
SEQUENCE	COMMENT	manual comment		
SEQUENCE	FLUSHED	forcibly flushed	0=no, 1=yes	1
ERROR	ERROR ID	error identifier number		5

Notes:

1 Data flushed from disk - unable to be processed through ACDS or DPSS (screening).

2 Class should always be prod (i.e. production) for PPS delivered data. This can, however, be set to a different value during test deliveries when trialing development pipelines etc.

3 A given basic pipeline may have updated versions with the same pipeline name

4 Every pipeline has a unique configuration and associated identifier

5 Every occurrence of a processing error yields a monotonically increasing error number which can be traced back within the PCMS database. Note that this number is also the version number used in the PIPE and PRF file names.

6 File names

6.1 File name conventions

SSC filenames comply with ISO 9660 level 2, and are subject to additional constraints also.

- Filenames are up to 27 characters, followed by a dot, followed by 3 characters.

- All filename characters are upper case.

- Where a fixed number of digits are specified, leading zeros are present if the field would not otherwise be filled.

- Allowed characters include only A-Z, 0-9 and the underscore character (_).

- Each file made by the SSC has a unique filename, unless the contents of the file are to replace a previous edition of that file.

6.2 PIPE file

The filename construction of the PIPE file is described in section 5.1.

6.3 Transaction details file

The filename construction of the transaction details file is described in section 5.2.

6.4 Deliverable and index files

The deliverable files have filenames of the form:

iioooooooooottttttxxx_v.fff

Field	Meaning	Value	Note
ii	File type identifier	PP	
oooooooooo	Observation number		1
tttttt	Deliverable file type		2
xxx	Source number	000 − FFF	3
v	File version	0 − 9	
fff	File format	TAR or ASC or HTM	4

Notes:
1 The XMM-Newton observation number PPPPPPOOLL in [R-1] (section 5.3.1.1) for PPS files. Note that for slew data, this always begins with a '9'.
2 Allowed values are shown in the following table
3 Hexadecimal equivalent of decimal source number, starting at 001. xxx = 000 for non-source-specific files
4 TAR for product group files, ASC for PPS run message files, HTM for index files

tttttt field value	File description
EEVLIS	EPIC event lists group
ESKYIM	EPIC sky images group
EANCIL	EPIC ancillary group
ESRLIS	EPIC source lists group
ESOURC	EPIC source-specific group
OIMAGE	OM images group
OMSLIS	OM source lists group
OMSRTS	OM timeseries group
OANCIL	OM ancillary group
REVLIS	RGS event lists group
REXPIM	RGS exposure images group
RIMAGE	RGS images group
RSPECT	RGS spectrum group
RTIMES	RGS timeseries group
CRSCOR	Cross-correlation group
PPSDAT	PPS data group
PPSGRA	PPS graphics group
PPSMSG	PPS run message file

6.5   Data product files

The form of the filenames of data product files are given in Appendix 1.

These are provided for information only. They are subject to SAS configuration control, but not to ICD configuration control.

7 Deliverable Files

The deliverable files are the product group files which result from the SSC's pipeline processing of XMM-Newton data (both pointed and slew) and the PPS run message file. The file names of the deliverable files are described in section 6.

7.1 Pipeline product group files

The pipeline product group files are GNU `tar` files which contain, between them, all the individual files that are the results of the SAS pipeline processing of a single (pointed or slew) XMM-Newton observation. No directory information is present in these `tar` files, all constituent files thus un`tar` into the same directory.

There are 17 pipeline product group types. Each one contains related files, generally from one of the three major XMM-Newton instruments (i.e. EPIC, RGS or OM). A DTS transmission of pipeline product group files may not include instances of all types. In particular, for slew observations, currently only the PN instrument provides useful products so only EPIC files (and even then only a subset as source detection is not performed at present), and PPS files are delivered. The pipeline product group file types are listed below:

Deliverable file description
EPIC event lists group
EPIC sky images group
EPIC ancillary group
EPIC source lists group
EPIC source-specific group
OM images group
OM source lists group
OM timeseries group
OM ancillary group
RGS event lists group
RGS exposure images group
RGS images group
RGS spectra group
RGS timeseries group
Cross-correlation group
PPS data group
PPS graphics group

Although the constituent files of the product group types are not covered by this ICD, there is one file which all product group files contain. This is the index file, an html file containing links only to all the other files in the product group. It also contains brief descriptions of the files which are the targets of these links.

One of the pipeline product group types (the `PPS graphics group`) contains only display file types (e.g. png, pdf, html) as opposed to the FITS files which dominate the other groups. This is provided to allow on-line browsing of the graphical products of the pipeline processing (starting from the index file), some of which are viewable via the XSA interface. Many of the constituent product files in other product group `TAR` files are also available via the XSA for user download.

All pipeline product group types except one occur at most once in an FTS `tar` file. The exception is the `EPIC source-specific group`, which occurs once per selected EPIC-detected celestial X-ray source. The number of `EPIC source-specific group` files in an FTS file is thus not fixed (although there are typically a few tens of such files).

7.2   PPS run message file

The PPS run message file is an ASCII file of an arbitrary number of 80-character lines which is always present in PPS product transmissions. The file is designed to be part of the message to the guest observer which announces that their data is now processed. The contents of the file are not further defined here, but the file is never empty.

Deliverable file description
PPS run message file

8 Deliverable file keywords

The XSA gives access to files on the basis of their XSA keyword values. Keyword – value pairs are provided for the deliverable files in the catalogue details block of the transaction details file (see section 5) - they are coded as ASCII. These keywords are defined in this section, where a brief description of each keyword is given. Full explanations of the values of the keywords are provided in [R-3].

A keyword is required to link a catalogue details block with a deliverable file. This keyword is PIPEPROD FP for PPS product group and PPS run message files and is present in all catalogue details blocks. The keyword value (i.e. the filename of the deliverable file) is enclosed in single quotes. The file naming convention for deliverable files is described in section 6.4. Filenames are unique, so this file-pointer keyword can be used as the primary keyword to index the relevant XSA database table.

Section 8.1 defines the keywords that are associated with the PPS product group and PPS run message files.

The format of the keywords is described in [A-2]. Allowed keyword types are:

String   Denoted "An", where n is the maximum number of characters. The keyword value is enclosed in single quotes.

Integer   Denoted "In", where n is the maximum number of digits (excluding any sign character).

Real   Denoted "R$n.m$", where n is the maximum total number of digits (excluding sign and decimal point characters), and m is the maximum number of digits after the decimal point.

Date   Here denoted "D", the format is yyyy-mm-ddThh:mm:ssZ.

8.1 Keywords associated with all PPS files

The following table defines keywords that are associated with PPS product group and PPS run message files. All FTS TDF catalogue details blocks relating to PPS deliverable files will contain all of these keywords (with values).

Keyword	Format	Description
PIPEPROD_FP	A28	Name of file to which keywords relate
INSTRUMENT	A18	Instruments contributing to product group
OBS_ID	A10	XMM-Newton observation ID
TYPE	A22	Deliverable file description
TARGET	A20	Name of observation target
RA_POINT	R7.4	RA of XMM-Newton pointing (J2000.0, deg)
DEC_POINT	R6.4	Declination of XMM-Newton pointing (J2000.0, deg)
PA_POINT	R4.1	Position angle of XMM-Newton (CCW from North, deg)
DURATION	I6	Observation duration (sec)
DATE_OBS	D	Date of start of observation
(continued on next page)		

(continued from previous page)		
Keyword	Format	Description
LII_POINT	R5.2	Galactic longitude of XMM-Newton pointing (deg)
BII_POINT	R4.2	Galactic latitude of XMM-Newton pointing (deg)
OBSERVER	A41	Name of guest observer
OM_MODES	A54	OM modes used in observation
PROCREVISION	A8	Processing revision
PROCDATE	D	Processing date
SASVERSION	A20	SAS version identifier
PPSVERSION	A24	PPS configuration version identifier

The following keywords were removed from the table in version 4.0 of the document though they have not been present in TDF files for a long time: EPIC_PN_MODES, EPIC_MOS1_MODES, EPIC_MOS2_MODES, RGS1_MODES, RGS2_MODES, OM_FILTERS, EPIC_PN_FILTERS, EPIC_MOS1_FILTERS, EPIC_MOS2_FILTERS, OBS_MODE, OM_DET, VVFLAGS

Some string keywords take values that are concatenations of a limited set of substrings. Example values of the substrings of some keywords are provided in Appendix 2. The values of the TYPE keyword are also provided there.

9   Appendix 1

9.1   Data product file name

The form of the filenames of the data product files are shown in the following subsection.

These are provided for information only. They are subject to SAS configuration control, but not to ICD configuration control.

The filename fields are further described in [R-3].

9.1.1   PPS product file names

PPS data product filenames take the 27.3 character form:

<div align="center">Poooooooooooddueeetttttttsxxx.fff</div>

Field	Meaning	Value
P	File type identifier	P
oooooooooo	Observation identifier	
dd	Data source identifier	
u	Exposure flag	
eee	Exposure number within the observation	
tttttt	Product type	
s	Data subset number	
xxx	Source number	
fff	File format	

Note the data subset number (s) may refer to the energy band for EPIC products, the window number or filter identifier for OM or the order number for RGS.

10 Appendix 2

10.1 Allowed values of the TYPE keyword

All deliverable files have an associated keyword TYPE (section 8). The values of the TYPE keyword for each type of deliverable file are given in the table below.

Deliverable file type	Allowed TYPE keyword values
Pipeline product group files	`EPIC EVENT LISTS`
	`EPIC SKY IMAGES`
	`EPIC ANCILLARY`
	`EPIC SOURCE LISTS`
	`EPIC SOURCE-SPECIFIC`
	`OM IMAGES`
	`OM SOURCE LISTS`
	`OM TIMESERIES`
	`OM ANCILLARY`
	`RGS EVENT LISTS`
	`RGS EXPOSURE IMAGES`
	`RGS IMAGES`
	`RGS SPECTRA`
	`RGS TIMESERIES`
	`CROSS-CORRELATION`
	`PPS DATA`
	`PPS GRAPHICS`
PPS run message file	`PPS RUN MESSAGE`

10.2 Example PPS product group keyword substring values

Some PPS product group string keywords may only be made up of specific character sub-strings (with blanks as delimiters), examples are given in the following table.

The values presented in the table are represented in this form in the ODF.

These are provided for information only. They are subject to SAS configuration control, but not to ICD configuration control.

Keyword	Allowed Values	Description
`INSTRUMENT`	E1	EPIC MOS 1
	E2	EPIC MOS 2
	E3	EPIC pn
	OM	OM
	R1	RGS 1
	R2	RGS 2

11 Appendix 3

11.1 Constituents of the pipeline product group files

The data product files which are included in the pipeline product group files are listed here. The format and the expected number of file instances in the group are also given, in some cases this number is quite uncertain. FITS format files will be individually compressed with GNU `gzip`.

The following table is provided for information only. It is subject to SSC configuration control, but not to ICD configuration control.

Product group	Constituent files	Format	Typical number
EPIC event list group	EPIC MOS imaging mode event list	FITS	2
	EPIC PN imaging mode event list	FITS	1
	SLEW single raw event list (*slew only*)	FITS	1
	SLEW step event list (*slew only*)	FITS	70
	EPIC timing mode event list	FITS	0
	PPS HTML index	HTML	1
EPIC sky image group	EPIC image	FITS	18
	SLEW step image (*slew only*)	FITS	210
	Unfiltered slew step image (*slew only*)	FITS	70
	EPIC observation image	FITS	1
	EPIC observation exposure map	FITS	1
	PPS HTML index	HTML	1
EPIC ancillary group	EPIC camera exposure map	FITS	18
	SLEW step exposure map (*slew only*)	FITS	210
	EPIC camera background map	FITS	18
	EPIC camera background map	FITS	18
	EPIC camera detector mask	FITS	15
	EPIC camera global background timeseries	FITS	3
	EPIC exposure-merged exposure map	FITS	15
	EPIC observation sensitivity map	FITS	1
	EPIC observation exposure map	FITS	1
	EPIC observation region file	ASCII	1
	PPS HTML index	HTML	1
EPIC source list group	EPIC obs box-local source list	FITS	1
	EPIC obs box-map source list	FITS	1
	EPIC obs ml source list	FITS	1
	EPIC FITS summary source list	FITS	1
	EPIC FITS summary source list	HTML	1
	PPS HTML index	HTML	1
EPIC source-specific group	EPIC FITS source timeseries	FITS	30
	EPIC FITS source spectrum	FITS	30
	EPIC FITS source bkground spectrum	FITS	30
(continued on next page)			

Product group	Constituent files	Format	Typical number
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	EPIC FITS ancillary response file	FITS	30
	EPIC source region	ASCII	30
	PPS HTML index	HTML	1
OM images	OM OSW FITS image	FITS	20
	OM OSW FITS sky image	FITS	20
	OM observation FITS sky image	FITS	2
	OM OSW FITS Grism-aligned image	FITS	3
	OM OSW FITS Grism spectra list	FITS	3
	OM OSW FITS Grism spectrum	FITS	3
	PPS HTML index	HTML	1
OM source lists group	OM OSW source list	FITS	20
	OM observation source list	FITS	1
	OM OSW FITS grism source list	FITS	3
	PPS HTML index	HTML	1
OM timeseries group	OM OSW FITS source timeseries	FITS	10
	OM OSW source timeseries	PDF	10
	OM FITS tracking star timeseries	FITS	8
	PPS HTML index	HTML	1
OM ancillary group	OM OSW ASCII region	ASCII	20
	PPS HTML index	HTML	1
RGS event list group	RGS event list	FITS	2
	RGS source list	FITS	2
	PPS HTML index	HTML	1
RGS exposure group	RGS exposure map	FITS	2
	PPS HTML index	HTML	1
RGS image group	RGS FITS image	FITS	2
	RGS FITS energy-dispersion image	FITS	2
	PPS HTML index	HTML	1
RGS spectrum group	RGS FITS source spectrum	FITS	4
	RGS FITS source region spectrum	FITS	4
	RGS FITS background spectrum	FITS	4
	RGS FITS background model spectrum	FITS	4
	RGS FITS response matrix	FITS	2
	RGS FITS whole field spectrum	FITS	4
	RGS FITS whole field response matrix	FITS	2
	RGS FITS fluxed spectrum	FITS	1
	RGS FITS flare background timeseries	FITS	2
	RGS FITS cross-dispersion histogram	FITS	2
	PPS HTML index	HTML	1
RGS timeseries group	RGS FITS background-subtracted source timeseries	FITS	2
	RGS FITS source background timeseries	FITS	2
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Product group	Constituent files	Format	Typical number
Cross-correlation group	FITS source cross-corr summary	FITS/HTML	2
	FITS source cross-corr results	FITS	20
	FITS FOV cross-corr summary	FITS/HTML	1
	FITS FOV cross-corr results	FITS	10
	Finding chart plot	PDF	80
	Cross-corr searched catalogues	FITS/HTML	2
	Cross-corr catalogue descriptions	HTML	20
	XMM-Newton - rosat image plot	PDF	1
	XMM-Newton catalogue plot	PDF	1
	Main cross-corr page	HTML	1
	PPS HTML index	HTML	1
PPS data group	PPS product index	FITS	1
	Calibration index file	FITS	1
	Attitude time series	FITS	1
	Reference catalogue	FITS	1
	PPS script log	ASCII	1
	PPS HTML index	HTML	1
PPS graphics group	EPIC PNG image	PNG	3
	EPIC PNG exposure map	PNG	3
	EPIC PNG background map	PNG	3
	EPIC PDF global background timeseries	PDF	3
	EPIC PNG observation image	PNG	1
	EPIC PNG observation exposure map	PNG	1
	EPIC PNG observation background map	PNG	1
	EPIC PDF source timeseries plot	PDF	30
	EPIC PDF source FFT plot	PDF	30
	EPIC PDF source spectrum plot	PDF	30
	EPIC HTML summary page	HTML	1
	OM PDF tracking history plot	PDF	10
	OM PNG sky image	PNG	20
	OM PNG observation sky image	PNG	2
	OM PDF grism spectrum plot	PDF	3
	OM HTML summary page	HTML	1
	RGS image plot	PNG	2
	RGS energy-dispersion image plot	PNG	2
	RGS source spectrum plot	PDF	2
	RGS whole field spectrum plot	PDF	2
	RGS fluxed source spectrum plot	PDF	1
	RGS HTML summary page	HTML	1
	HTML source cross-corr summary	HTML	1
	HTML source cross-corr results	HTML	1
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Product group	Constituent files	Format	Typical number
	HTML FOV cross-corr summary	HTML	1
	HTML FOV cross-corr results	HTML	1
	Observation summary	HTML	1
	SSC logo1	PNG	1
	SSC logo2	PNG	1
	CDS logo1	PNG	1
	CDS logo2	PNG	1
	CDS logo3	PNG	1
	PPS summary	HTML	1
	PPS HTML index	HTML	1