



**Request for Comment
on CORBA Profile for SCA Next**

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Preface

In August 2009, the JPEO and its JTRS SCA Next Working Panel invited the WINNF to assist it in developing the specification of a new release of the SCA whose working title is “SCA Next.” The WINNF created a “SCA Next Work Group” to coordinate this work and informed the JTRS SCA Next Working Panel that the WINNF wished to take the lead on developing solutions for two of the previously defined Change Proposals: S047 “Develop CORBA/e and CORBA Services wording” and S013 “SCA Architectural Consistency”, as well as offer comments and suggestions for many of the other change proposals.

Discussions with the JTRS working panel clarified that task S047 was primarily to develop a CORBA profile for use in SCA Next replacing the “Minimum CORBA” profile used in SCA 2.2.2. The WINNF work group has worked since that time, using both teleconferences and in-person meetings, and has completed its work on S047.

The WINNF SCA Next Work Group is pleased to contribute the attached proposed specification of a CORBA Profile to the JTRS SCA Next Working Panel for use as part of SCA Next. Note that this relates to Change Proposal S047. The WINNF requests your consideration and invite your comments.

Please respond with your comments to the WINNF SCA Next Work Group Chair: Terry Anderson, terry.anderson@itt.com.

Request for Comment on CORBA Profile for SCA Next

1 Introduction

Where the SCA Next specifies the use of CORBA by SCA Applications it shall be understood to mean CORBA/e Compact Profile (REF) with the differences specified in this document. This document specifies two profiles based on the CORBA/e Compact profile. The permitted CORBA features are listed in Appendix A. The first profile is intended for Applications that will be hosted on most General Purpose Processor (GPP) platforms and uses the symbol ‘F’ (for Full) in the Appendix A. The second profile is intended for Applications that will be hosted on GPP platforms with highly constrained resources (limited processing power, limited memory, very low power usage, etc.) and uses the symbol ‘C’ (for Constrained) in the Appendix A.

Compliance with this specification shall mean that SCA Applications intended for use on general GPP platforms shall only use CORBA features marked with the symbol ‘F’ in the SCA column. SCA Applications intended for use on constrained GPP platforms shall only use CORBA features marked with the symbol ‘C’. All Applications are encouraged to restrict usage to features marked with ‘C’ in order to ease their porting to constrained platforms. Applications intended to be hosted on DSPs or FPGAs might use the ‘C’ features as a guide but neither of these profiles were designed for this use. Features that Applications are not permitted to use have been marked with ‘o’ (for Omit). All GPP platform OEs shall support all features marked with ‘C’ and general GPP platforms (those not severely resource-constrained), shall support all features marked with ‘F’.

Platforms may support additional features as desired and may require additional features to fully support SCA Next requirements.

Platform software such as Core Framework and platform Devices and Services are not intended to be restricted by this specification. Such platform software may use additional CORBA features and may require additional features to be fully SCA Next compliant.

Note: paragraphs and sections marked with “[Non-normative]” are for guidance and not part of the specification.

[Non-normative] Because platforms may use additional features, these two “profiles” are not profiles in the same sense as the CORBA/e Compact and Micro profiles. They are not intended to specify complete ORBs for hosting SCA systems.

[Non-normative] With a few noted exceptions, both profiles are proper subsets of the CORBA/e Compact feature list.

2 References

- (CORBA/e) Common Object Request Broker Architecture (CORBA) *for embedded* Specification, Version 1.0 (OMG formal/2008-11-06), Object Management Group, Nov. 2008.
- (Minimum CORBA) Minimum CORBA Specification, Version 1.0 (OMG formal/02-

(RTCORBA) 08-01), Object Management Group, Aug. 2002. (SCA 2.2.2 misstates this as August 2001).
Real-time CORBA Specification, Version 1.2 (OMG formal/2005-01-04), Object Management Group, Jan. 2005.

3 [Non-normative] Comparisons with existing profiles

For convenience, columns showing the features included in some other profiles have been included: Minimum CORBA 1.0, CORBA/e Compact and Micro. These comparisons are non-normative.

SCA 2.2.2 specified Minimum CORBA v1.0. For convenience we have included a column comparing the ‘F’ profile with Minimum CORBA. In this column the symbol ‘R’ represents a restriction from Minimum CORBA and ‘E’ represents an extension or feature not included in Minimum. The comparison is non-normative. One reason for defining new profiles for SCA Next was the widely felt need for features from Real-Time CORBA (RT CORBA) that were not included in Minimum and other features that improve performance. There are also a number of other features that were not in Minimum. Many of these come from later versions of CORBA than the one Minimum was based on or were newly added during the CORBA/e development. Some of these have been included because they are considered valuable, have known use cases and are considered to have acceptable code footprint and performance.

Columns comparing the ‘F’ and ‘C’ profiles to the CORBA/e Compact profile have also been included. This comparison is for convenience and is non-normative. The columns use the same ‘R’ (restriction) and ‘E’ (extension) symbols as that for Minimum CORBA.

4 [Non-normative] Reduction of Platform Resource Use

These profiles (with details in Appendix A) are addressed to SCA Applications. The permitted features have been chosen to support known use cases for SCA Applications while avoiding features that require excessive processing resources (processor power, ORB memory footprint, Application runtime memory size, etc.). While platform designers will often know the resource availability and may choose to use resource intensive features, Applications are usually intended to be portable between platforms and so it is desirable to minimize their demand on resources to ease porting to more constrained environments.

Some of the resource intensive features that have been omitted will reduce resource demands even with an ORB that supports them if the features are not used. However, to achieve the full goal of reducing demand on system resources, ORBs omitting support for these features will be required.

With a few noted exceptions, the ‘F’ and ‘C’ profiles are proper subsets of the CORBA/e Compact profile. This means that a platform with sufficient resources could use a CORBA/e Compact ORB and support nearly all permitted Application features and require minimal porting effort.

4.1 Complex Types in Any

The use of CORBA Any, such as in CF::PropertySet, can have very resource intensive impact. Core Framework requires the use of Any in PropertySet to support properties in the domain profile. Changing this would have significant impact on porting existing code to SCA Next. However, Core Framework only requires the types the value Any resulting from the XML code in the domain profile. This only requires:

- CORBA Basic Types (CORBA/e 6.10.1) excluding WChar
- SEQUENCES of the above types (such as String)
- PropertySet or SEQUENCE of PropertySet as a value

It does require support for the value to contain a PropertySet and so the predefined struct for PropertySet is required.

Although user-defined structs can be defined in XML, these are NOT sent as CORBA struct but rather as nested SEQUENCES. Therefore support for CORBA struct (other than that in PropertySet) and union is NOT required by CF.

SCA Next deprecates the use of other types, including user defined CORBA structs and unions in the value of PropertySet or other uses of Any in Applications and non-standard APIs. While such use is permitted in SCA Next compliant Applications, it is discouraged and will be disallowed in versions of the SCA after SCA Next.

[Non-normative] ORB providers can provide insertion and extraction operations for known simple types and transport them without large TypeCodes that can add significantly to message sizes (type information can be larger than the actual data). For complex types, the CORBA compiler must generate code for insertion and extraction and add it to each component using the interface as well as adding the type information to each message. Even when using an ORB that supports complex-types in Any, most of the resource savings is achieved if the Application does not use them. Some additional savings in size will be achieved by use of an ORB that does not support them.

5 Permitted features not in CORBA/e Compact

This specification permits the use of a few RTCORBA features that provide useful ways to system tune performance but are not supported by CORBA/e Compact: additional ORB_init parameters, Thread Pools, SERVER_DECLARED priority model, ServerProtocolPolicy and ClientProtocolPolicy, and activate_object_with_priority.

5.1 ORB_init

Parameters to ORB_init must be used to define persistence and id assignment policies for rootPOA. These are currently supported by some vendors but not standardized. The SCA CORBA profile includes some additional standardized parameters that shall be supported by the

ORB_init call. The specification of these additional parameters will be defined in a later draft of this specification.

5.2 Thread Pools

RTCORBA includes Thread Pools as a mechanism for a server to provide multiple priorities with less overhead than priority banding. This feature is supported by some ORB vendors but is not included in Minimum CORBA or CORBA/e profiles. It can improve system performance with less resource use than priority banding. For example, after startup pool priorities can be changed to optimize for runtime. Applications complying with the Full profile shall be permitted to use Thread Pools.

5.3 Server Priority Model

RTCORBA defines two models for determining the priority for servants processing method calls: CLIENT_PROPAGATED model and SERVER_DECLARED model. Only the CLIENT_PROPAGATED model is supported in CORBA/e Compact, but the use of the SERVER_DECLARED model is sufficiently valuable for managing priorities that Applications shall be permitted to use it. SERVER_DECLARED model does not require propagating the priority with each method call and so resulting in smaller messages and less processing to set priority on each call.

5.4 ServerProtocolPolicy and ClientProtocolPolicy

In order to support lighter weight methods for managing priorities, Applications complying with the Full profile shall be permitted to use RTCORBA ServerProtocolPolicy and ClientProtocolPolicy.

5.5 Activate_object_with_priority

In order to support lighter weight methods for managing priorities, Applications shall be permitted to use the RTCORBA activate_object_with_priority.

6 CORBA Services

The CORBA/e specification includes CORBA services, such as Naming Service, Event Service and Lightweight Log Service. The profiles specified in this document make no requirements about these services and in no way take precedence over the requirements concerning these services in the SCA Next specification.

Appendix A

The attached spreadsheet is a table of CORBA features that shall be permitted in the Full and the Constrained profiles.