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FIRST GROUND  
SEGMENT  
  
LIST OF ICDS

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List of ICDs for ILT has been consolidated following the EGSE/FGSSE meeting Diagram showing the ICD with respect to the design has been added, see appendix A Traceability matrix has been put up-to-date with FGS IRD issue 1.2		

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# 1 INTRODUCTION

## 1.1 *Purpose and scope*

This document lists the I/F between the various systems of the FIRST GS or FGS centers which will be controlled through ICDs. The list of I/F covers all FIRST mission phases from ILT to post-mission.

The interfaces internal to a given system and centre are not addressed in this document.

In line with the FGS Design Description (see [RD-1]) and FGS IRD (see [RD-2]), the following FGS centers and systems considered are:

(centers)

- the FSC
- the ICCs
- the ICC@MOC
- the MOC

(systems)

- the FIRST Common Science System (FCSS)
- the EGSE-ILT
- the CCE
- the MOC (system)
- the RTA
- the OBSM

For each such I/F, the section 2 of this document indicates:

- the definition of the information flow
- the reference to the ICD (document) defining the interface
- the mission phases for which the I/F is valid
- the FGS team who is the ICD custodian/ mission phase
- the systems (or centers) producing or consuming the information / mission phase
- the date at which the ICD has to be issued (TBC, should not it be referred to in the relevant SPMPs?)

The section 3 of this document traces the interface requirements of the FGS IRD, see [RD-2], to the different ICDs .

## 1.2 *Reference documents*

[RD-1] FGS Design Description Document, FIRST/FSC/DOC/0146, issue 0.2, 02/10/00

[RD-2] FGS Interface Requirement Document, FIRST/FSC/DOC/0117, issue 1.2, 05/10/00

### 1.3 *Acronyms and Definition*

See FSCDT list at <http://astro.estec.esa.nl/FIRST/FINDAS/fscdt.html>

## 2 LIST OF ICDS

The following table lists all the FGS interfaces and associated information.

For readability purpose, the interfaces have been grouped as follows:

**Procedural interfaces:** these are the information flow between the FGS operational centers which are subject to manual procedures between centers.

**Satellite TC & TM data:** this section of the table groups all the ICDs that are related to the definition of the satellite TC and TM data format

**MOC data:** this section of the table groups all the ICDs that are related to the definition of the format and/or exchange protocol for data generated by MOC in the in-orbit phase. Some of these ICDs may be applicable for ILT, IST as the EGSE-ILT or the CCE may mimic the MOC for these data both wrt the format and the exchange protocol.

**FSC data:** this section of the table groups all the ICDs that are related to the definition of format and/or exchange protocol for data generated by the FSC in the in-orbit or post mission phase.

**ICC data:** this section of the table groups all the ICDs that are related to the definition of format and/or exchange protocol for data generated by the ICC in the in-orbit or post mission phase. Some of these ICDs may be applicable for ILT or IST as the ICCs may already generate these data for testing their instruments.

**Test specific data:** this section of the table groups all the ICDs that are related to the definition of format and/or exchange protocol for the data specific to ILT or IST..

**SW:** this section of the table groups all the ICDs that are related to SW interfaces

The column heading are overall self-explanatory. The "**Systems (centres) involved/ Mission phase**" column lists for each interface the system (or center) which are generating or consuming the information related to the interface. The system (center) generating the information is underlined (when relevant).

The ICDs which are already applicable already in the ILT phase are marked in **blue**.

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D O C U M E N T

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
<i>Operational interactions between centers</i>							
MOC-FSC operational interactions			In-orbit	MOC or FSC?	(MOC-FSC)		MOC-FSC interface procedures
MOC-ICC operational interactions			In-orbit	MOC	(MOC-ICC)		MOC-ICC and ICC@MOC interface procedures
FSC-ICC operational interactions			In-orbit Post mission	ICC or FSC?	(FSC-ICC)		FSC-ICC interface procedures
<i>Satellite TC &amp; TM data</i>							

a

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ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
MIB format	1		ILT IST In-orbit Post-mission	PI  Project/Prime  MOC ??	<u>MIB editor</u> – EGSE-ILT – FCSS – RTA <u>MIB editor</u> – CCE – FCSS – RTA <u>(MIB editor)</u> – MOC – FCSS – RTA <u>MIB editor</u> – FCSS - RTA	??	<p>Formats to support the definition of</p> <ul style="list-style-type: none"> <li>- TC mnemonic</li> <li>- TC packets formats.</li> <li>- HK TM packet (header + data field)</li> <li>- Instrument science TM packet header (not science TM data field).</li> <li>- OOL values</li> <li>- Parameter calibration curves</li> </ul> <p>In ILT, the MIB format will also support the definition of the TEI TC and TM and in IST, the definition of SCOE TC and TM.</p> <p><i>The MIB, it self, which will contain the definition of the TC and TM is not part of this list as this is a database not a document.</i></p>
Science TM data field	2		ILT IST In-orbit Post-mission	PIs (all phases)	<u>Instr.</u> - FCSS (all phases)	??	<p>Definition of the instruments science packets data field format</p> <p><i>This ICD will be in appendix to the Instrument user manuals (one per instrument)</i></p>
<i>MOC data</i>							

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
Time Correlation (TBC)			IST In-orbit	Project/Prime MOC	<u>CCE</u> – FCSS – RTA <u>MOC</u> – FCSS – RTA		Definition of TiC information format  <i>TiC TM in ILT is not used at all: In ILT instrument and TE clocks will be kept synchronized with test control clock. In in-orbit phase, MOC will keep the on-board time synchronized with ground time +/- 20ms</i>
Derived parameter			IST In-orbit	Project/Prime MOC	<u>CCE</u> – FCSS – RTA <u>MOC</u> – FCSS – RTA	??	Definition of derived parameter data format  <i>Derived parameters TM are created by CCE (IST) and MCS (in-orbit operation). Derived parameter TM in ILT will not be used.</i>
OOL data	3		ILT IST In-orbit	ICCs Project/Prime MOC	FCSS – <u>RTA</u> <u>CCE</u> – FCSS <u>MOC</u> – FCSS	??	Definition of OOL data format  <i>Derived parameters TM are created by RTA (ILT), CCE (IST) and MCS (in-orbit operation). Derived parameter TM in ILT will not be used.</i>



ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
NRT TM I/F	4		ILT IST In-orbit	ICC Project/Prime MOC	EGSE-ILT – FCSS – RTA CCE – FCSS MOC– FCSS (ICC@MOC)		<p>Definition of the protocol for the stream of the NRT TM I/F from EGSE-ILT(router) in ILT, CCE in IST and MOC in operation and for establishing the stream.</p> <p>Although it is expected that the TM stream protocol be similar in all phases (e.g. TCP-IP), the way establishing the stream will differ along the different phases, leading to separate section in the document.</p>
TC history	5		ILT IST In-orbit	ICC Project/Prime MOC	RTA – FCSS CCE – FCSS MOC – FCSS	??	<p>Definition of the TC history format.</p> <p><i>The TC history format is expected to be largely the same across mission phases. It is however possible that some fields will be mission phase specific.</i></p>
Planning Skeleton			In-orbit	MOC	MOC – FCSS		
Schedule status information			In-orbit	MOC	MOC – FCSS		
Commanding timeline summary			In-orbit	MOC	MOC – FCSS		
S/C orbit data reconstituted			In-orbit	MOC	MOC – FCSS		
S/C attitude history			In-orbit	MOC	MOC – FCSS		
SSO database			in-orbit	MOC	MOC – FCSS		
DDS I/F			In-orbit	MOC	MOC - FCSS(FSC)		Definition of DDS services and protocol to retrieve MOC data files and consolidated TM and export FSC/ICC data files to MOC.
<i>FSC data</i>							

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
Schedule			In-orbit	FSC	<u>FCSS(FSC)</u> – MOC		Definition of the format and contents of schedule. Includes S/C commanding request definition
FSC data to ICC			In-orbit Post-mission	FSC	FCSS ( <u>FSC</u> – ICC)	??	Definition of all the data (and their relationships) shared by FSC and ICC as well as the transfer mechanism from FSC to ICCs  <i>Captured by the FCSS design class model and ODBMS replication/remote access policy</i>
<b>ICC data</b>							
Instrument Command Sequences			In-orbit	MOC	<u>FCSS(ICC)</u> – MOC		Definition of instrument command sequences used for manual commanding by MOC
Instrument OBS interchange format	<b>6</b>		ILT IST In-orbit	ICC Project/Prime MOC	<u>OBSMaint</u> – FCSS – EGSE-ILT <u>OBSMaint</u> – FCSS – CCE <u>OBSMaint</u> – FCSS – MOC	??	Definition of the exchange format for instrument memory image  <i>The instrument memory as returned by MOC and the instrument memory update from ICC to MOC will be exchanged in the same format.</i>
Instrument apertures and pointing misalignment			In-orbit	MOC	MOC – FCSS		

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
ICC data to FSC			In-orbit Post-mission	FSC	FCSS ( <u>ICC</u> - FSC)	??	Definition of all the data (and their relationships) shared between ICC and FSC as well as the transfer mechanism from ICCs to FSC  <i>Captured by the FCSS design class model and ODBMS replication/remote access policy</i>
FCSS - RTA TM I/F	7		ILT IST In-orbit post-mission	ICC (all phases)	<u>FCSS</u> – RTA(all phases)		Definition of the protocol between RTA and the FCSS for establishing TM data flow & Definition of the TM data flow protocol between FCSS and RTA
RTA – FCSS data I/F	8		ILT	ICC (all phases)	<u>RTA</u> – FCSS		Definition of the protocol between RTA and the FCSS for <ul style="list-style-type: none"> <li>- transferring TC history data (ILT only)</li> <li>- transferring OOL data (ILT only)</li> </ul>
FCSS OBS I/F	9		ILT IST In-orbit	ICC (all phases)	OBSMaint – FCSS – EGSE-ILT OBSMaint – FCSS – CCE OBSMaint – FCSS		Definition of the protocol to store/retrieve the instrument memory image to/from the FCSS as well as associated files.  <i>The transfer of the instrument memory image between the FCSS and MOC in in-orbit phase is covered by the DDS I/F</i>

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
FCSS MIB I/F	10		ILT IST In-orbit	ICC (all phases)	MIB editor – FCSS – EGSE-ILT MIB editor – FCSS – CCE MIB editor – FCSS		Definition of the protocol to store/retrieve the MIB files to/from the FCSS  <i>The transfer of the MIB files between the FCSS and MOC in in-orbit phase is covered by the DDS I/F</i>
<i>Test specific data</i>							
EGSE-ILT - FCSS Test Procedure I/F	11		ILT	ICC	<u>EGSE-ILT</u> – FCSS	??	Definition of the protocol and data format between EGSE-ILT(Test Control) and FCSS to exchange <ul style="list-style-type: none"> <li>- observing modes,</li> <li>- command mnemonic sequences,</li> <li>- test procedures definition,</li> <li>- autonomy procedures definition</li> <li>- test procedure log</li> </ul>
CCE - FCSS data I/F			IST	Project/Prime	<u>CCE</u> – FCSS		Definition of interface protocol and exchange format between the CCE and the FCSS for test execution data (e.g. test definition, test log execution)
RTA events and TM parameters	12		ILT	ICC	<u>RTA</u> – EGSE-ILT		Definition of RTA events format and TM parameters and transfer protocol to implement autonomy function of the EGSE-ILT.  <i>RTA generates events (e.g. OOL) to the EGSE-ILT test controller to drive test procedures execution</i>

ICD name	ICD No (ILT only)	ICD ref.	Mission phases	Custodian/ Mission phase	Systems (centres) involved/ Mission phase	Need date/ Mission phase	ICD brief description <i>and other additional comments</i>
<b>SW</b>							
S/C orbit predictor SW			In-orbit	MOC	<u>MOC</u> – FCSS		<i>MOC will deliver deliver algorithm specification for SW (TBC)</i>
S/C attitude constraints SW			In-orbit	MOC	<u>MOC</u> – FCSS		<i>MOC will deliver deliver algorithm specification for SW (TBC)</i>
S/C slew time and path predictor SW			In-orbit	MOC	<u>MOC</u> – FCSS		<i>MOC will deliver deliver algorithm specification for SW (TBC)</i>
Instrument simulator SW API			In-orbit	PI	Instrument simulator – S/C simulator		
Instrument time estimator, instrument commanding and instrument data processing API			ILT IST In-orbit Post mission	ICC (all phases)	FCSS		<i>Internal to FCSS, captured by FCSS class model</i>

**APPENDIX A : IRD-ICDS TRACEABILITY MATRIX**

IRD requirements From the FGS IRD see [RD-2]	I/F name (see section 2)	ICD reference
FGS-IR-3.1-10 FGS-IR-3.1-20 FGS-IR-3.1-30	DDS I/F	
FGS-IR-3.1-40 FGS-IR-3.1-50 FGS-IR-3.1-60 FGS-IR-3.1-70	MIB: these are requirements on the content of the TM packet	N/A
FGS-IR-3.1-80 FGS-IR-3.1-90 FGS-IR-3.1-100 FGS-IR-3.1-110	DDS I/F	
FGS-IR-3.1-120 FGS-IR-3.1-130 FGS-IR-3.1-140	S/C orbit predictor SW and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-150 FGS-IR-3.1-160 FGS-IR-3.1-170	S/C attitude constraints SW and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-180 FGS-IR-3.1-190 FGS-IR-3.1-200	S/C slew time and path predictor SW and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-210 FGS-IR-3.1-220 FGS-IR-3.1-230 FGS-IR-3.1-240 FGS-IR-3.1-250	Planning Skeleton and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-260	Schedule status information MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-270 FGS-IR-3.1-280 FGS-IR-3.1-290	Commanding timeline summary and MOC-FSC operational interactions and DDS I/F	

FGS-IR-3.1-300 FGS-IR-3.1-310 FGS-IR-3.1-320 FGS-IR-3.1-330 FGS-IR-3.1-340	TC history and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-350 FGS-IR-3.1-360 FGS-IR-3.1-370	S/C orbit data reconstituted and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-380 FGS-IR-3.1-390 FGS-IR-3.1-400 FGS-IR-3.1-410	S/C attitude history and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-420 FGS-IR-3.1-430 FGS-IR-3.1-440	Time Correlation TM and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-450 FGS-IR-3.1-460	Derived parameter TM and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-470 FGS-IR-3.1-480	OOL data. and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-500	MIB format and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-510	Instrument apertures and pointing misalignment and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-520	SSO database MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.1-530 FGS-IR-3.1-540	MOC-FSC operational interactions	
FGS-IR-3.2-10	MOC-ICC operational interactions	
FGS-IR-3.2-20 FGS-IR-3.2-30 FGS-IR-3.2-40	<i>Not covered, ICC internal interfaces</i>	N/A
FGS-IR-3.3-10 FGS-IR-3.3-20 FGS-IR-3.3-30 FGS-IR-3.3-40	NRT TM I/F	

FGS-IR-3.4-10 FGS-IR-3.4-20 FGS-IR-3.4-30 FGS-IR-3.4-40 FGS-IR-3.4-50 FGS-IR-3.4-60 FGS-IR-3.4-70	Schedule and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.4-80 FGS-IR-3.4-90 FGS-IR-3.4-100	Instrument OBS interchange format and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.4-110	SSO database and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.4-120	MIB format and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.4-130	Instrument Command Sequences and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.4-140	Instrument apertures and pointing misalignment and MOC-FSC operational interactions and DDS I/F	
FGS-IR-3.5-10 FGS-IR-3.5-20 FGS-IR-3.5-30 FGS-IR-3.5-40 FGS-IR-3.5-50 FGS-IR-3.5-60 FGS-IR-3.5-70 FGS-IR-3.5-80 FGS-IR-3.5-90 FGS-IR-3.5-100 FGS-IR-3.5-110 FGS-IR-3.5-120 FGS-IR-3.5-130 FGS-IR-3.5-140 FGS-IR-3.5-150 FGS-IR-3.5-160	FSC data to ICC and FSC-ICC operational interactions	
FGS-IR-3.7-10 FGS-IR-3.7-20 FGS-IR-3.7-30	ICC data to FSC and FSC-ICC operational interactions and FCSS OBS I/F	



FGS-IR-3.7-40 FGS-IR-3.7-50 FGS-IR-3.7-60 FGS-IR-3.7-70 FGS-IR-3.7-80	ICC data to FSC and FSC-ICC operational interactions	
FGS-IR-3.7-90	Instrument simulator SW API and FSC-ICC operational interactions	
FGS-IR-3.7-100	Instrument time estimator SW API and FSC-ICC operational interactions	
FGS-IR-3.7-110	Instrument commanding SW API and FSC-ICC operational interactions	
FGS-IR-3.7-120	Instrument data processing SW API and FSC-ICC operational interactions	
FGS-IR-3.7-130 FGS-IR-3.7-140 FGS-IR-3.7-150	FSC-ICC operational interactions and/or ICC data to FSC	
FGS-IR-3.7-160	MIB format and FSC-ICC operational interactions and ICC data to FSC and FCSS MIB I/F	
FGS-IR-3.7-170	Instrument Command Sequences and FSC-ICC operational interactions and ICC data to FSC	
FGS-IR-3.7-180	Instrument apertures and pointing misalignment and FSC-ICC operational interactions and/or ICC data to FSC	
FGS-IR-3.7-190	FSC-ICC operational interactions and/or ICC data to FSC	
FGS-IR-3.8-10 FGS-IR-3.8-20 FGS-IR-3.8-30	FCSS – RTA TM I/F	
FGS-IR-4.1-05 FGS-IR-4.1-10 FGS-IR-4.1-20 FGS-IR-4.1-25 FGS-IR-4.1-30 FGS-IR-4.1-40	EGSE-ILT – FCSS Test Procedure I/F	
FGS-IR-4.1-60 FGS-IR-4.1-70 FGS-IR-4.1-80	MIB format & FCSS MIB I/F	
FGS-IR-4.1-90 FGS-IR-4.1-100 FGS-IR-4.1-110	Instrument OBS Interchange Format & FCSS OBS I/F	
FGS-IR-4.2-10 FGS-IR-4.2-20 FGS-IR-4.2-30 FGS-IR-4.2-40 FGS-IR-4.2-50	NRT TM I/F	

FGS-IR-4.2-60 FGS-IR-4.2-70 FGS-IR-4.2-80 FGS-IR-4.2-90	EGSE-ILT – FCSS Test Procedure I/F	
FGS-IR-4.3-10 FGS-IR-4.3-20 FGS-IR-4.3-25 FGS-IR-4.3-26 FGS-IR-4.3-35	FCSS-RTA TM I/F	
FGS-IR-4.3-40 FGS-IR-4.3-50 FGS-IR-4.3-60	FCSS MIB I/F	
FGS-IR-4.4-10 FGS-IR-4.4-20 FGS-IR-4.4-30 FGS-IR-4.4-40 FGS-IR-4.4-50	RTA – FCSS data I/F	
FGS-IR-4.5-10 FGS-IR-4.5-20	FCSS OBS I/F	
FGS-IR-4.7-10 FGS-IR-4.7-20 FGS-IR-4.7-30 FGS-IR-4.7-40	RTA events and TM parameters I/F	
FGS-IR-4.9-10 FGS-IR-4.9-20 FGS-IR-4.9-30	NRT TM I/F	
FGS-IR-4.10-10 FGS-IR-4.10-20	FCSS MIB I/F	

## APPENDIX B : ILT ICDS AND SET-UP

The following diagram from the FGSD, see [RD-1] , describes the ILT set-up in terms of systems and components. It shows the data interfaces between the components. The ICDs relevant to these interfaces are indicated in the diagram. The ICD numbers correspond to the number in 2.

