OBOSS System Integration Frame Contract

OBOSS-III Software Requirements

Document No.:	Terma/SPD/OBOSS-III/003
Date:	21.11.2003
Issue:	2
Revision:	1
Distribution:	ESTEC, Terma
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Document Change Record

Issue	Date	Change
1	27.05.2003	New document.
1.1	30.09.2003	Updated after demonstrator specification. The following requirements are affected by the update: Req-4.1.7-1, Req-4.1.7-2, Req-4.1.7-3, Req-4.1.7-4, Req-4.1.7-5, Req-4.1.8-1, Req-4.1.9-4, and Req-4.1.9-7.
2	11.11.2003	Updated according to ESTEC comments. Applicability attribute has been updated for all requirements. Method for verification has been updated from analysis to test for the following requirements: Req-4.1.1-3, Req-4.1.1-7, Req-4.1.1-15, Req-4.1.2-4, Req-4.1.2-5, Req-4.1.2-9, Req-4.1.2-15, Req-4.1.2-16, Req-4.1.2-17, Req-4.1.2-18, Req-4.1.2-20, and Req-4.3.0-1. The following hardware resource requirement has been deleted: Req-4.5.1-1. The following FDIR requirements have been added: Req-4.1.14-1, Req-4.1.14-2, Req-4.1.14-3, Req-4.1.14-4, and Req-4.1.14-5. The following reusability requirement has been added: Req-4.13.0-7. The following performance requirements have been added: Req-4.2.0-1, Req-4.2.0-2, Req-4.2.0-3, and Req-4.2.0-4. The following operational requirement has been updated to be in accordance with the performance requirements: Req-4.4.0-1. The following operational requirements has been deleted: Req-4.4.0-2. The deleted operational requirement has been replaced by the following requirements: Req-4.4.0-3 and Req-4.4.0-4. Section 3.2 and Appendix A regarding software architecture has been added.
2.1	21.11.2003	Updated according to action items from OBOSS-III PDR. Section 3.2 regarding software architecture has been updated. Method for verification has been updated from analysis to test for the following requirements: Req-4.1.1-1, Req-4.1.1-2, Req-4.1.1-4, Req-4.1.1-8, Req-4.1.1-9, Req-4.1.2-1, Req-4.1.2-2, Req-4.1.2-3, Req-4.1.2-6, Req-4.1.2-10, and Req-4.1.2-11. Method for verification has been updated from analysis to analysis and test for the following requirements: Req-4.1.2-8, Req-4.1.3-9, Req-4.1.3-10, Req-4.1.6-5, Req-4.1.11-17, Req-4.1.13-8, and Req-4.1.14-3. The following resource requirements have been added: Req-4.5.2-3 and Req-4.5.2-4. Appendix A has been updated to provide the logical model of the software. Traceability matrix in Appendix B has been included.

1 Introduction

1.1 Scope

The purpose of this document is to define the software requirements for the third updated version of the On-Board Operations Support Software (OBOSS), referenced to as OBOSS-III.

OBOSS-III constitutes a baseline for an onboard data handling software system, offering a selection of the services defined in the telemetry and telecommand Packet Utilization Standard (PUS). Based on the OBOSS-III software package, satellite software developers can make their own mission specific instantiation of a data handling system.

New features in OBOSS-III includes an update from the PUS services defined in the ESA standard PSS-07-101 to the PUS services defined in the new ECSS-E-70-41A standard [AD1]. Two new services are now supported and the software programming language has been updated from Ada 83 to Ada 95.

1.2 Abbreviations and Acronyms

APID	Application ID
CCSDS	Consultative Committee for Space Data Systems
CDS	CCSDS Day Segmented
CRC	Cyclic Redundancy Code
CUC	CCSDS Unsegmented Code
ECSS	European Cooperation for Space Standardization
ESA	European Space Agency
FDIR	Failure Detection Isolation and Recovery
HOOD	Hierarchical Object-Oriented Design
HRT-HOOD	Hard Real-Time HOOD
ID	Identifier
ISO	International Organization for Standardization
OBOSS	On-board Operations Support Software
PDR	Preliminary Design Review
PTC	Parameter Type Code
PUS	Packet Utilization Standard
SAU	Smallest Addressable Unit
SVF	Software Validation Facility
TC	Telecommand
TM	Telemetry

1.3 Outline of Document

Chapter 2 enumerates applicable and reference documents.

Chapter 3 gives a general description of the OBOSS-III software and the test environment to be used for software validation.

Chapter 4 defines the specific requirements.

Appendix A contains a logical model that also gives an overview of the top-level architectural design.

Appendix B contains a traceability matrix that maps the functional requirements to the elements in the logical model.

2 References

2.1 Applicable Documents

[AD1] European Cooperation for Space Standardization, "Space Engineering: Ground Systems and Operations - Telemetry and Telecommand Packet Utilization", doc. No. ECSS-E-70-41A, January 2003.

[AD2] "Ada 95 Reference Manual, Language and Standard Libraries, International Standard ISO/IEC 8652:1995(E)".

[AD3] Alan Burns, "The Ravenscar Profile", Real-Time Systems Research Group, Department of Computer Science, University of York, UK.

2.2 Reference Documents

[RD1] "Reference Software Validation Facility, Packet Tools, Software User Manual", doc. no. TERMA/SPACE/RSVF/PT/SUM, Terma, November 2001.

[RD2] The Open Ravenscar home page, "http://www.openravenscar.org/".

3 General Description

3.1 Functionality

The OBOSS-III software will constitute a mission-independent set of services, that implements major parts of the ECSS-E-70-41A packet utilization standard [AD1]. The following PUS services was partly or fully supported by the previous version of OBOSS and will be supported by OBOSS-III according to the new ECSS standard:

- Telecommand Verification.
- Device Command Distribution.
- Housekeeping and Diagnostic Data Reporting.
- Event Reporting.
- Memory Management.
- Function Management.
- On-board Operations Scheduling.
- On-board Monitoring.
- On-board Storage and Retrieval.

The following new PUS services will also be included in OBOSS-III:

- Large Data Transfer.
- Event-Action.

Details about which service sub-types that are supported, can be found in the next chapter.

3.2 Architecture

Due to the nature of the OBOSS-III software package as a set of services, which in an OBOSS-III instantiation shall be combined in a number of application processes, it is impossible to give a coherent top-level architecture of the OBOSS-III software. Such an architecture will first exist when an OBOSS-II instantiation is developed.

The logical model of the software in Appendix A can however also be seen as an attempt to describe the top-level OBOSS-III architecture using HRT HOOD diagrams. The architecture is divided between the 12 supported PUS services. Each service is equipped with a initialization operation and a "handle

incoming PUS packet" operation ("make telemetry" for services that do not receive service requests).

3.3 Environment

The first version of OBOSS was developed for a 1750A platform. During the OBOSS-II update, the software was ported to an ERC32 platform. The OBOSS-III development will also be performed on an ERC32 platform using the GNAT/ORK cross compilation system [RD2].

Test and validation will be performed using the reference software validation tools [RD1], developed under previous ESA contracts. A demonstrator test case will be defined and implemented for the software validation activities. The specification of the demonstrator is beyond the scope of this document.

4 Specific Requirements

This section contains the actual requirements for the OBOSS-III software.

For each requirement the following is defined:

- Requirement number consisting of the text "Req-" followed by the subsection number, a hyphen, and an incrementing counter.
- The requirement text.
- Requirement applicability being either "OBOSS-II (unchanged)", "OBOSS-II (changed)" or "OBOSS-III (new)".
    - "OBOSS-II (unchanged)" indicates that the requirement is an OBOSS-II requirement which is unaffected by the OBOSS-III updates. The requirement is applicable for both OBOSS-II and OBOSS-III.
    - "OBOSS-II (changed)" indicates that the requirement is an updated version of an OBOSS-II requirement. The updated requirement is only applicable for OBOSS-III.
    - "OBOSS-III (new)" indicates that the requirement is a completely new requirement which only is applicable for OBOSS-III.
- Requirement verification being one of the following:
    - R - indicating the requirement will be verified by review of the architectural design.
    - I - indicating the requirement will be verified by code inspection.
    - A - indicating the requirement will be verified by analysis.
    - T - indicating the requirement will be verified by test.

Primary focus has been on identifying the requirements that are specific for the OBOSS-III software package. This is also reflected in the requirements level of detail. Where ever possible new OBOSS-III functionality is mentioned specifically.

4.1 Functional Requirements

4.1.1 Telecommands

Req-4.1.1-1
All telecommand packets shall have a packet structure as defined in section 5.3.1 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-2
All telecommand packets shall have a packet header as defined in section 5.3.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-3
All telecommand packet headers shall have a packet ID field as defined in section 5.3.2 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.1-4
All telecommand packet headers shall have a packet sequence control field as defined in section 5.3.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-5
The sequence flags field in the packet sequence control field of the telecommand packet header shall always contain "11", indicating a stand-alone packet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.1-6
The sequence count field in the packet sequence control field of the telecommand packet header shall contain a separate sequence count for each APID and nothing else, as defined in section 5.3.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-7
All telecommand packet headers shall have a packet length field as defined in section 5.3.2 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.1-8
All telecommand packets shall have a packet data field as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-9
All telecommand packet data fields shall have a data field header as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-10

The data field header in the telecommand packet data field shall contain a CCSDS secondary header flag as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.1-11
The data field header in the telecommand packet data field shall contain a TC packet PUS version number field with value = 1, as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.1-12
The data field header in the telecommand packet data field shall contain an ACK field, a service type field, and a service sub-type field, as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.1-13
The data field header in the telecommand packet data field shall contain a source ID field as defined in section 5.3.3 of [AD1]. The value of the source ID field shall be identical to the application ID for the application process that generates the telecommand.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.1-14
The data field header in the telecommand packet data field shall contain spare bits, in order to pad the data field header to an integral number of words, as defined in section 5.3.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.1-15
All telecommand packet data fields shall contain a packet error control field as defined in section 5.3.3 of [AD1]. The data handling software shall at least support one type of packet error control (ISO checksum or CRC).
Applicability: OBOSS-II (unchanged)
Verification: T

4.1.2 Telemetry

Req-4.1.2-1
All telemetry source packets shall have a packet structure as defined in section 5.4.1 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-2
All telemetry source packets shall have a packet header as defined in section 5.4.2 of [AD1].

Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-3
All telemetry source packet headers shall have a packet ID field as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-4
The version number field in the packet ID field of the telemetry source packet header shall always contain the value 0, as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-5
The packet ID field in the telemetry source packet header shall contain a type field, a data field header flag field, and a application process ID field, as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.2-6
All telemetry source packet headers shall have a packet sequence control field as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-7
The grouping flags field in the packet sequence control field of the telemetry source packet header shall always contain "11", indicating a stand-alone packet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.2-8
The source sequence count field in the packet sequence control field of the telemetry source packet header shall contain a separate sequence count for each destination, as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: A, T

Re-4.1.2-9
All telemetry source packet headers shall have a packet length field as defined in section 5.4.2 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.2-10

All telemetry source packets shall have a packet data field as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-11
All telemetry source packet data fields shall have a data field header as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-12
The data field header in the telemetry source packet data field shall begin with a spare bit set to zero, as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.2-13
The data field header in the telemetry source packet data field shall contain a TM source packet PUS version number field with the value 1, as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-14
The data field header in the telemetry source packet data field shall contain four additional spare bits set to zero, as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.2-15
The data field header in the telemetry source packet data field shall contain a service type field and a service subtype field, as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.2-16
The data field header in the telemetry source packet data field shall include a packet sub-counter field as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.2-17
The data field header in the telemetry source packet data field shall include a destination ID field as defined in section 5.4.3 of [AD1]. The value of the destination ID field shall be identical to the application ID for the application process that receives the telecommand.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.2-18
The data field header in the telemetry source packet data field shall include a Time field as defined in section 5.4.3 of [AD1]. The data handling software shall at least support one time format (CUC or CDS).
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.2-19
The data field header in the telemetry source packet data field shall contain spare bits, in order to pad the data field header to an integral number of words, as defined in section 5.4.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.2-20
All telemetry source packet data fields shall contain a packet error control field as defined in section 5.4.3 of [AD1]. The data handling software shall at least support one type of packet error control (ISO checksum or CRC).
Applicability: OBOSS-II (unchanged)
Verification: T

4.1.3 Telecommand Verification

Req-4.1.3-1
The data handling software shall support the telecommand verification service sub-type 1 telecommand acceptance report - success, with source data consisting of a telecommand packet id field and a packet sequence control field, as defined in section 6.3.2 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.3-2
The data handling software shall support the telecommand verification service sub-type 2 telecommand acceptance report - failure, as defined in section 6.3.2 of [AD1]. All fields shall be supported. Notice that code field is mandatory.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.3-3
The data handling software shall support the telecommand verification service sub-type 3 telecommand execution started report - success, with source data consisting of a telecommand packet id field and a packet sequence control field, as defined in section 6.3.3 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.3-4
The data handling software shall support the telecommand verification service sub-type 4 telecommand execution started report - failure, as defined in section 6.3.3 of [AD1]. All fields shall be supported

Applicability: OBOSS-II (unchanged)
Verification: T

Re-4.1.3-5
The data handling software shall support the telecommand verification service sub-type 5 telecommand execution progress report - success, with source data consisting of a telecommand packet id field, a packet sequence control field, and a step number field, as defined in section 6.3.4 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.3-6
The data handling software shall support the telecommand verification service sub-type 6 telecommand execution progress report - failure, as defined in section 6.3.4 of [AD1]. All fields shall be supported
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.3-7
The data handling software shall support the telecommand verification service sub-type 7 telecommand execution completed report - success, with source data consisting of a telecommand packet id field and a packet sequence control field, as defined in section 6.3.5 of [AD1].
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.3-8
The data handling software shall support the telecommand verification service sub-type 8 telecommand execution completed report - failure, as defined in section 6.3.5 of [AD1]. All fields shall be supported
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.3-9
In order to facilitate error handling on ground, a globally unique set of error codes (code field in telecommand verification service sub-types 2, 4, 6, and 8) shall be applied to the entire on-board system. Error codes 0 to 15 shall be reserved for error codes defined in the standard (currently are error codes 0 to 5 reserved for service sub-type 2). Error codes 16 to 127 shall be used for mission specific error codes that are applicable for all application processes. Error codes from 128 and up shall be used for mission specific error codes that only are applicable for a single application process.
Applicability: OBOSS-III (new)
Verification: A, T

Req-4.1.3-10
Telecommand verification packets shall be routed to the source of the verified telecommand.
Applicability: OBOSS-II (unchanged)
Verification: A, T

4.1.4 Device Command Distribution

Req-4.1.4-1
The data handling software shall support the device command distribution service sub-type 1 distribute on-off commands, as defined in section 7.3.1 of [AD1]. All fields shall be supported. Notice that address field type is enumerated.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.4-2
The data handling software shall support the device command distribution service sub-type 2 distribute register load commands, as defined in section 7.3.2 of [AD1]. All fields shall be supported. The possible data types for parameters in the register data field may be limited to unsigned integers (Parameter Type Code (PTC) = 3 in [AD1]). Notice that register address field type is enumerated.
Applicability: OBOSS-II (changed)
Verification: T

4.1.5 Housekeeping and Diagnostic Data Reporting

Req-4.1.5-1
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 1 define new housekeeping parameter report, as defined in section 8.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-2
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 2 define new diagnostic parameter report, as defined in section 8.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-3
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 3 clear housekeeping parameter report definitions, as defined in section 8.3.2 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-4
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 4 clear diagnostic parameter report definitions, as defined in section 8.3.2 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-5

The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 5 enable housekeeping parameter report generation, as defined in section 8.3.3 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-6
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 6 disable housekeeping parameter report generation, as defined in section 8.3.3 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-7
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 7 enable diagnostic parameter report generation, as defined in section 8.3.3 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-8
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 8 disable diagnostic parameter report generation, as defined in section 8.3.3 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-9
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 9 report housekeeping parameter report definitions, as defined in section 8.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-10
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 10 housekeeping parameter report definitions report, as defined in section 8.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-11
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 11 report diagnostic parameter report definitions, as defined in section 8.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)

Verification: T

Req-4.1.5-12
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 12 diagnostic parameter report definitions report, as defined in section 8.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-13
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 17 select periodic housekeeping parameter report generation mode, as defined in section 8.3.6 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-14
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 18 select periodic diagnostic parameter report generation mode, as defined in section 8.3.6 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.5-15
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 19 select filtered housekeeping parameter report generation mode, as defined in section 8.3.6 of [AD1]. All fields shall be supported including threshold type and threshold value.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.5-16
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 20 select filtered diagnostic parameter report generation mode, as defined in section 8.3.6 of [AD1]. All fields shall be supported including threshold type and threshold value.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.5-17
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 21 report unfiltered housekeeping parameters, as defined in section 8.3.7 of [AD1]. The unfiltered housekeeping parameters are those that are included in the select filtered housekeeping parameter report generation mode service request.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.5-18

The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 22 report unfiltered diagnostic parameters, as defined in section 8.3.7 of [AD1]. The unfiltered diagnostic parameters are those that are included in the select filtered diagnostic parameter report generation mode service request.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.5-19
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 23 unfiltered housekeeping parameters report, as defined in section 8.3.7 of [AD1]. The unfiltered housekeeping parameters are those that are included in the select filtered housekeeping parameter report generation mode service request. All fields shall be supported including threshold type and threshold value.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.5-20
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 24 unfiltered diagnostic parameters report, as defined in section 8.3.7 of [AD1]. The unfiltered diagnostic parameters are those that are included in the select filtered diagnostic parameter report generation mode service request. All fields shall be supported including threshold type and threshold value.
Applicability: OBOSS_III (new)
Verification: T

Req-4.1.5-21
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 25 housekeeping parameter report, as defined in section 8.3.8 of [AD1]. All fields shall be supported including the mode field.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.5-22
The data handling software shall support the housekeeping and diagnostic data reporting service sub-type 26 diagnostic parameter report, as defined in section 8.3.8 of [AD1]. All fields shall be supported including the mode field.
Applicability: OBOSS-II (changed)
Verification: T

4.1.6 Event Reporting

Req-4.1.6-1
The data handling software shall support the event reporting service sub-type 1 normal/progress report, as defined in section 10.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.6-2
The data handling software shall support the event reporting service sub-type 2 error/anomaly report - low severity, as defined in section 10.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.6-3
The data handling software shall support the event reporting service sub-type 3 error/anomaly report - medium severity, as defined in section 10.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.6-4
The data handling software shall support the event reporting service sub-type 4 error/anomaly report - high severity, as defined in section 10.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.6-5
A globally unique set of report ID's shall be applied to the entire on-board system. Report ID's from 0 to 127 shall be used for mission specific Report ID's that are applicable for all application processes. Report ID's from 128 and up shall be used for mission specific report ID's that only are applicable for a single application process.
Applicability: OBOSS-III (new)
Verification: A, T

4.1.7 Memory Management

Req-4.1.7-1
The data handling software shall support the memory management service sub-type 2 load memory using absolute addresses, as defined in section 11.3.2 of [AD1]. All fields shall be supported except checksum at data level. It can be assumed that SMALLEST_ADDRESSABLE_UNIT (SAU) always is 1 octet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.7-2
The data handling software shall support the memory management service sub-type 5 dump memory using absolute addresses, as defined in section 11.3.4 of [AD1]. All fields shall be supported. It can be assumed that SAU always is 1 octet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.7-3

The data handling software shall support the memory management service sub-type 6 memory dump using absolute addresses report, as defined in section 11.3.4 of [AD1]. All fields shall be supported except checksum at data level. It can be assumed that SAU always is 1 octet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.7-4
The data handling software shall support the memory management service sub-type 9 check memory using absolute addresses, as defined in section 11.3.6 of [AD1]. All fields shall be supported. It can be assumed that SAU always is 1 octet.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.7-5
The data handling software shall support the memory management service sub-type 10 memory check using absolute addresses report, as defined in section 11.3.6 of [AD1]. All fields shall be supported. It can be assumed that SAU always is 1 octet.
Applicability: OBOSS-II (unchanged)
Verification: T

4.1.8 Function Management

Req-4.1.8-1
The data handling software shall support the function management service sub-type 1 perform function, as defined in section 12.3.2 of [AD1]. All fields shall be supported. It can be assumed that the N-field always is present. Service sub-type 1 replaces the three service sub-types defined for the function management service in previous versions of the standard.
Applicability: OBOSS-III (new)
Verification: T

4.1.9 On-board Operations Scheduling

Req-4.1.9-1
The data handling software shall support the on-board operations scheduling service sub-type 1 enable release of telecommands, as defined in section 14.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.9-2
The data handling software shall support the on-board operations scheduling service sub-type 2 disable release of telecommands, as defined in section 14.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.9-3

The data handling software shall support the on-board operations scheduling service sub-type 3 reset command schedule, as defined in section 14.3.1 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.9-4
The data handling software shall support the on-board operations scheduling service sub-type 4 insert telecommands in command schedule, as defined in section 14.3.2 of [AD1], with the exception of the interlocking functionality. All fields shall be supported except interlock set ID, interlock assessed ID, assessment type, and execution timeout. Notice that the parameter type for the telecommand packet field now is "Any TC".
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-5
The data handling software shall support the on-board operations scheduling service sub-type 5 delete telecommands, as defined in section 14.3.3 of [AD1]. All fields shall be supported. Notice that the sequence count field parameter type is unsigned integer.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-6
The data handling software shall support the on-board operations scheduling service sub-type 9 report subset of command schedule in detailed form, as defined in section 14.3.5 of [AD1]. All fields shall be supported. Notice that the sequence count field parameter type is unsigned integer.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-7
The data handling software shall support the on-board operations scheduling service sub-type 10 detailed schedule report, as defined in section 14.3.5 of [AD1], with the exception of the interlocking functionality. All fields shall be supported except interlock set ID, interlock assessed ID, assessment type, and execution timeout. Notice that the parameter type for the telecommand packet field now is "Any TC".
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-8
The data handling software shall support the on-board operations scheduling service sub-type 11 report subset of command schedule in detailed form over time period, as defined in section 14.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.9-9

The data handling software shall support the on-board operations scheduling service sub-type 12 report subset of command schedule in summary form, as defined in section 14.3.5 of [AD1]. All fields shall be supported. Notice that the sequence count field parameter type is unsigned integer.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-10
The data handling software shall support the on-board operations scheduling service sub-type 13 summary schedule report, as defined in section 14.3.5 of [AD1]. All fields shall be supported. Notice that the sequence count field parameter type is unsigned integer.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.9-11
The data handling software shall support the on-board operations scheduling service sub-type 14 report subset of command schedule in summary form over time period, as defined in section 14.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.9-12
The data handling software shall support the on-board operations scheduling service sub-type 16 report command schedule in detailed form, as defined in section 14.3.5 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.9-13
The data handling software shall support the on-board operations scheduling service sub-type 17 report command schedule in summary form, as defined in section 14.3.5 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

4.1.10 On-board Monitoring

Req-4.1.10-1
The data handling software shall support the on-board monitoring service sub-type 1 enable monitoring of parameters, as defined in section 15.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-2
The data handling software shall support the on-board monitoring service sub-type 2 disable monitoring of parameters, as defined in section 15.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-3
The data handling software shall support the on-board monitoring service sub-type 4 clear monitoring list, as defined in section 15.3.3 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-4
The data handling software shall support the on-board monitoring service sub-type 5 add parameters monitoring list, as defined in section 15.3.4 of [AD1], with the exception of the delta check functionality. All fields shall be supported except delta #rep and NOD. The parameters to be specified for each check includes a report ID value, defining an event report to be generated in case of a monitoring violation.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.10-5
The data handling software shall support the on-board monitoring service sub-type 6 delete parameters from monitoring list, as defined in section 15.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-6
The data handling software shall support the on-board monitoring service sub-type 7 modify parameter checking information, as defined in section 15.3.6 of [AD1], with the exception of the delta check functionality. All fields shall be supported except NOD. The parameters to be specified for each modified check includes a report ID value, defining an event report to be generated in case of a monitoring violation.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.10-7
The data handling software shall support the on-board monitoring service sub-type 8 report current monitoring list, as defined in section 15.3.7 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-8
The data handling software shall support the on-board monitoring service sub-type 9 current monitoring list report, as defined in section 15.3.7 of [AD1], with the exception of the delta check functionality. All fields shall be supported except delta #rep and NOD. The parameters to be reported for each check includes a report ID value, defining an event report to be generated in case of a monitoring violation.
Applicability: OBOSS-II (changed)
Verification: T

Req-4.1.10-9
The data handling software shall support the on-board monitoring service sub-type 10 report current parameters out-of-limit list, as defined in section 15.3.8 of [AD1].

Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-10
The data handling software shall support the on-board monitoring service sub-type 11 current parameters out-of-limit list report, as defined in section 15.3.8 of [AD1], with the exception of the delta check functionality. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.10-11
The data handling software shall support the on-board monitoring service sub-type 12 check transition report, as defined in section 15.3.9 of [AD1], with the exception of the delta check functionality. All fields shall be supported including transition time.
Applicability: OBOSS-II (unchanged)
Verification: T

4.1.11 Large Data Transfer

Req-4.1.11-1
The data handling software shall support the large data transfer service sub-type 1 first downlink part report, as defined in section 16.3.2 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-2
The data handling software shall support the large data transfer service sub-type 2 intermediate downlink part report, as defined in section 16.3.3 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-3
The data handling software shall support the large data transfer service sub-type 3 last downlink part report, as defined in section 16.3.4 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-4
The data handling software shall support the large data transfer service sub-type 4 downlink abort report, as defined in section 16.3.6 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-5
The data handling software shall support the large data transfer service sub-type 5 downlink reception acknowledgement, as defined in section 16.3.7 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-6
The data handling software shall support the large data transfer service sub-type 6 repeat parts, as defined in section 16.3.8 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time. Sliding-window functionality is not required.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-7
The data handling software shall support the large data transfer service sub-type 7 repeated part report, as defined in section 16.3.5 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time. Sliding-window functionality is not required.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-8
The data handling software shall support the large data transfer service sub-type 8 abort downlink, as defined in section 16.3.9 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer downlink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-9
The data handling software shall support the large data transfer service sub-type 9 accept first uplink part, as defined in section 16.3.2 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-10
The data handling software shall support the large data transfer service sub-type 10 accept intermediate uplink part, as defined in section 16.3.3 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-11

The data handling software shall support the large data transfer service sub-type 11 accept last uplink part, as defined in section 16.3.4 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-12
The data handling software shall support the large data transfer service sub-type 12 accept repeated part, as defined in section 16.3.5 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time. Sliding-window functionality is not required.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-13
The data handling software shall support the large data transfer service sub-type 13 abort reception of uplinked data, as defined in section 16.3.6 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-14
The data handling software shall support the large data transfer service sub-type 14 uplink reception acknowledgement report, as defined in section 16.3.7 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-15
The data handling software shall support the large data transfer service sub-type 15 unsuccessfully received parts report, as defined in section 16.3.8 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time. Sliding-window functionality is not required.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-16
The data handling software shall support the large data transfer service sub-type 16 reception abort report, as defined in section 16.3.9 of [AD1]. All fields shall be supported except the large data unit ID. Large data transfer uplink shall be limited to one data unit at a time.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.11-17
A globally unique set of mission specific transmission abort reason codes shall be applied to the entire on-board and ground system.

Applicability: OBOSS-III (new)
Verification: A, T

4.1.12 On-board Storage and Retrieval

Req-4.1.12-1
The data handling software shall support the on-board storage and retrieval service sub-type 1 enable storage in packet stores, as defined in section 18.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-2
The data handling software shall support the on-board storage and retrieval service sub-type 2 disable storage in packet stores, as defined in section 18.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-3
The data handling software shall support the on-board storage and retrieval service sub-type 3 add packets to storage selection definition, as defined in section 18.3.2 of [AD1], with the limitation that the packet selection sub-service shall be provided by the originating application process (i.e. no N1 and application ID field). All other fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-4
The data handling software shall support the on-board storage and retrieval service sub-type 4 remove packets from storage selection definition, as defined in section 18.3.2 of [AD1], with the limitation that the packet selection sub-service shall be provided by the originating application process (i.e. no N1 and application ID field). All other fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-5
The data handling software shall support the on-board storage and retrieval service sub-type 5 report storage selection definition, as defined in section 18.3.3 of [AD1]. The store ID field shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-6
The data handling software shall support the on-board storage and retrieval service sub-type 6 storage selection definition report, as defined in section 18.3.3 of [AD1], with the limitation that the packet selection sub-service shall be provided by the originating application process (i.e. no N1 and application ID field). All other fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-7
The data handling software shall support the on-board storage and retrieval service sub-type 7 downlink packet store contents for packet range, as defined in section 18.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-8
The data handling software shall support the on-board storage and retrieval service sub-type 8 packet store contents report, as defined in section 18.3.4 of [AD1].
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12.9
The data handling software shall support the on-board storage and retrieval service sub-type 9 downlink packet store contents for time period, as defined in section 18.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-10
The data handling software shall support the on-board storage and retrieval service sub-type 10 delete packet stores contents up to specified packets, as defined in section 18.3.6 of [AD1]. All fields shall be supported. If the field deletion set is zero, the entire packet store is deleted regardless of whether it has been downlinked or not.
Applicability: OBOSS-II (unchanged)
Verification: T

Req-4.1.12-11
The data handling software shall support the on-board storage and retrieval service sub-type 11 delete packet stores contents up to specified storage time, as defined in section 18.3.7 of [AD1]. All fields shall be supported.
Applicability: OBOSS-II (unchanged)
Verification: T

4.1.13 Event-Action

Req-4.1.13-1
The data handling software shall support the event-action service sub-type 1 adding events to the detection list, as defined in section 21.3.1 of [AD1]. All fields shall be supported.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-2

The data handling software shall support the event-action service sub-type 2 deleting events from the detection list, as defined in section 21.3.2 of [AD1]. All fields shall be supported.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-3
The data handling software shall support the event-action service sub-type 3 clear the event detection list, as defined in section 21.3.3 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-4
The data handling software shall support the event-action service sub-type 4 enable actions, as defined in section 21.3.4 of [AD1]. All fields shall be supported.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-5
The data handling software shall support the event-action service sub-type 5 disable actions, as defined in section 21.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-6
The data handling software shall support the event-action service sub-type 6 report the event detection list, as defined in section 21.3.5 of [AD1].
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-7
The data handling software shall support the event-action service sub-type 7 event detection list report, as defined in section 21.3.5 of [AD1]. All fields shall be supported.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.13-8
A copy of all event reports (event reporting service sub-types 1, 2, 3, and 4) generated by any application process, shall be sent to the event-action service.
Applicability: OBOSS-III (new)
Verification: A, T

4.1.14 FDIR

Req-4.1.14-1
Task exceptions shall, if possible, be reported to ground using the event reporting service.
Applicability: OBOSS-III (new)

Verification: T

Req-4.1.14-2
Reception of packets that can not be converted into well-formed telecommands or telemetry shall be reported to ground using the event reporting service.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.14-3
If N-item telecommands are received that contains both valid and invalid items (for example known and unknown parameter# values), the valid items shall be handled as requested. The presence of the invalid items shall be reported to ground using either the telecommand verification service or the event reporting service.
Applicability: OBOSS-III (new)
Verification: A, T

Req-4.1.14-4
Attempts by telecommands to add items to lists that are already full (for example scheduler, monitoring list, or event-detection list), shall be reported to ground using either the telecommand verification service or the event reporting service.
Applicability: OBOSS-III (new)
Verification: T

Req-4.1.14-5
The event-action service shall report the reception of any telemetry that is not a service type 5 report, using the event reporting service.
Applicability: OBOSS-III (new)
Verification: T

4.2 Performance Requirements

Performance depends on the specific instantiation of the OBOSS-III data handling software. A definition of an OBOSS-III instantiation is therefore required, in order to detailed specify the performance requirements. The performance requirements included here assumes a typical data handling system instantiation running on a 25 MHz ERC32 platform.

All performance requirements will be verified by test, to the extent allowed by the simulated ERC32 environment.

Req-4.2.0-1
The OBOSS-III software shall be able to receive, accept, and start execution of 14 telecommands per second on the uplink data stream. (Typical minimum telecommand size is 13 bytes. With standard ESA Telecommand uplink protocols a 13 bytes telecommand requires 35 bytes on the uplink channel. 14 telecommands per second corresponds therefore to an uplink bandwidth of approximately 4000 bits/s.)
Applicability: OBOSS-III (new)

Verification: T

Req-4.2.0-2
The OBOSS-III software shall be able to accept and start execution of 50 telecommmands per second, including telecommands arriving on the uplink channel, telecommands released from the on-board scheduler, and telecommands generated by other services (event-action etc.).
Applicability: OBOSS-III (new)
Verification: T

Req-4.2.0-3
The OBOSS-III software shall be able to generate at least 4000 bits/s of telemetry on the downlink data stream.
Applicability: OBOSS-III (new)
Verification: T

Req-4.2.0-4
The release time accuracy for commands residing in the on-board scheduler shall be at least 100 ms with regard to the on-board clock.
Applicability: OBOSS-III (new)
Verification: T

4.3 External Interface Requirements

Req-4.3.0-1
The structure and layout of external telecommand and telemetry packets shall be as prescribed in [AD1].
Applicability: OBOSS-II (changed)
Verification: T

4.4 Operational Requirements

Req-4.4.0-1
Incoming telecommands shall arrive at a rate of no more than 14 TC's per second.
Applicability: OBOSS-II (changed)
Verification: A

Req-4.4.0-3
To prevent excessive bursts of TC's, it is not allowed to place more than 10 telecommands with the same release time on the on-board schedule.
Applicability: OBOSS-III (new)
Verification: A

Req-4.4.0-4
In order to guarantee that telecommmands are accepted and execution started immediately after release from the schedule, not more than 20 telecommands should have release times within the same second.

Applicability: OBOSS-III (new)
Verification: A

4.5 Resource Requirements

4.5.1 Hardware

None.

4.5.2 Software

Req-4.5.2-1
The data handling software shall be developed in Ada-95 [AD2] with the restrictions introduced by the Ravenscar profile [AD3].
Applicability: OBOSS-III (new)
Verification: A

Req-4.5.2-2
The GNAT/ORK Ada cross compiler for ERC32 shall be used.
Applicability: OBOSS-III (new)
Verification: A

Req-4.5.2-3
An typical instantiation of the OBOSS-III software with four application processes, shall be able to run on an 25 MHz ERC32 processor, performing all required operations and fulfilling all specified deadlines.
Applicability: OBOSS-III (new)
Verification: A, T

Req-4.5.2-4
Such a typical instantiation shall occupy no more than 75% of the available 25 MHz ERC32 processor resources.
Applicability:
Verification: A, T

4.6 Verification Requirements

Req-4.6.0-1
The verification of the data handling software shall be performed using a test set-up based on the reference SVF tools [RD1].
Applicability: OBOSS-III (new)
Verification: A

4.7 Acceptance Testing Requirements

Req-4.7.0-1

The acceptance testing shall be based on a demonstrator test case. The demonstrator test case is still to be defined.
Applicability: OBOSS-III (new)
Verification: A

4.8 Documentation Requirements

Req-4.8.0-1
The OBOSS-III updates shall be documented in an OBOSS-III Design Specification.
Applicability: OBOSS-III (new)
Verification: A

Req-4.8.0-2
The OBOSS Manual for Reuse shall be updated to reflect the OBOSS-III baseline.
Applicability: OBOSS-III (new)
Verification: A

Req-4.8.0-3
The OBOSS home page shall be updated with the OBOSS-III design additions and modifications.
Applicability: OBOSS-III (new)
Verification: A

Req-4.8.0-4
The data handling software development tests shall be documented in OBOSS-III unit and integration test plans and OBOSS-III unit and integration test reports.
Applicability: OBOSS-III (new)
Verification: A

Req-4.8.0-5
Validation of the data handling software shall be documented in an OBOSS-III Software Validation Testing Specification and an OBOSS-III Software Validation Testing Report.
Applicability: OBOSS-III (new)
Verification: A

4.9 Security Requirements

None.

4.10 Quality Requirements

None.

4.11 Reliability Requirements

None.

4.12 Maintainability Requirements

Req-4.12.0-1
The software shall be under configuration control during the development.
Applicability: OBOSS-III (new)
Verification: A

4.13 Reusability Requirements

Req-4.13.0-1
Parameterized design objects and implementation objects shall be used to the extent feasible.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-2
External interfaces shall be isolated in designated components.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-3
The software design shall where feasible be organised in a layered structure.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-4
Parts of a system that are likely to change shall be isolated in designated components.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-5
Machine dependent code shall be isolated from the rest of the code.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-6
Properties of types shall be obtained by using attributes.
Applicability: OBOSS-II (unchanged)
Verification: I

Req-4.13.0-7
It shall be possible to migrate the software to a new environment (i.e. the software shall be independent of any specific external library paths etc.).
Applicability: OBOSS-III (new)
Verification: I

4.14 Design and Programming Requirements

4.14.1 Design Standards

Req-4.14.1-1
The design shall be expressed in HRT-HOOD.
Applicability: OBOSS-II (unchanged)
Verification: R

Req-4.14.1-2
The priorities of tasks shall be unique.
Applicability: OBOSS-II (changed)
Verification: I

Req-4.14.1-3
The priority of a protected object shall be greater than or equal to the ceiling of its users, i.e. compliant with the priority ceiling protocol.
Applicability: OBOSS-II (changed)
Verification: I

Req-4.14.1-4
The priorities of protected objects shall, if feasible, be unique.
Applicability: OBOSS-II (changed)
Verification: I

4.14.2 Programming Standards

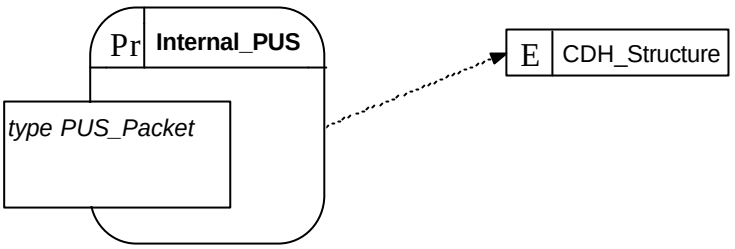
Req-4.14.2-1
The mapping of the HRT-HOOD design into Ada shall use a tasking structure that only implements cyclic, sporadic, and protected objects.
Applicability: OBOSS-II (unchanged)
Verification: I

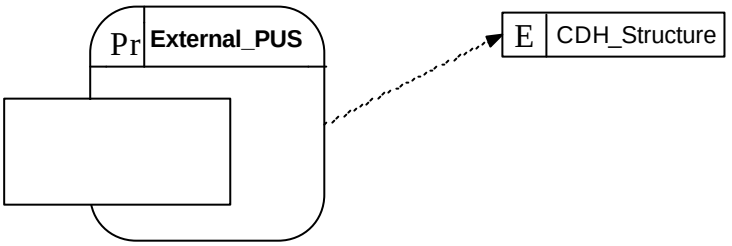
Req-4.14.2-2
HRT-HOOD protected objects shall, if feasible, be implemented using Ada-95 protected objects.
Applicability: OBOSS-II (changed)
Verification: I

Appendix A

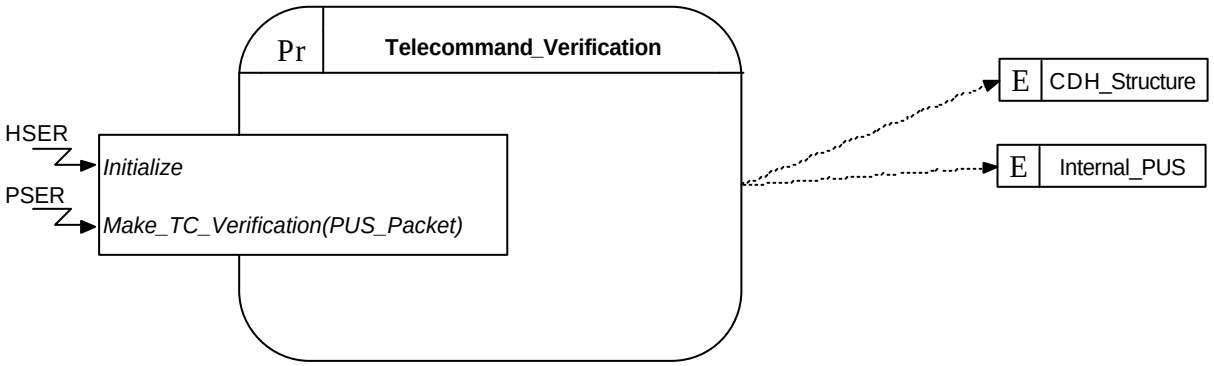
Logical Model and Top-Level Architectural Design

Project	OBOSS III
Drawing	HRT HOOD PUS
Version	R01-2
Author	JHL

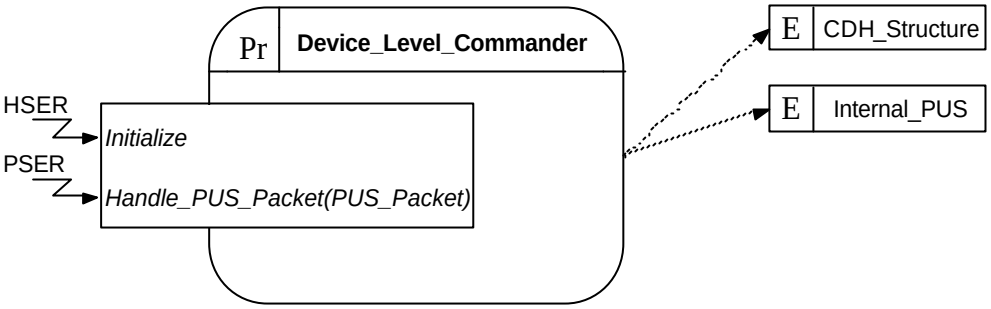




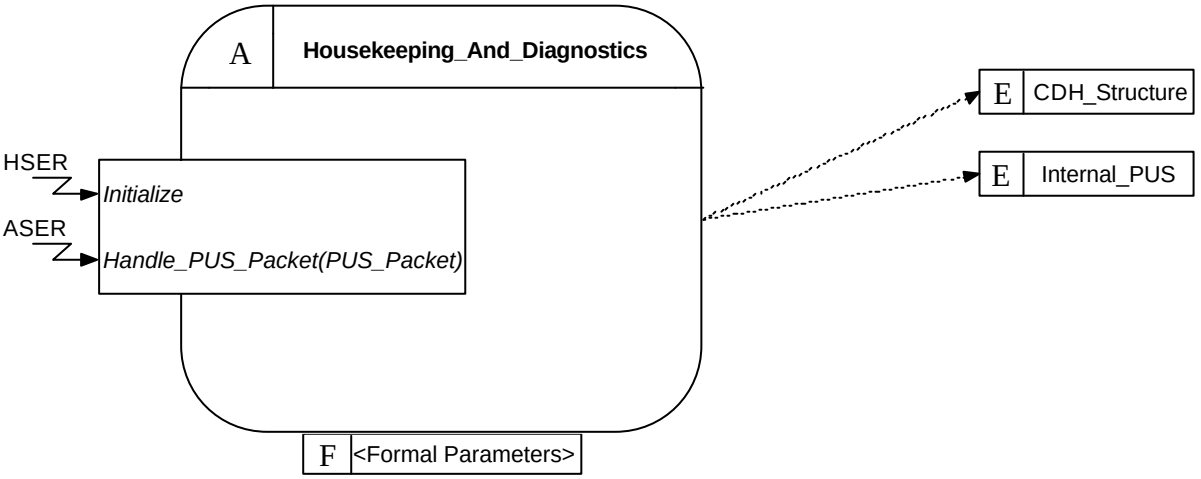
Project	OBOSS III
Drawing	HRT HOOD Telecommand Verification
Version	R01-2
Author	JHL



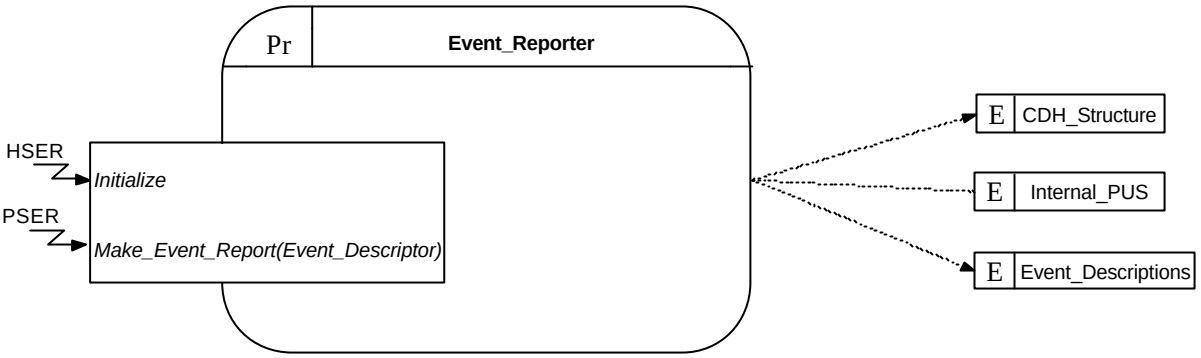
Project	OBOSS III
Drawing	HRT HOOD Device Level Commanding
Version	R01-2
Author	JHL



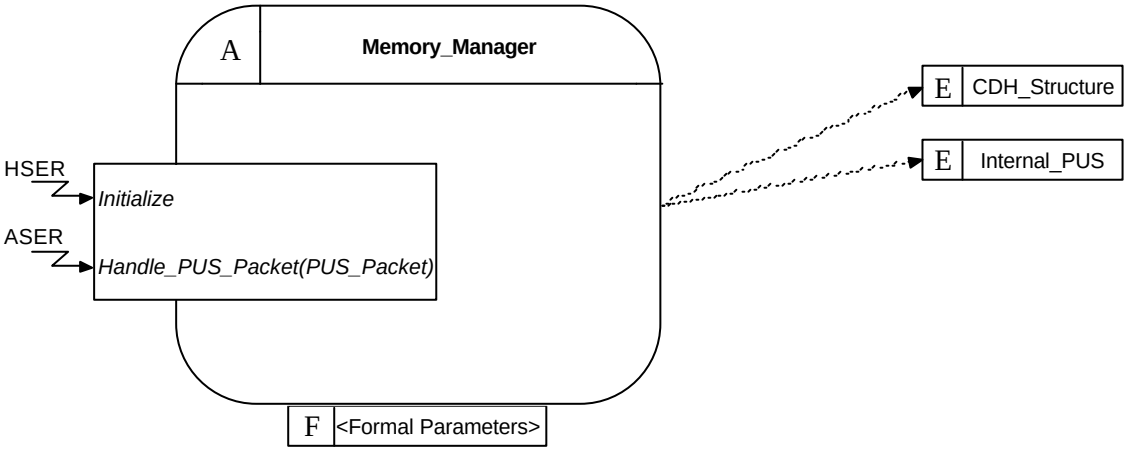
Project	OBOSS III
Drawing	HRT HOOD Housekeeping And Diagnostics Class
Version	R01-2
Author	JHL



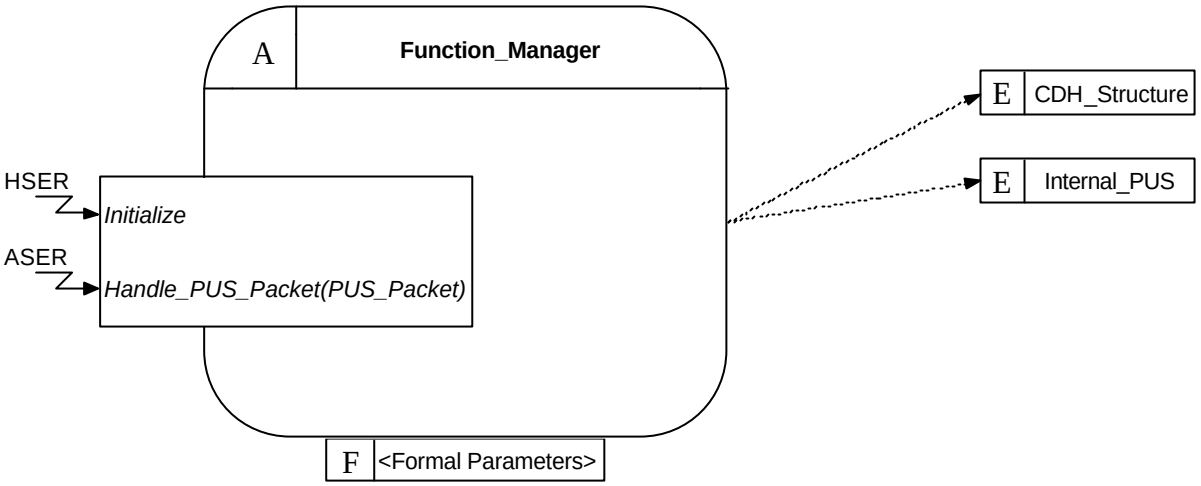
Project	OBOSS III
Drawing	HRT HOOD Event Reporting
Version	R01-2
Author	JHL



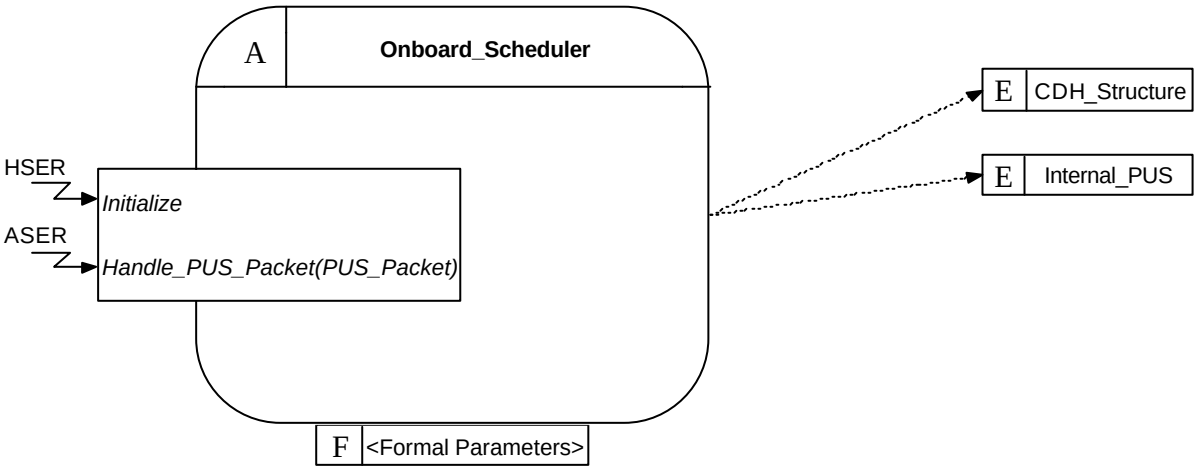
Project	OBOSS III
Drawing	HRT HOOD Memory Management Class
Version	R01-2
Author	JHL



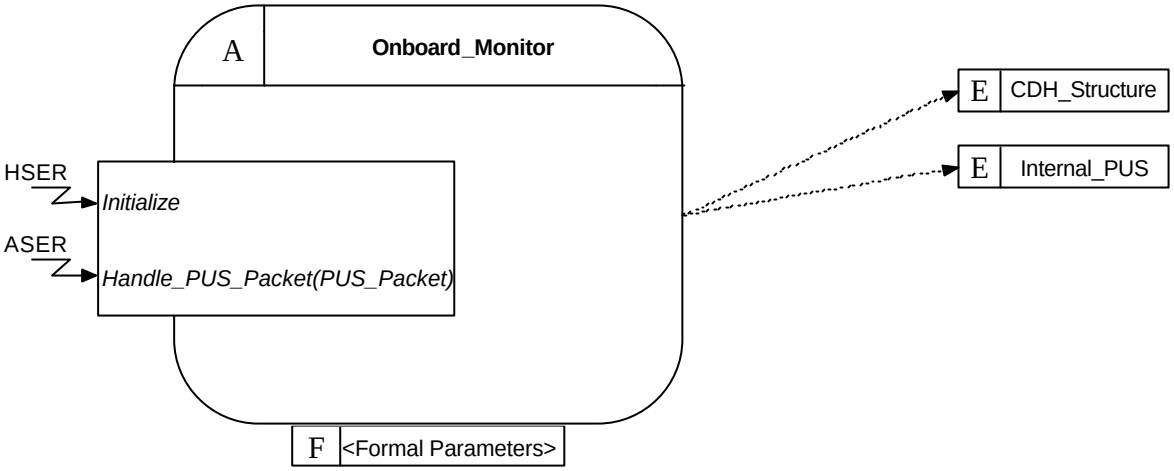
Project	OBOSS III
Drawing	HRT HOOD Function Management Class
Version	R01-2
Author	JHL



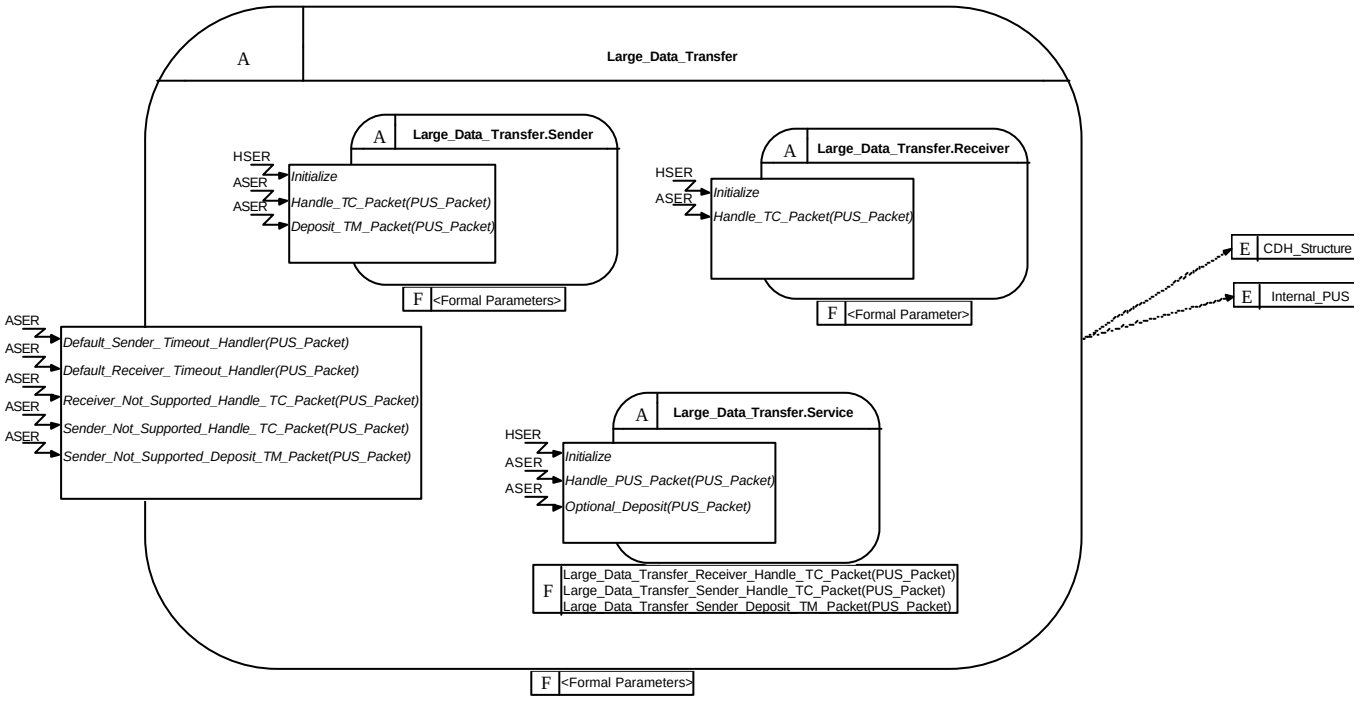
Project	OBOSS III
Drawing	HRT HOOD Onboard Scheduling Class
Version	R01-2
Author	JHL



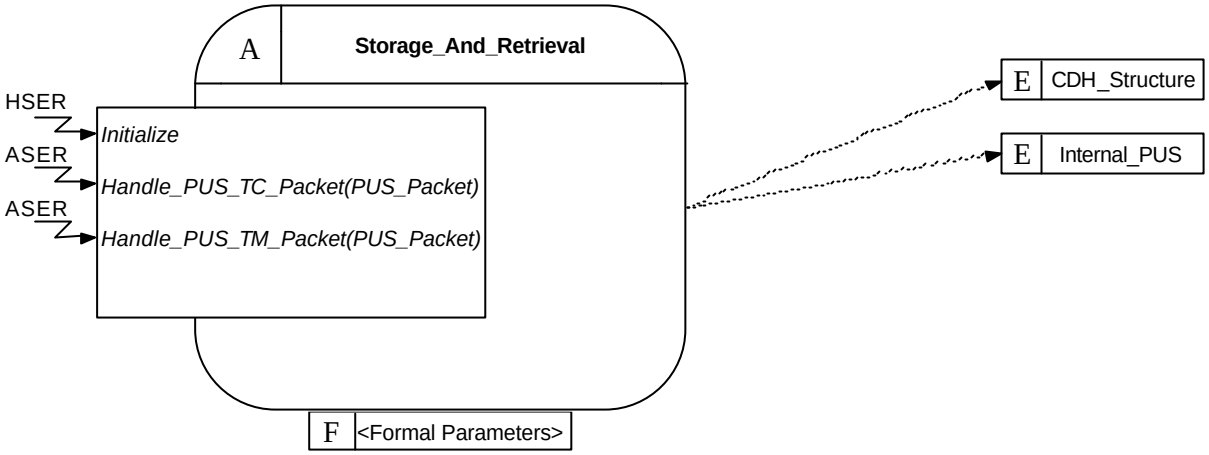
Project	OBOSS III
Drawing	HRT HOOD Onboard Monitoring Class
Version	R01-2
Author	JHL

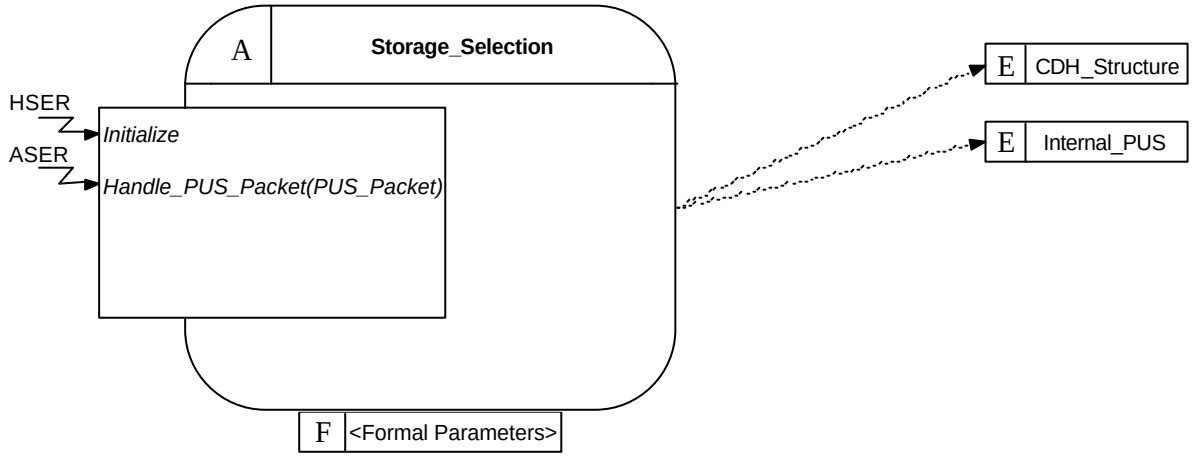


Project	OBOSS III
Drawing	HRT HOOD Large Data Transfer Class
Version	R01-2
Author	JHL

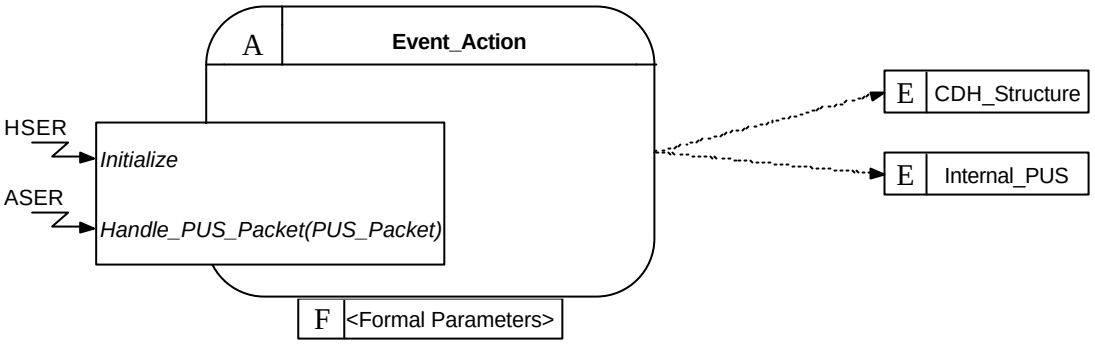


Project	OBOSS III
Drawing	HRT HOOD Onboard Storage And Retrieval Class
Version	R01-3
Author	JHL





Project	OBOSS III
Drawing	HRT HOOD Event Action Class
Version	R01-2
Author	JHL



Appendix B

Traceability Matrix

The traceability matrix in this appendix maps the software functional requirements in Section 4.1, to the logical model elements presented in Appendix A.

Requirement	Drawing	Object
Req-4.1.1-1	HRT HOOD PUS	External_PUS
Req-4.1.1-2	HRT HOOD PUS	External_PUS
Req-4.1.1-3	HRT HOOD PUS	External_PUS
Req-4.1.1-4	HRT HOOD PUS	External_PUS
Req-4.1.1-5	HRT HOOD PUS	External_PUS
Req-4.1.1-6	HRT HOOD PUS	External_PUS
Req-4.1.1-7	HRT HOOD PUS	External_PUS
Req-4.1.1-8	HRT HOOD PUS	External_PUS
Req-4.1.1-9	HRT HOOD PUS	External_PUS
Req-4.1.1-10	HRT HOOD PUS	External_PUS
Req-4.1.1-11	HRT HOOD PUS	External_PUS
Req-4.1.1-12	HRT HOOD PUS	External_PUS
Req-4.1.1-13	HRT HOOD PUS	External_PUS
Req-4.1.1-14	HRT HOOD PUS	External_PUS
Req-4.1.1-15	HRT HOOD PUS	External_PUS
Req-4.1.2-1	HRT HOOD PUS	External_PUS
Req-4.1.2-2	HRT HOOD PUS	External_PUS
Req-4.1.2-3	HRT HOOD PUS	External_PUS
Req-4.1.2-4	HRT HOOD PUS	External_PUS
Req-4.1.2-5	HRT HOOD PUS	External_PUS
Req-4.1.2-6	HRT HOOD PUS	External_PUS
Req-4.1.2-7	HRT HOOD PUS	External_PUS
Req-4.1.2-8	HRT HOOD PUS	External_PUS
Req-4.1.2-9	HRT HOOD PUS	External_PUS
Req-4.1.2-10	HRT HOOD PUS	External_PUS

Req-4.1.2-11	HRT HOOD PUS	External_PUS
Req-4.1.2-12	HRT HOOD PUS	External_PUS
Req-4.1.2-13	HRT HOOD PUS	External_PUS
Req-4.1.2-14	HRT HOOD PUS	External_PUS
Req-4.1.2-15	HRT HOOD PUS	External_PUS
Req-4.1.2-16	HRT HOOD PUS	External_PUS
Req-4.1.2-17	HRT HOOD PUS	External_PUS
Req-4.1.2-18	HRT HOOD PUS	External_PUS
Req-4.1.2-19	HRT HOOD PUS	External_PUS
Req-4.1.2-20	HRT HOOD PUS	External_PUS
Req-4.1.3-1	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-2	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-3	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-4	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-5	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-6	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-7	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-8	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-9	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.3-10	HRT HOOD Telecommand Verification	Telecommand_Verification
Req-4.1.4-1	HRT HOOD Device Level Commanding	Device_Level_Commander
Req-4.1.4-2	HRT HOOD Device Level Commanding	Device_Level_Commander
Req-4.1.5-1	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-2	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-3	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-4	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-5	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-6	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics

Req-4.1.5-7	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-8	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-9	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-10	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-11	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-12	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-13	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-14	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-15	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-16	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-17	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-18	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-19	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-20	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-21	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.5-22	HRT HOOD Housekeeping and Diagnostics Class	Housekeeping_And_Diagnostics
Req-4.1.6-1	HRT HOOD Event Reporting	Event_Reporter
Req-4.1.6-2	HRT HOOD Event Reporting	Event_Reporter
Req-4.1.6-3	HRT HOOD Event Reporting	Event_Reporter
Req-4.1.6-4	HRT HOOD Event Reporting	Event_Reporter
Req-4.1.6-5	HRT HOOD Event Reporting	Event_Reporter
Req-4.1.7-1	HRT HOOD Memory Management Class	Memory_Manager

Req-4.1.7-2	HRT HOOD Memory Management Class	Memory_Manager
Req-4.1.7-3	HRT HOOD Memory Management Class	Memory_Manager
Req-4.1.7-4	HRT HOOD Memory Management Class	Memory_Manager
Req-4.1.7-5	HRT HOOD Memory Management Class	Memory_Manager
Req-4.1.8-1	HRT HOOD Function Management Class	Function_Manager
Req-4.1.9-1	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-2	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-3	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-4	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-5	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-6	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-7	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-8	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-9	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-10	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-11	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-12	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.9-13	HRT HOOD Onboard Scheduling Class	Onboard_Scheduler
Req-4.1.10-1	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-2	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-3	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-4	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-5	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-6	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-7	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-8	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-9	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-10	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.10-11	HRT HOOD Onboard Monitoring Class	Onboard_Monitor
Req-4.1.11-1	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-2	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-3	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service

Req-4.1.11-4	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-5	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-6	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-7	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-8	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-9	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-10	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-11	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-12	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-13	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-14	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-15	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-16	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.11-17	HRT HOOD Large Data Transfer Class	Large_Data_Transfer.Service
Req-4.1.12-1	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-2	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-3	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-4	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-5	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-6	HRT HOOD Onboard Storage and Retrieval Class	Storage_Selection
Req-4.1.12-7	HRT HOOD Onboard Storage and Retrieval Class	Storage_And_Retrieval
Req-4.1.12-8	HRT HOOD Onboard Storage and Retrieval Class	Storage_And_Retrieval
Req-4.1.12-9	HRT HOOD Onboard Storage and Retrieval Class	Storage_And_Retrieval
Req-4.1.12-10	HRT HOOD Onboard Storage and Retrieval Class	Storage_And_Retrieval
Req-4.1.12-11	HRT HOOD Onboard Storage and Retrieval Class	Storage_And_Retrieval

Req-4.1.13-1	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-2	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-3	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-4	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-5	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-6	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-7	HRT HOOD Event Action Class	Event_Action
Req-4.1.13-8	HRT HOOD Event Action Class	Event_Action
Req-4.1.14-1	All	All
Req-4.1.14-2	HRT HOOD PUS	External_PUS
Req-4.1.14-3	All	All
Req-4.1.14-4	All	All
Req-4.1.14-5	HRT HOOD Event Action Class	Event_Action