software

26 June, 2000

v0.1

HUT

Contents

Chapter 1. hardware

1.1. System Overview

1.1.1. System Use Cases

Figure 1.1. Overall System Use Case diagram.

1.1.1.1. Use Case: System initialisation and start-up

Actors	User, Archiver and Control Computer (ACC), HUT-IR, Positioning System (PS)
Preconditions	devices not powered but otherwise connected as in operation
Description	Power-on on all devices/computers. Devices initialize and connect together via network. User initializes archiving (directories set-up, file names given). User starts the archiving process.
Exception	computers do not connect on network
Activities	?
Postcondition	system successfully started, HUT_IR, PS and ACC initialized. HUT-IR and PS sending the data. ACC archiving it.

1.1.1.2. Use Case: Shut-down

Actors	User, Archiver and Control Computer (ACC), HUT-IR, Positioning System (PS)
Preconditions	devices/computers in normal operating conditions
Description	?? <– Josse - **just turn it down**
Exception	??
Activities	?
Postcondition	measuring and archiving stoped, all data saved, devices/computers powered down

1.1.1.3. Use Case: Start calibration

Actors	User, Archiver and Control Computer (ACC), HUT-IR
Preconditions	devices/computers in normal operating conditions
Description	User gives command to start calibration phase. HUT-IR deconnects antennas from receivers and starts the calibration. HUT-IR automatically returns to measurements phase after the calibration is ready. User interface on ACC continuosly indicates to the operator in which operation mode (calibration or measurement) HUT-IR is in.
Exception	calibration 'long time' does not end e.g. HUT-IR does not return back to measurement phase, network connection, some error indicated in HUT-IR
Activities	calibration
Postcondition	HUT-IR performing calibration

Chapter 2. software

data size estimation, data definitions…

2.1. Requirements specification - Use Cases

bla bla …

2.1.1. Use Cases

Figure 2.1. Use Case diagram.

2.1.1.1. Use Case: Initialisation and start-up

Actors	Power (or User ??? <–Josse), System
Preconditions	device not powered but otherwise connected as in operation (on-board the plane, ethernet card connected to the network, etc…)
Description	After system power turned on the HUT-IR CPU initialises (init HW, load operating system (interrupts enabled), launch HUT-IR sw). After HUT-IR sw is launched it connects to main on-board computer and gets settings from there. Then it initialises the correlators, the serial bus, timers. By enabling IRQ's it starts the normal data collecting operation.
Exception	cannot establish connection to the main computer or connection established but no setting data available, error initialising the HUT-IR HW
Activities	?
Postcondition	system successfully started up, HUT_IR HW intialised and data collecting operation has begun

2.1.1.2. Use Case: Shut-down

Actors	Power (or User ??? <–Josse), System
Preconditions	device in normal operating conditions
Description	Requires no special reaction. Device can simply be turned off (?????!!! <– Tuomo)
Exception	power turned off
Activities	-
Postcondition	device powered down

2.1.1.3. Use Case: Set/Get setting

Actors	User, System, HUT-IR HW
Preconditions	device in normal operating conditions
Description	User wants to set/change or read a setting. User issues command via the main on-board computer thru network. Command arrives, then decide which HW part (serial bus, correlators, timers or ??) it concerns. Set/Get the setting into/from that HW-unit.
Exception	error on serial bus (when 'Get'), undefined setting
Activities	?
Postcondition	setting changed or read, normal operation continued

2.1.1.4. Use Case: Next GPS' Pulse-Per-Second

Actors	GPS-PPS, System, HW-clock
Preconditions	device in normal operating conditions
Description	Next second mark from GPS arrived. Update the Timekeeping (concretely how?? <– Josse). If integer periods of integration time elapsed, synchronise the Integration Timer (set to zero).
Exception	synchronising the Integration Timer causes glitch[1], PPS does not arrive (<– is this possible at all??)
Activities	-
Postcondition	time updated, Intergration Timer synchronised, normal operation continued

2.1.1.5. Use Case: Next Integration Time elapsed

Actors	Integration Timer, System, Serial Bus
Preconditions	device in normal operating conditions
Description	Period of Integration Time elapsed. Set Settings for next integration on serial bus (temperature sampling positions, switches in receivers etc…) and read other data (temperatures, PMS, Serial Bus's status) from Serial Bus. Read all correlator values add them to data obtained from Serial Bus add the timestamp and send all data package to the main on-board computer (Archiver).
Exception	error on serial bus (status bits), timestamp not available,
Activities	?
Postcondition	all necessary data for archiving successfully acquired from the HW, data forwarded to the main on-board computer (Archiver), settings for next integration time activated in HW, normal operation continued (e.g. next integration period started)

2.1.1.6. Use Case: Send/Receive on Serial Bus

[1]*glitch:* T_i was shorter then should be, hence it started new integration period but shortly after that it was reset by PPS

Actors	Serial Bus, System
Preconditions	device in normal operating conditions
Description	Send/Receive data on serial bus
Exception	error on serial bus (status bits), error while transmitting (<– possible at all?? Tuomo)
Activities	?
Postcondition	setting data activated in the HW and data successfuly read from HW, serial bus status continued OK, normal operation of the device continued

2.1.1.7. Use Case: Main on-board CPU connecting to HUT-IR

Actors	Main on-board Computer, System
Preconditions	no connection between the HUT-IR and the main computer
Description	Establish connection request received by HUT-IR. Accept connection. (<— or check something ? Josse)
Exception	some other computer connecting, not the Archiver (<– does this make sence? Josse)
Activities	?
Postcondition	the two computers connected, normal operation going on

2.1.1.8. Use Case: Main on-board CPU receiving data from HUT-IR

Actors	Main on-board Computer, System
Preconditions	connection between the HUT-IR and the main computer establish, normal operation
Description	HUT-IR is sending the data package upon each integration time
Exception	connection breaks, HW error
Activities	?
Postcondition	the data package successfully forwarded to the main computer for archiving

2.1.1.9. Use Case: Synchronize the timekeeping (??? this UC needed ??)

Actors	Main on-board Computer, System, HW-clock
Preconditions	normal operation
Description	Time of Main on-board Computer and HUT-IR's HW-clock should be synchronized up to second precision.
Exception	connection breaks, HW error
Activities	UC 2.1.1.5
Postcondition	the two computer's timekeeping synchronised

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