

## ***Ultra LightWeight CORBA Profile in SCA-Next***

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# ULWeight CORBA Profile: History 1

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- The JTRS JPEO has released in December 2010 the Draft SCA Next specification.
- Simultaneously the ESSOR Industries have finalized the elaboration of the ESSOR SCA-based Architecture.



## ULWeight CORBA Profile: History 2

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- Starting from an extract of the ESSOR Architecture, provided as an input with authorization of the ESSOR Program, the SCA Next Work Group of the WinnF prepared contribution documents, with the goal to maximize the harmonization between ESSOR and JTRS achievements.
- The **Ultra Light Weight** CORBA profile (ULW) contribution has been finally included in the SCA-Next specification.

- The “Ultra lightweight” is intended for DSP and FPGA processing elements and is a subset of the other profiles previously present in the SCA Next draft specification, which were typically applicable for GPP and DSP environment.

# Profile Characteristics 1

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- DSP and FPGA hosted waveform components are typically used for the fast processing capabilities that these kind of processing elements present.
- The complete IDL features are not needed in DSP or FPGA processing
- A smaller set can be better implemented on these kinds of processing elements.



## Profile Characteristics 2

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- In order to ease waveform portability the “Ultra lightweight” could apply for both CORBA and Non-CORBA approaches.
- The Ultra lightweight profile is defined in terms of IDL features, as such it is supported by compile and run-time features

The IDL features of the Ultra lightweight profile have been selected considering that:

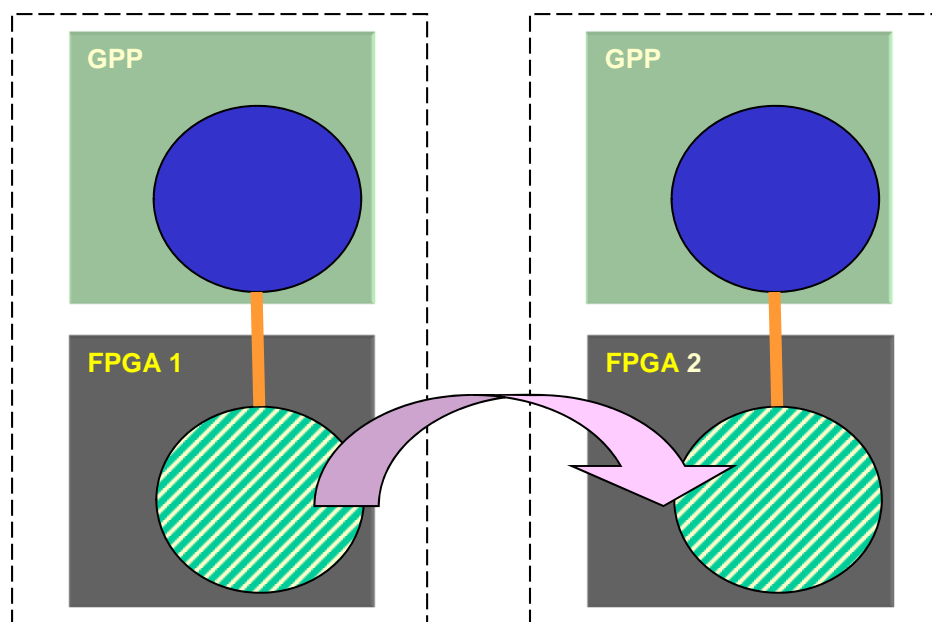
- typical DSP/FPGA algorithms implementations have to operate very fast, but on simple data types
- it is possible to convey information (back and forth) by using simple data containers (e.g. sequence of basic types)
- the IDL features of the Ultra lightweight profile can be supported by COTS ORBs current implementations (also in FPGAs that represent the more constrained processing elements in terms of ORB support)
- The IDL features set has to be small but not too limited, presenting an adequate flexibility to allow the required data communication



# ULWeight Profile applicability 1

- The ULW profile improves waveform portability by limiting waveform-components interfaces complexity.

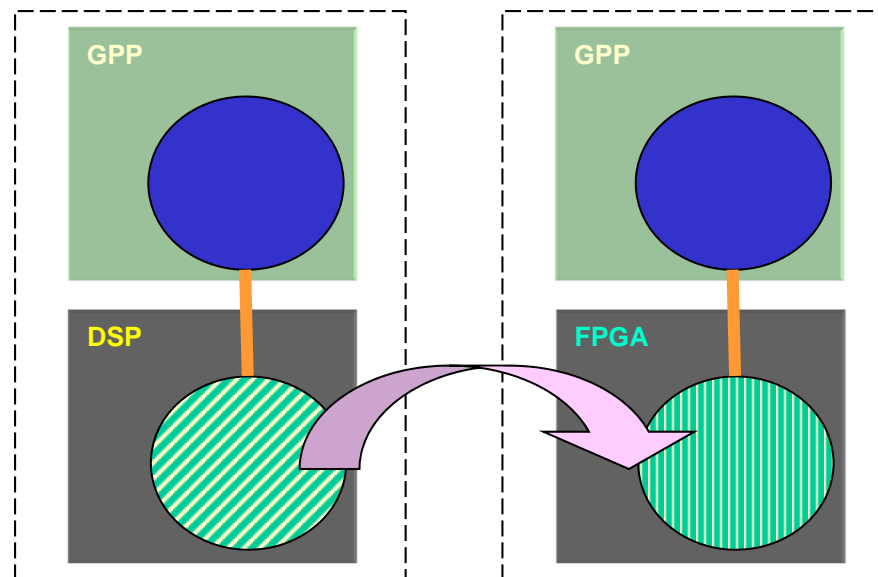
For example by using an IDL subset a WF component located in FPGA (or DSP) is more likely to require less effort while being ported from a platform A to a platform B. In fact the FPGA (or DSP) ORB will be more likely to support a common reduced IDL subset.



## ULWeight Profile applicability 2

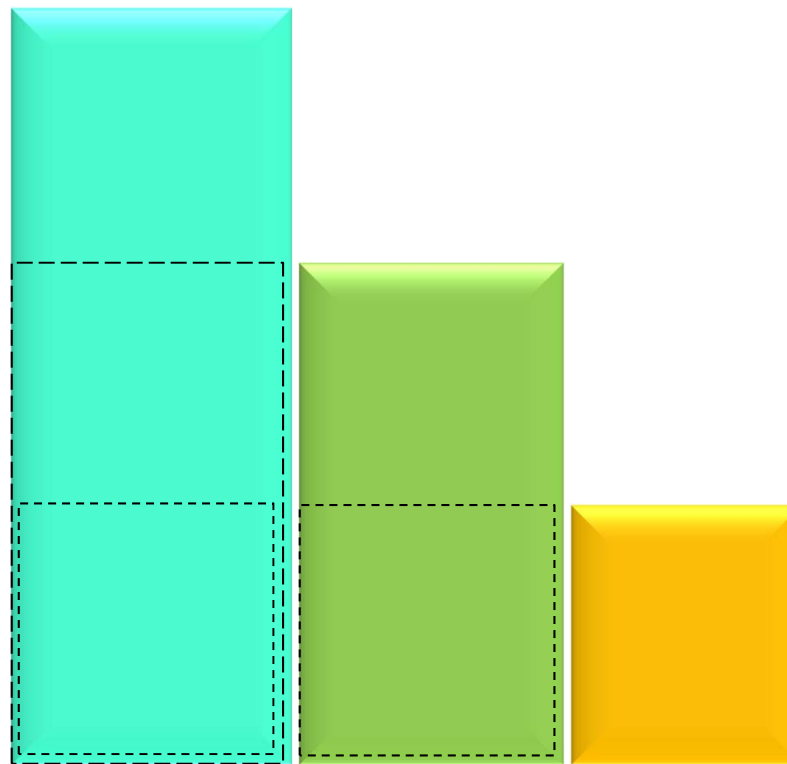
- The “CORBA Ultra lightweight” profile allows improving waveform portability also when going from a DSP to an FPGA and viceversa.

For example, a WF component developed for a DSP environment, and whose IDL interfaces are designed according to the Ultra lightweight Profile, can be ported to an FPGA, starting from the same IDL interfaces, and keeping the behaviour of the component transparent towards the rest of the system, independently from its location. The opposite is valid too, i.e. an FPGA component can be easily ported to a DSP.



## Profiles relationship 1

These ULW profile features are a subset of the other two profiles in the SCA Next specification, which are the “Full” and “Lightweight”.



## Profiles relationship 2

Operation/Feature	Full IDL	Lightweight IDL	Ultra lightweight IDL
Abstract Interfaces	NRQ	NRQ	NRQ
<b>Value Type</b>	NRQ	NRQ	NRQ
<b>Any</b>	MAN	NRQ	NRQ
<b>operation context clauses</b>	NRQ	NRQ	NRQ
<b>boolean, octet, short, unsigned short, long, unsigned long, enum</b>	MAN	MAN	MAN
<b>float, double, long double, long long, unsigned long long, char, string</b>	MAN	MAN	NRQ
<b>wide character/string</b>	NRQ	NRQ	NRQ
<b>unions</b>	MAN	MAN	NRQ
<b>arrays</b>	MAN	MAN	NRQ
<b>struct</b>	MAN	MAN	MAN
<b>sequence</b>	MAN	MAN	MAN
<b>import</b>	NRQ	NRQ	NRQ
<b>keywords: module, interface, in, out, inout, void, typedef, oneway. return values: basic data types</b>	MAN	MAN	MAN
<b>All other keywords</b>	MAN	MAN	NRQ

# ULW Supported IDL features

IDL basic data types	short
	long
	unsigned short
	unsigned long
	boolean
	octet
IDL complex data types	struct (restricted to supported basic data types)
	sequence (restricted to supported basic data types)
	enum
IDL keywords	module
	interface
	in
	out
	inout
	void
	typedef
	oneway
Return value	Return values of a basic data type to be supported

# ULW Optional IDL features

Feature	Description
Usage of struct in sequence	A sequence can contain also struct complex type (of supported basic data types), in addition to supported basic data types, as already specified in the supported features.
Unbounded sequence	A sequence should be bounded whenever it is possible. In other words, the usage of unbounded sequences should be advised only if unavoidable.
Const, FALSE, TRUE. [*]	Constant data values can be specified by using supported basic data types. FALSE and TRUE are the values needed by the boolean basic data type.
raises (exception) [*]	The usage of exceptions should be avoided whenever possible. In fact in most cases their function can be carried out and so replaced by using a 'out' parameter or a return value.

[\*] Last two features are not directly specified by the Specification

## Conclusions / Lessons learned

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- The ULWeight Corba Profile is a WInnF contribution based on ESSOR program information
- The profile is applicable for DSP and FPGA processing elements
- It allows for better portability, defining a focused scope for waveform-components interfaces, still providing appropriate flexibility
- Waveforms based on the ULWeight profile have been successfully ported on different platforms (with different processing elements) with reduced efforts