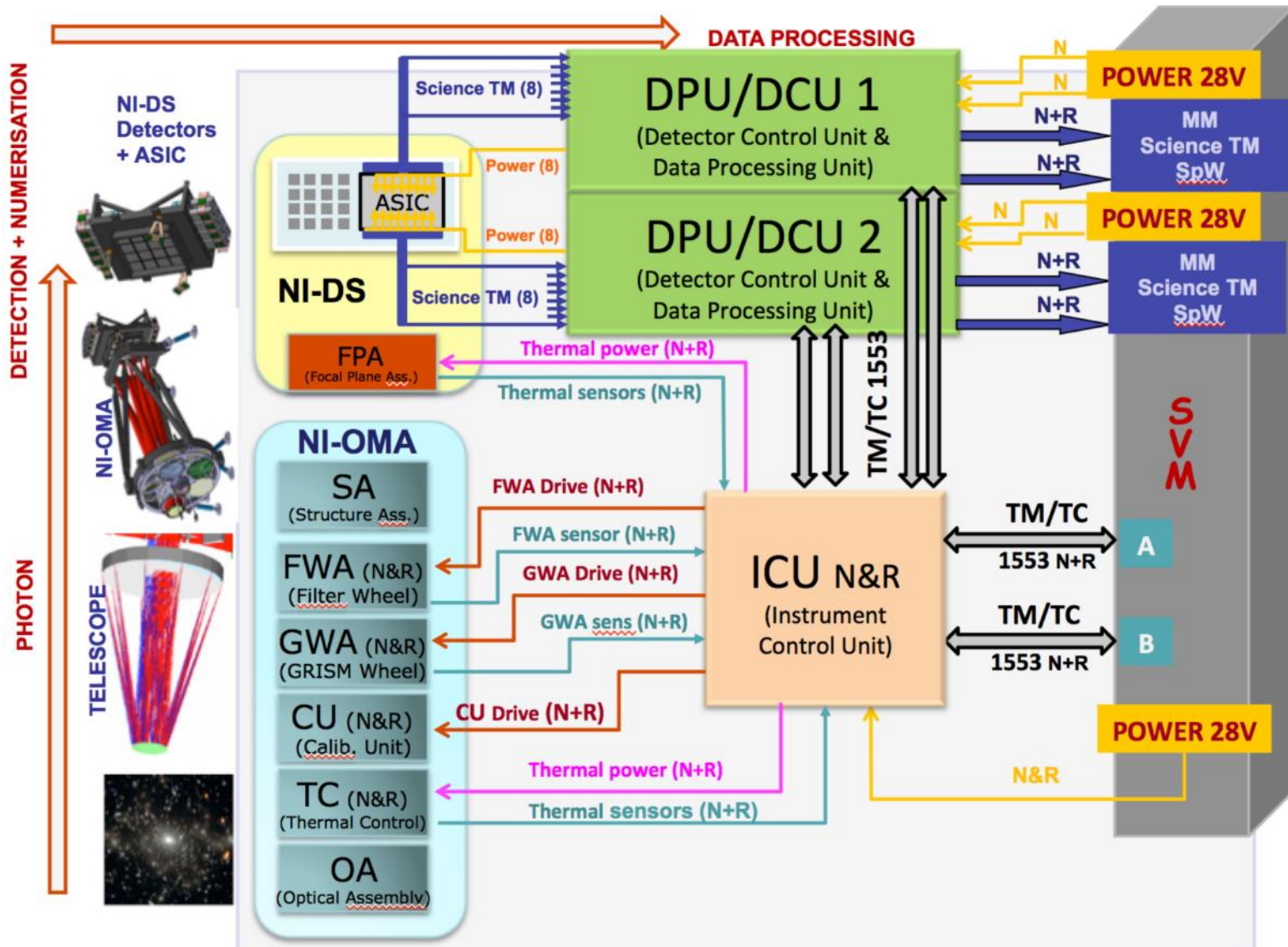


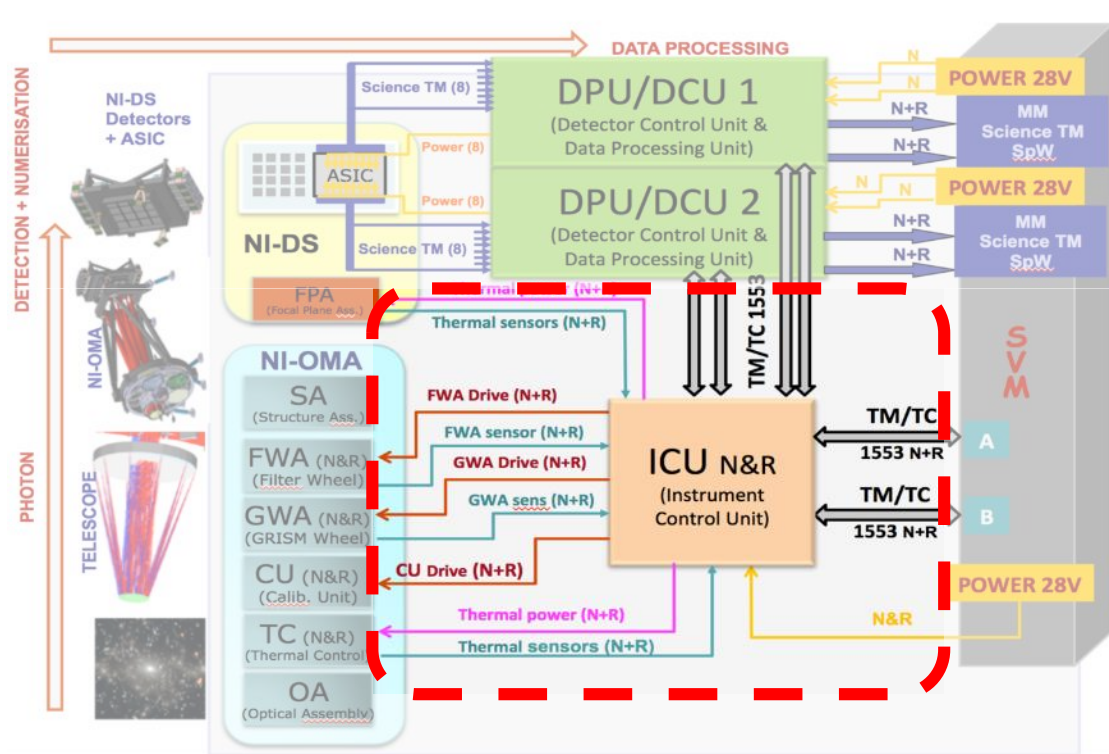
Attività Bologna-OATo

G. Sirri per INFN Bologna

Functional architecture of NISP Instrument



Instrument Control Unit (ICU)



NISP Instrument Control Unit (ICU)

- Telecomandi (TC)
- Telemetrie (TM)

Per

- Data Processing Unit (DPU)
- Filtri (FWA)
- Prismi (GWA)
- Unità di calibrazione (CU)
- Sensori/Riscaldatori (OMADA)

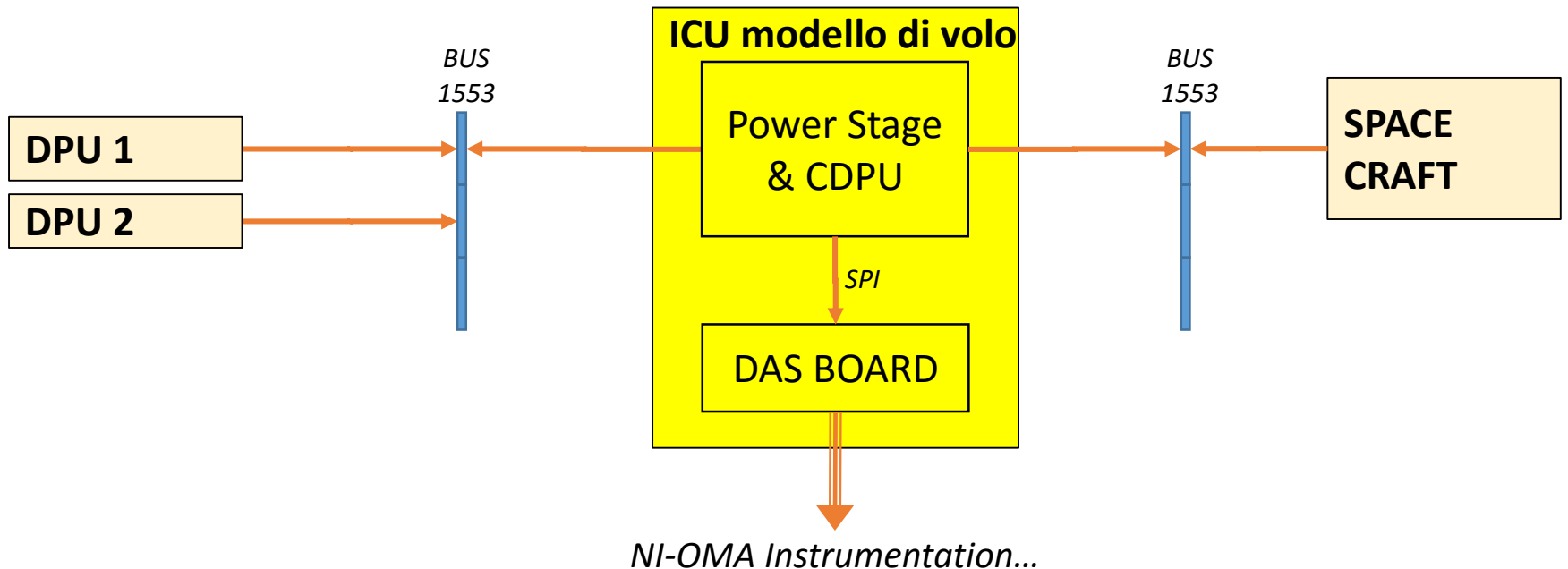
Unità prodotta da AIRBUS-CRISA, in diversi modelli:

- EBB unità integrata e rappresentativa (2016 @ INAF-OATo and INFN-BO per sviluppo)
- EM elettrico (inizio 2017 @ Italia per test; inizialmente non previsto da restituire)
EQM elettrico di qualifica (estate 2017 @ Marsiglia per AIV);
- FM volo (FM, fine 2017 per AIV).

Boot software (BSW) e Driver (DSW): Spagna.

Application Software (ASW) in carico a Italia: responsabilità INAF-OATo con supporto INFN

Instrument Control Unit (ICU)



CPDU:

Processore: LEON2

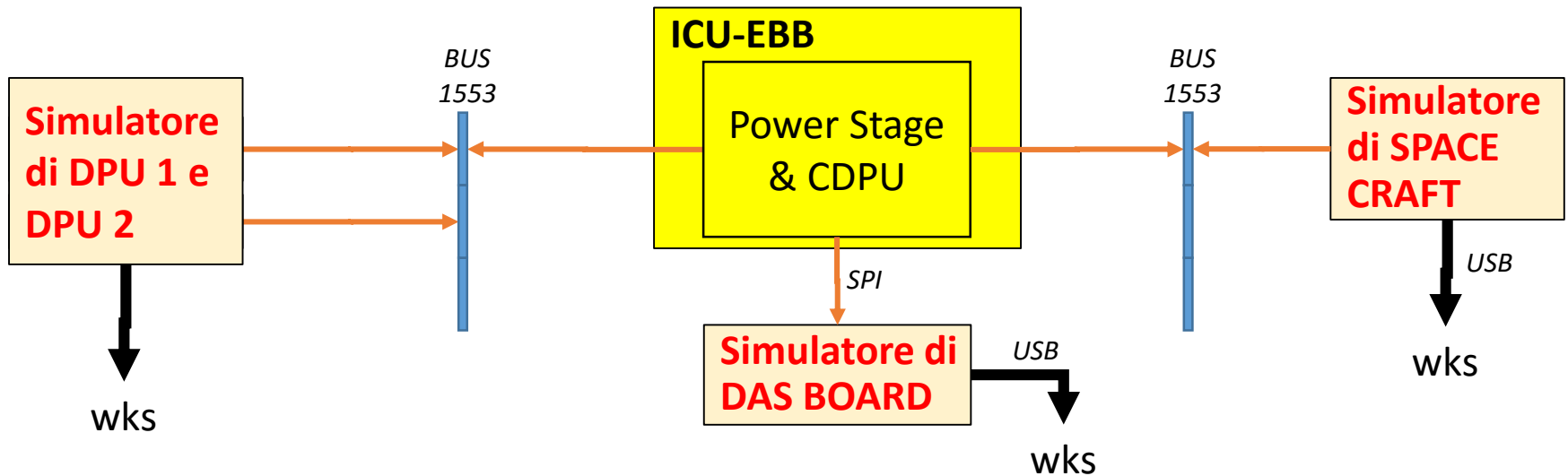
Sistema Operativo : RTEMS (versione spazio)

Linguaggio : C

DAS BOARD [NON PRESENTE NEL MODELLO DI SVILUPPO (ICU-EBB)]

Scheda di controllo degli strumenti del NI-OMA. Connessa alla CDPU tramite una connessione SPI sul backplane della ICU.

Contributo INFN a ICU-ASW



Team Integrato di sviluppo per l'ASW: INAF-OATo e INFN Bologna

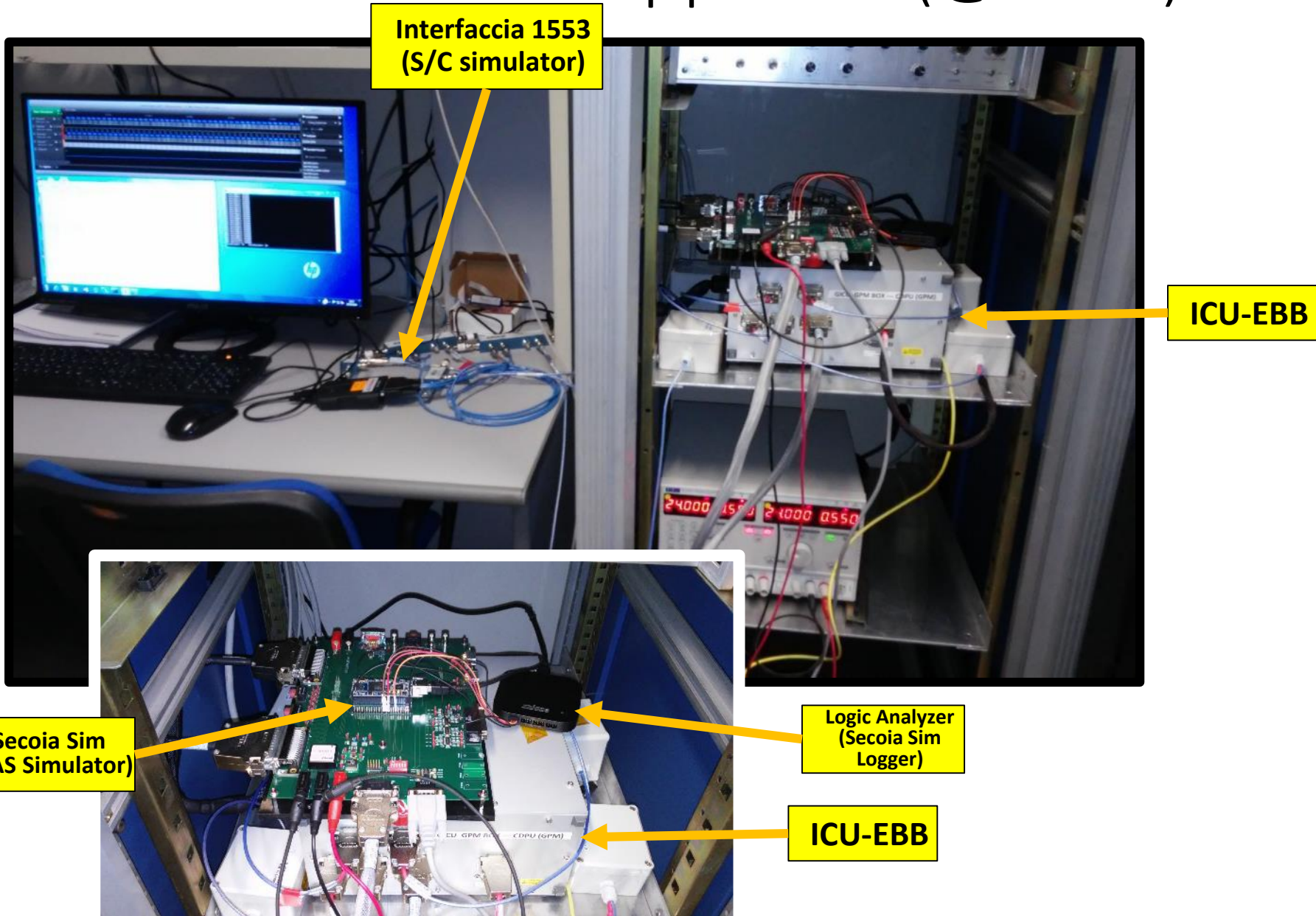
Torino: 4 persone (1 responsabile Working Package + 3 ricercatori/informatici)

Bologna: 4 persone (1 ricercatore, 1 dottorando, 1 tecnologo elettronico, 1 tecnologo informatico dal CNAF)

In particolare l'INFN ha in carico tutti test equipments:

- **Simulatore DAS BOARD:** in collaborazione con Spagna (prossima presentazione) *done*
- **Simulatore Spacecraft:** wks + Ballard UA1130 (1 canale) + bus 1553 *almost completed*
- **Simulatore DPU:** wks + Ballard UA1133 (2 canali) + bus 1553 *to be done*

Piattaforma di sviluppo ICU (@INFN)



Contributo INFN a ICU-ASW

Inoltre:

Supporto allo sviluppo [con il supporto del CNAF]

- sw repository (ICU-ASW + altre attività di sviluppo di WE)
- strumenti per la static code analysis

contributo diretto all'ASW della ICU

test (debug) e validazione del modulo ASW di comunicazione sul bus MIL1553

- inoltro di telecomandi
- richiesta telemetrie

Inoltre:

Test delle sequenze di test con l'EGSE fornito da ESA

A partire da Dicembre 2016 si intende utilizzare la piattaforma di sviluppo per ICU di INFN Bologna per i primi test di comunicazione con l'EGSE che ESA sta fornendo a INAF-IASFBO per le attività di AIV.

ICU ASW Status

Euclid Consortium

PUS services and protocol towards the S/C

Implemented and tested:

PUS Service 1 (TC acceptance and acknowledgement)

PUS Service 3 (HK packet management) – partially

PUS Service 6 to be tested (in particular the management of DPU memory areas)

PUS Service 8 (only the main functions for preparation and triggering of exposures)

Deep subaddressing tested only on TC reception, to be tested on TM packets generation

Interface test with DPU performed with success (one dither configured and exposures triggered)

S/C simulator based on C++ APIs of Ballard 1553 I/F almost completed

DPU simulator based on Python scripts running on CoPilot (Ballard GUI)

Tested by INFN with S/C simul.

Tested by INFN with S/C simul.

Made in INFN

Next step: to be realized in C++ (by INFN)

S/C Simulator Output

Euclid Consortium

```
bc_service.log (14.8 KB) - BareTail
File Edit View Preferences Help
Open Highlighting Follow Tail ANSI C:\Users\Wto\Desktop\Vogs\bc_service.log (14.8 KB)
bc_service.log ch1-monitor.log main.log
[11:11:12.472]: new operation is a TC/TM
[11:11:12.472]: 0 BC -> TC_00 : 1d00 c001 001d 1908 0100 000c 40bd 653a 0001 0002 0080 000f 0010 6800 0000 0000 0001 df57
[11:11:12.482]: 2382764 BC -> DTD : 0024 2a01
[11:11:12.722]: 2682443 BC <- ATR2 : 001a 2d01
[11:11:12.762]: 2720424 BC <- TM2_00 : 0d00 c001 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 7bd4
[11:11:12.772]: 2732704 BC -> ATC2 : 001a 2d01
[11:11:13.462]: 3431783 BC <- DTC : 0024 2a01
[11:11:13.712]: 3681503 BC <- ATR2 : 001a 2d02
[11:11:13.762]: 3719484 BC <- TM2_00 : 0d00 c002 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 15ef
[11:11:13.772]: 3731764 BC -> ATC2 : 001a 2d02
[11:11:14.714]: 4680563 BC <- ATR2 : 0016 2d03
[11:11:14.764]: 4718544 BC <- TM2_00 : 0d00 c003 000f 1001 0101 0000 0000 0000 1400 c001 ae6f
[11:11:14.764]: 4730824 BC -> ATC2 : 0016 2d03
[11:11:15.718]: 5679623 BC <- ATR2 : 0016 2d04
[11:11:15.768]: 5719604 BC <- TM2_00 : 0d00 c004 000f 1001 0701 0000 0000 0000 1d00 c001 df66
[11:11:15.768]: 5728944 BC -> ATC2 : 0016 2d04
[11:11:16.708]: 6678683 BC <- ATR2 : 001a 2d05
[11:11:16.758]: 6716664 BC <- TM2_00 : 0d00 c005 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 1c6f
[11:11:16.768]: 6728944 BC -> ATC2 : 001a 2d05
[11:11:17.708]: 7677743 BC <- ATR2 : 001a 2d06
[11:11:17.758]: 7715724 BC <- TM2_00 : 0d00 c006 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 7254
[11:11:17.768]: 7728004 BC -> ATC2 : 001a 2d06
[11:11:18.468]: 3369984 BC -> TC_00 : 1d00 c002 0017 1908 0100 000c 40ce 0a00 0004 0f10 0410 0410 0310 0410 b112
[11:11:18.468]: 3381824 BC -> DTD : 001e 2a02
[11:11:18.708]: 8676803 BC <- ATR2 : 001a 2d07
[11:11:18.758]: 8714784 BC <- TM2_00 : 0d00 c007 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 a7a2
[11:11:18.758]: 8727064 BC -> ATC2 : 001a 2d07
[11:11:19.458]: 9426143 BC <- DTC : 001e 2a02
[11:11:19.708]: 9675863 BC <- ATR2 : 001a 2d08
[11:11:19.758]: 9713844 BC <- TM2_00 : 0d00 c008 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 6154
[11:11:19.758]: 9726124 BC -> ATC2 : 001a 2d08
[11:11:20.708]: 10674923 BC <- ATR2 : 001a 2d09
[11:11:20.758]: 10712904 BC <- TM2_00 : 0d00 c009 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 b4a2
[11:11:20.758]: 10725184 BC -> ATC2 : 001a 2d09
[11:11:21.708]: 11673983 BC <- ATR2 : 001a 2d0a
[11:11:21.758]: 11711864 BC <- TM2_00 : 0d00 c00a 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 0000
[11:11:21.758]: 11724244 BC -> ATC2 : 001a 2d0a
[11:11:22.708]: 12673043 BC <- ATR2 : 0016 2d0b
[11:11:22.758]: 12711024 BC <- TM2_00 : 0d00 c00b 000f 1001 0101 0000 0000 0000 1d00 c002 1185
[11:11:22.758]: 12723304 BC -> ATC2 : 0016 2d0b
[11:11:23.708]: 13672104 BC <- ATR2 : 0016 2d0c
[11:11:23.758]: 13710084 BC <- TM2_00 : 0d00 c00c 000f 1001 0701 0000 0000 0000 1d00 c002 6815
[11:11:23.758]: 13722364 BC -> ATC2 : 0016 2d0c
[11:11:24.468]: 9364344 BC -> TC_00 : 1d00 c003 003d 1908 0100 000c 40e7 001b 0e0c 0e0c 0e0c 0e0c ffff 0a00
[11:11:24.468]: 0 BC -> TC_01 : 0005 9d84
[11:11:24.468]: 9376184 BC -> DTD : 0044 2a03
[11:11:24.708]: 14671163 BC <- ATR2 : 001a 2d0d
[11:11:24.758]: 14709144 BC <- TM2_00 : 0d00 c00d 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 0000
[11:11:24.758]: 14721424 BC -> ATC2 : 001a 2d0d
[11:11:25.450]: 15420504 BC <- DTC : 0044 2a03
[11:11:25.700]: 15670223 BC <- ATR2 : 001a 2d0e
[11:11:25.750]: 15708204 BC <- TM2_00 : 0d00 c00e 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 0000
[11:11:25.760]: 15720484 BC -> ATC2 : 001a 2d0e
[11:11:26.704]: 16669283 BC <- ATR2 : 001a 2d0f
[11:11:26.754]: 16707264 BC <- TM2_00 : 0d00 c00f 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 0000
[11:11:26.754]: 16719544 BC -> ATC2 : 001a 2d0f
[11:11:27.704]: 17668343 BC <- ATR2 : 001a 2d10
[11:11:27.754]: 17706324 BC <- TM2_00 : 0d00 c010 0013 1003 1901 0000 0000 0000 0003 0000 0000 0000 0000
[11:11:27.754]: 17718604 BC -> ATC2 : 001a 2d10
[11:11:28.704]: 18667403 BC <- ATR2 : 001a 2d11
```

Green: TCs to ICU
Grey: TM from ICU to S/C
White: protocol messages

```
bc_service.log (14,8 KB) - BareTail
File Edit View Preferences Help
Open Highlighting Follow Tail ANSI C:\Users\Wto\Desktop\Vogs\bc
bc_service.log ch1-monitor.log main.log
[11:11:12.472]: new operation is a TC/TM
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[11:11:12.762]: 2720424 BC <- TM2_00 : 0d00 c001 0013 1003 1901 0000
[11:11:12.772]: 2732704 BC -> ATC2 : 001a 2d01
[11:11:13.462]: 3431783 BC <- DTC : 0024 2a01
[11:11:13.712]: 3681503 BC <- ATR2 : 001a 2d02
[11:11:13.762]: 3719484 BC <- TM2_00 : 0d00 c002 0013 1003 1901 0000
[11:11:13.772]: 3731764 BC -> ATC2 : 001a 2d02
[11:11:14.714]: 4680563 BC <- ATR2 : 0016 2d03
```

Publicazioni

S. Liori et al.

Detailed design and rst tests of the application software for the instrument control unit of Euclid-NISP

Proc. SPIE, Volume 9904, Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave

99042Q (July 29, 2016); doi: 10.1117/12.2232313

(C.4) E. Franceschi et al.

EGSE customization for the Euclid NISP Instrument AIV/AIT activities

Proc. SPIE, Volume 9904, Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave

99042T (July 29, 2016); doi: 10.1117/12.2234262

(C.5) M. Trifoglio et al.

Instrument Workstation for the EGSE of the Near Infrared Spectro-Photometer instrument (NISP) of the EUCLID mission

Proc. SPIE, Volume 9904, Space Telescopes and Instrumentation 2016: Optical, Infrared, and Millimeter Wave

990460 (July 29, 2016); doi: 10.1117/12.2234219

Richiesta Specifiche – Bologna 2017

Richieste orientate prevalentemente al completamento del Test Equipment per l'ICU Flight Model che si prevede sia finanziato da ASI a parte i dispositivi di comunicazione 1553 specificati qui sotto.

CONSUMO	1. Metabolismo (0.5k x FTE)	2.00	7.00	0.00
	2. Manutenzione one-shot UPS (2x 0.5k)	1.00		
	3. Test Equipment per ICU modello di volo, Accessori per bus di comunicazione MIL-1553 ridondato (cavi, stub a 4 porte e terminatori)	4.00		
INVENTARIO	1. Test Equipment per ICU modello di volo: Interfaccia MIL1553, 2 canali	15.00	16.50	0.00
	2. Test Equipment per ICU modello di volo, Alimentatore	1.50		