1st ESA IP Cores Workshop

ESTEC/TEC-EDM

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AGENDA

(morning)

09.00 Welcome / presentations

09.10 The ESA IP Cores service: (ESA)
- Why , History , Steps to request, technical support, ESA IP Cores webpage

09.45 Overview of current ESA IP Cores (ESA)
- main functions, origin, use record, specific licence constraints.

10.30 *Coffee Break*

10.45 Ideas to improve the ESA IP Cores service (I: general administrative) (ALL)
- website / customer interface, IPRequest form, Licensing, Delivery of IP: lead-time / format, Fees, Collecting and sharing users feedback, Technical support.

11.30 Ideas to improve ESA IP Cores service (II: general technical) (ALL)
- technical documentation, source code, test benches, EDA tool support, precompiled simulation models, abstraction levels, bus system support.

12.30 *Lunch Break*

AGENDA

(afternoon)

13.30 ESA IP Cores user's experiences

13:30	Stephane Davy	OBSPM LESIA CNRS (France)
13:45	Franco Bigongiari	Aurelia Microelectronica (Italy)
14:00	Nicolas Renaud	Atmel (France)
14:15	Daniel Gonzalez	INTA (Spain)
14:30	Jiri Gaisler	Gaisler Research (Sweden)
14:45	Giuseppe Giachella	Laben (Italy)
15:00	Mattias Carlqvist	ESA/ESTEC (Netherlands)
15:15	Francisco Tortosa	ESA/ESTEC (Netherlands)

- feedback/experiences using ESA IP Cores
- Ideas to improve specific ESA IP Cores
- other IP Cores

16.30 Workshop conclusions / Future plans

- New IPs?, new IP versions?
- Topics not discussed this time: future workshops

ESA IP Cores Service

HISTORY

Some VHDL designs of high reuse potential were developed internally at ESA in the late 90's early 00's: CAN, LEON1/2, PTME, EDAC, etc

Some ESA contracts give IPRs to ESA to reuse and sublicense externally developed VHDL designs: OBDH, Space Wire, etc

ESA contractors started asking to re-use these IPs in ESA contracts. Also non-ESA customers.

Specific ownership/IPR, patents and ESA-third party agreements affect the use and transfer of several IPs

Growing number of requests…

2003: ESA Microlectronics section (TEC-EDM) and Electr. Eng. Contracts Service (RES-PTE) started to normalize and regulate the ESA IP Cores service: internal IP Policy, technical & admin databases, additional human resources, IP Request Form, Licence models, new web site, etc

ESA IP Cores Service

WHAT

- Maintain /License /Distribute several (13 now) Intellectual Property Cores (VHDL Designs + Simulation files + Documentation) frequently used in Space platforms and payloads.
- Collect users' feedback, communicate known problems.

WHY

achieve cheaper, faster multi-IP/S-o-C designs thanks to VHDL re-use

contribute to the availability of key digital functions (in "soft format"), mitigating ASSP/Standard ASIC components discontinuation/reluctance by foundries

promote use of standardised (ECSS) functions/communication protocols

promote the standardisation of platform and payload data communication and processing architectures

PROCUREMENT of ESA IP Cores: steps

1- Consult ESA **IP-Cores website** (http://www.estec.esa.nl/microelectronics/core/corepage.html) to:

1.1 learn details on IP availability

1.2 download technical documentation (IP user's manuals, etc)

1.2 evaluate acceptance of ESA licence conditions

2 - download, fill-in and send **IP Core Request Form** (electronic copy to IPCoreRequest@esa.int, and signed fax copy to address stated inside IPRF)

3 - If all conditions are met, ESTEC/RES-PTE will send to the prospect licensee a **licence** document tailored for his/her case.

4 - TEC-EDM will send the IP Core **source-code files** to licensee upon reception at RES-PTE of accepted licensing document (i.e. bearing licensee's signatures).

ESA IP Cores ownership

AVAILABLE IP-CORES BASED ON:

- ESA-owned Intellectual Property (e.g. internal development/rights assigned to ESA)

  → ESA has full control on IP-core and how it is licensed

- Rights given to ESA through licences resulting from ESA contracts

  → ESA has the right to use/grant sub-licences; Restrictions may apply

The above information is available on the TEC-EDM webpage.

ESA IP Cores Licence

2 TYPES OF LICENCE CURRENTLY AVAILABLE

Both types are based on the information supplied in the IP Request Form and standard licensing conditions which must be accepted by the Licensee

1 - "STANDALONE" LICENCE

- Issued for the Licensee's "own purposes" as stated in the IP Request Form
- Issued for 2 years; renewable
- Handling fee per IP-core

2 - LICENCE ATTACHED TO AN ESA CONTRACT

- Issued limited to the objectives, scope and duration of the contract
- Free of charge

ESA IP Core Licence General conditions

http://www.estec.esa.nl/microelectronics/core/ipcore_licence_template_external.pdf

- **To whom:**
  - Non-exclusive
  - Non-transferable (except explicitly agreed, i.e. sub-contractors)
  - Within ESA member/participant states territory
- **For what:**
  - HDL modelling, HW manufacturing
  - R&D and/or commercial
  - Peaceful applications (in accordance with United Nations)
- **No technical support** other than informing about known problems

Collecting Users' Feedback /

Reporting problems / Technical support

- All users have committed to report to ESA any errors found in the IP source code, testbenches and/or associated documentation. PLEASE DO!! ↙ THIS FEEDBACK IS CAPITAL TO IMPROVE THE QUALITY OF THE Ips

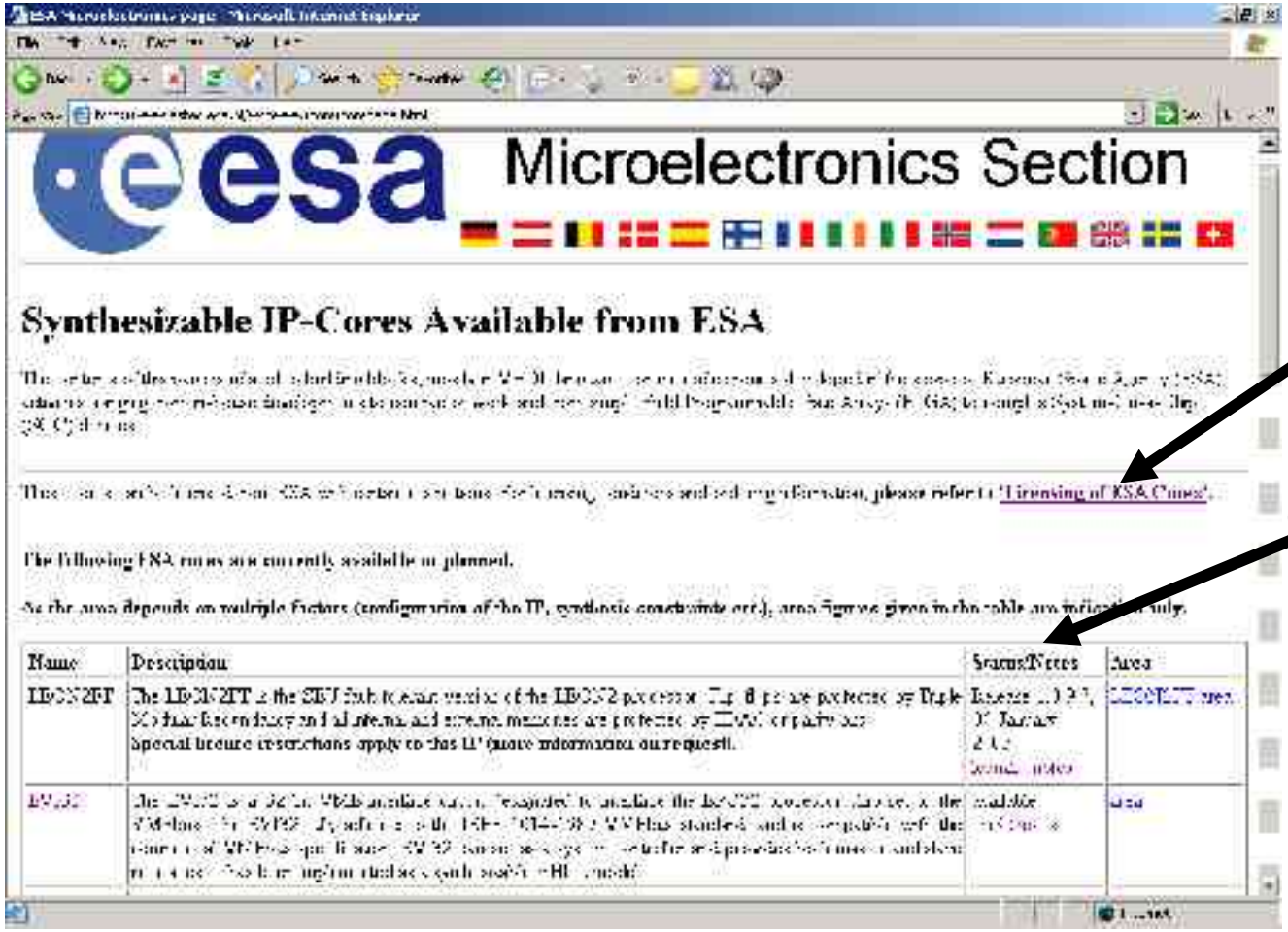
- This error reporting should be done directly to current "ESA IP Cores main focal point": IPRequestForm@esa.int. ESA Technical Officers (if ESA contract) should be on copy

- Due to limited resources, ESA can NOT commit to systematic technical support. (Problems affecting ESA contracts will have priority).

- ESA commits to collect and independently assess/verify reported problems, and THEN, informing users through the ESA IP Core web site ("status notes" column in IP table).

ESA IP CORES Web site

http://www.estec.esa.nl/microelectronics/core/corepage.html



Link to IP Request Form & licence conditions

Release notes, detected bugs, modifications log

IP Request Form , licence conditions

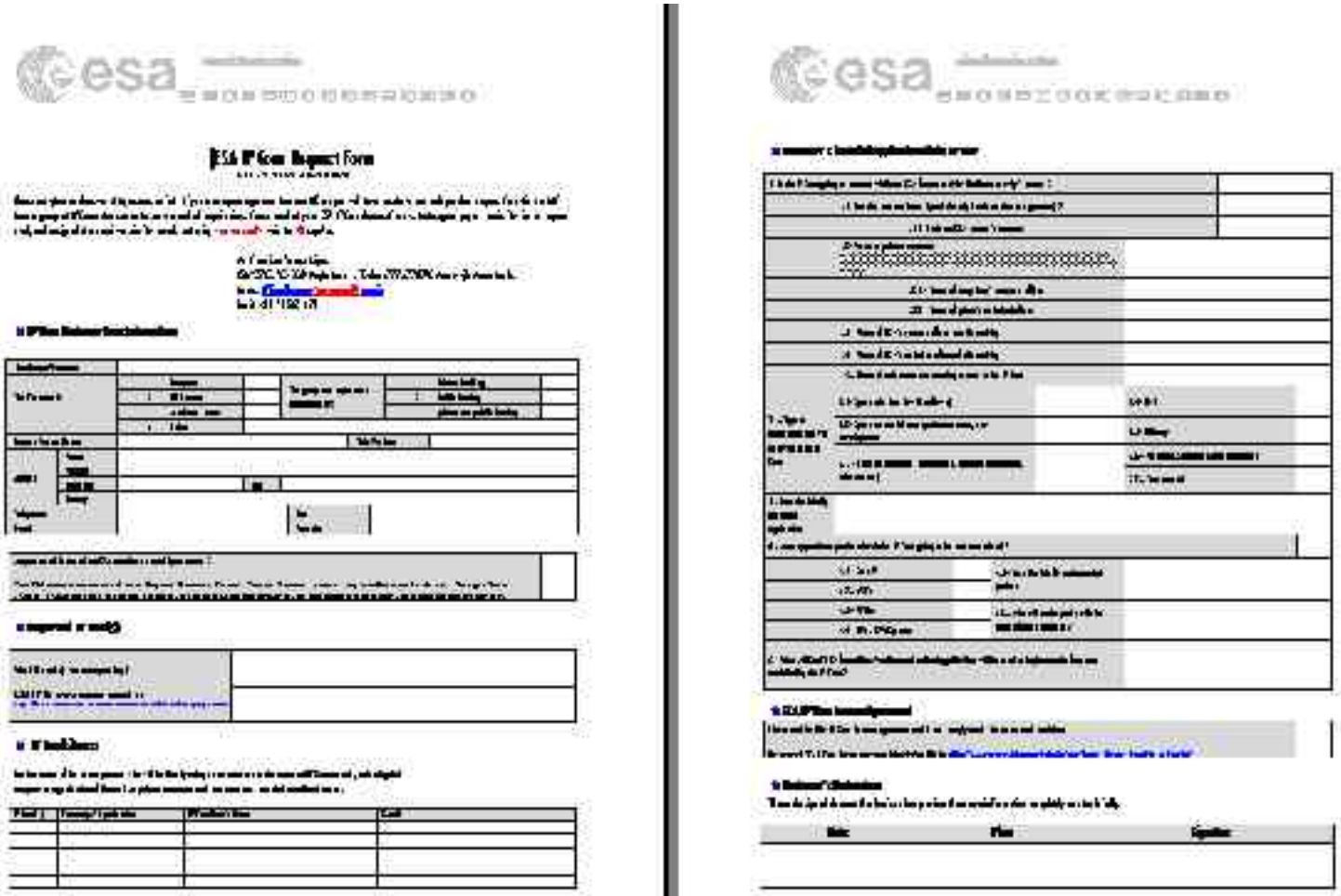
http://www.estec.esa.nl/microelectronics/core/licensing.html

IP Request Form

Licence text

IP Request Form

http://www.estec.esa.nl/microelectronics/core/ESAIPRequestForm.pdf



Overview of ESA IP Cores (I/III)

IP name	Main functions	IP origin	Licence special constraints	Requests(for ESA contracts)/Deliveries
SpaceWire (b)	ECSS-E-50-12 SpaceWire Encoder/Decoder	University of Dundee/AAE(tb)	Space applications/ STM patent notice	27(17)/17
SpaceWire-AMBA	ECSS-E-50-12 SpaceWire Encoder/Decoder with FIFOs and AMBA AHB master/slave interfaces	Astrium Velizy	STM patent notice	17(8)/12
CAN	HurriCANe: CAN core, controller, AMBA I/f	ESA internal development		16(9)/12
PTME	Complete CCSDS packet telemetry encoder, including VCM, VCA, TCE, R-S, APB, etc	ESA internal development/Gaisler Research		12(7)/10

Overview of ESA IP Cores (II/III)

IP name	Main functions	IP origin	Licence special constraints	Requests(for ESA contracts)/Deliveries
LEON2-FT	SPARC V8 32 bit microprocessor. TMR, EDAC and parity bits for SEU tolerance. No FPU, no PCI	ESA Internal development / Gaisler Research	Rad hard IC only with ATMEL	12(6)/7
CUC-CTM	CCSDS Unsegmented Code and Time Management, based on Elapsed Time services	ESA Internal development		8(7)/7
EDAC	Error Detection (double) and Correction (single) 4-64 bits codec	ESA Internal development		6(4)/4
PTCD	complete CCSDS packet telecommand decoder, based on MA28140 ASIC (GEC-Plessey)	Astrium Velizy	ESA activities only	4(3)/3

Overview of ESA IP Cores (III/III)

IP name	Main functions	IP origin	Licence special constraints	Requests(for ESA contracts)/Deliveries
PDEC	complete CCSDS packet telecommand decoder, including Command Pulse Selection and Distribution	Saab	ESA activities only	2(2)/2
OBDH	Data Handling System, PSS-04-255, On-board Communication Controller	Alcatel Espacio		2(1)/2
EVI32	ERC32 to VMEbus (IEEE 1014-1987) bus interface	ESA Internal development		2(1)/1
WIC	Wavelet Image Compression (lossy and lossless), based on Ocapi Flexwave IP	IMEC	Simulation models only, ESA activities only	1(1)/1

Ideas to improve **general administration** of ESA IP Cores Service

ESA IP Cores website

customer interface

IP Request form

Licensing scheme

Delivery of IP: lead-time / format

Fees

Collecting and sharing users feedback

News groups?

Technical support

Ideas to improve **general technical quality** of ESA IP Cores

Technical documentation

Source code

Test benches / simulation scripts

EDA tool support

precompiled models

Different abstraction levels (RTL, behavioral, transaction…)

Bus system support

Workshop conclusions / future plans (1/4)

Improving administrative aspects

-Website

-Lalal

Workshop conclusions / future plans (2/4)

Improving general technical aspects

-Source code

-EDA support

Workshop conclusions / future plans (3/4)

Improving IP specific technical aspects

-SpWb

-CAN

-LEON

-PTME

-PTCD

-PDEC

-EDAC

-CUC-CTM

-WIC

Workshop conclusions / future plans (4/4)

Next workshop

-Website

-Lalal