European Component Oriented Architecture (ECOA®) Collaboration Programme: Guidance Document: Reconfiguration

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Executive Summary

This document defines guidance ECOA system reconfiguration.

The aim of a reconfiguration is to adapt the system to a new operational context. A reconfiguration may occur following a functional decision or following as recovery action a fault handling.
1 Scope
This document is intended to provide guidance on container level checking and time synchronization.
The document is structured as follows:
Section 2 gives a brief introduction to the topic.
Section 3 expands abbreviations used in this report.
Section 4 provides definitions for the key terms used in this report.
Section 5 lists key documents referenced by this report.
Section 6 discusses the guidance to reconfiguration.

2 Introduction
This document defines guidance ECOA system reconfiguration.
The aim of a reconfiguration is to adapt the system to a new operational context. A reconfiguration may occur following a functional decision or following as recovery action a fault handling.
With the ECOA Architecture Specifications, it is possible to initiate three types of reconfigurations:

- A functional reconfiguration involving only a change in the behaviour of the application software components,
- A wire switching changing service providers within the same assembly schema,
- The replacing of the current deployment with a new one.

Section 6 details each type of reconfiguration.
3 Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
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<tr>
<td>ASC</td>
<td>Application Software Component</td>
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<tr>
<td>DSTL</td>
<td>Defence Science and Technology Laboratory</td>
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<tr>
<td>ECOA</td>
<td>European Component Oriented Architecture</td>
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<tr>
<td>ELI</td>
<td>ECOA Logical Interface</td>
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<tr>
<td>FR</td>
<td>French</td>
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<tr>
<td>IAWG</td>
<td>Industrial Avionics Working Group</td>
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<tr>
<td>I/O</td>
<td>Inputs-Outputs</td>
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<tr>
<td>OS</td>
<td>Operating System</td>
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<tr>
<td>PF</td>
<td>Platform</td>
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<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>RR</td>
<td>Request-Response</td>
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<tr>
<td>STD</td>
<td>Standard</td>
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<tr>
<td>TR</td>
<td>Technical Report</td>
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<tr>
<td>TRL</td>
<td>Technology Readiness Level</td>
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<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
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<tr>
<td>UK</td>
<td>United Kingdom</td>
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<tr>
<td>XML</td>
<td>eXtensible Markup Language</td>
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</table>
4 Definitions
For the purpose of this document, the definitions given in the ECOA Architecture Specification (ref. [AS]) Part 2 and those given below apply.

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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5 References

<table>
<thead>
<tr>
<th>AS</th>
<th>European Component Oriented Architecture (ECOA) Collaboration Programme: Architecture Specification (Parts 1 to 11)</th>
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<td></td>
<td>“ECOA” is a registered mark.</td>
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</table>

6 Guidance to Reconfiguration

6.1 Functional reconfiguration

Functional reconfiguration is equivalent to the notion of moding which may have an effect at different scopes:

- at service instance level (a change of functional behaviour is required for one given service),
- at component level (thereby possibly affecting more than one service provided by that component),
- or at system level (thereby possibly affecting more than one component).

Functional reconfiguration may be triggered:

- spontaneously by the component itself based upon internal decisions (e.g. the supervision module decides to change by itself the behaviour of the component),
- by receiving an order to do so from another component (e.g. a dedicated manager component requests mode changes of application software components – see system management guidance).

Mode change requests can be introduced with the help of a dedicated service operation within a functional service or within a dedicated moding management service. The initial mode can be set with the help of properties.

6.2 Wire switching

The wire switching can be initiated by the platform based:

- On a fault occurrence: the current server component ‘dies’ (e.g. the supervision module raises a fatal error) and the ECOA Infrastructure decides to switch the wiring to a secondary server component which becomes the actual server of the client.
- On a decision taken by the current server: the current server may declare the service it declares as unavailable – a secondary server, if available, then becomes the actual server of the client.
- Or on a decision taken by a server which is connected to the client with a lower rank value than the current rank: the server with the lower rank value may declare the service it provides as available and then becomes the actual server of the client.

The platform supplier may characterize wire switch behaviour on his platform by providing the maximum wire switch time or by informing if the wire switch is lossless or not.

6.3 Deployment change

On error notification, the ECOA Fault Handler may decide to replace the current deployment with a new one (see recovery action CHANGE_DEPLOYMENT in section 11.8 of [AS – Part 4]).

Furthermore, if the ECOA Fault Handler is being implemented as an ECOA ASC, it could make this decision based on functional information received from other components, using ECOA service links.

The new deployment may instantiate:
- either the same assembly schema but possibly on different computing resources – the same system behaviour is expected.
- or a new assembly schema. In that case, the new system behaviour may be different (e.g. to implement a degraded mode).

The platform supplier may characterize the deployment change on his platform by providing means of estimating the change time value, which depends on the target deployment.