European Component Oriented Architecture (ECOA®) Collaboration Programme: Guidance Document: ECOA® Logical Interface Example TCP/IP Binding

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0 Executive Summary

ECOA platforms communicate using the ECOA Logical Interface (ELI). The ELI defines a generic message format which is independent of the underlying transport mechanism. This guidance document provides an example of mapping this generic message format onto the Transmission Control Protocol (TCP) transport mechanism.

It is not in any way a “normative” part of ECOA, or even a definitive solution. The discussions here are purely examples of how ELI may be mapped on the TCP transport mechanism.

1 Scope

This document provides an example of mapping the ELI onto the TCP transport mechanism.

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 an example binding of ELI onto TCP.

Section 7 provides a summary of the guidance presented within this document.

2 Introduction

ECOA platforms communicate using the ECOA Logical Interface (ELI). ELI is an optional platform feature which may or may not be implemented within an ECOA platform. The ELI defines a generic message format which is independent of the underlying transport mechanism. This guidance document provides an example of mapping this generic message format onto the Transmission Control Protocol (TCP) transport mechanism.

The Transmission Control Protocol (TCP) mechanism is a protocol which uses a send/receive connect oriented mechanism to ensure the integrity of packets between a sender and receiver. TCP uses the Internet Protocol (IP) which is used extensively for client - service messaging. It is for this reason that the guidance has been produced for this protocol.

3 Abbreviations

API	Application Programming Interface
COTS	Commercial Off-The-Shelf
DGA	Direction Générale de l'Armement
Dstl	Defence Science and Technology Laboratory
ECOA	European Component Oriented Architecture
IP	Internet Protocol
MOD	Ministry of Defence
SOA	Service-oriented Architecture
TCP	Transmission Control Protocol
XML	eXtensible Markup Language
XSD	XML Schema Definition

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.

Term	***Definition***
IP	The **Internet Protocol** is a set of rules governing the format of data sent over the Internet or other network.
TCP	The **Transmission Control Protocol** is a set of rules that governs the delivery of data over the Internet or other network that uses the Internet Protocol, and sets up a connection between the sending and receiving devices.

5 References

AS	European Component Oriented Architecture (ECOA) Collaboration Programme: Architecture Specification (Parts 1 to 11) “ECOA” is a registered mark.

6 TCP Network Binding

This section describes an example TCP Network binding that allows the transmission of an ELI Message using the TCP/IP protocol. The binding shows one way that the TCP/IP protocol may be used to transport ELI messages; however it is not the only way that this may be done.

TCP is a connection-oriented (client/server) transport mechanism. The basic principle behind this binding is that each Platform is assigned a single TCP socket for receiving messages from other platforms (i.e. to act as a server). This socket could be given a standardised port number for all ECOA platforms (e.g. port number = 0xEC0A). In addition, each platform shall act as a client and connect to any platforms with which communication is required. Figure 1 depicts this relationship.

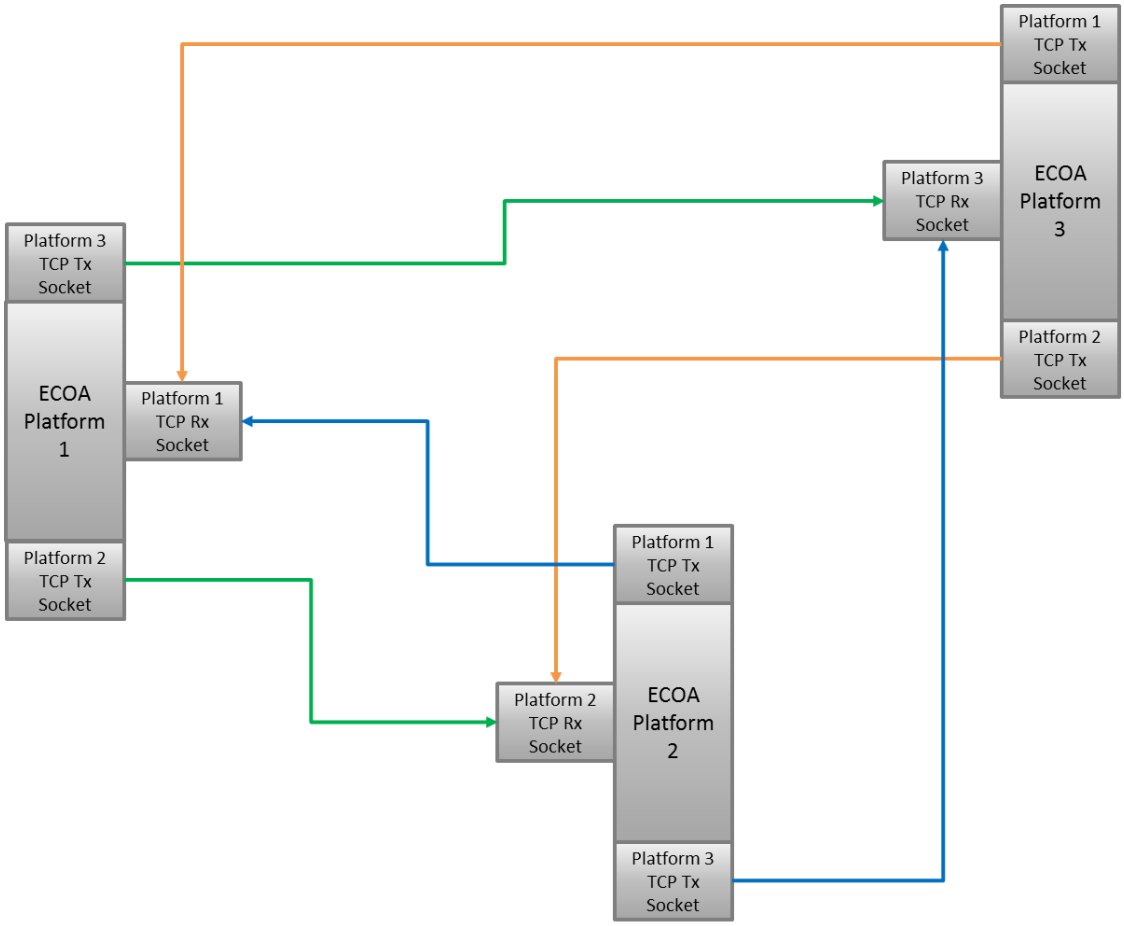

Figure 1 - Example of a TCP network logical architecture

TCP provides reliable, ordered and error-checked delivery of packets as part of its specification. This, coupled with the information enclosed within the generic ELI header provides sufficient information for a recipient to handle the message. No specialised TCP header is required for this binding.

If a platform consists of multiple nodes, using a single TCP socket for all inbound communication to a platform may not be efficient. This is due to the fact that there will be an overhead in forwarding the message onto the applicable node. In such situations, a more complex network topology may be beneficial (such as a single receive socket per node). However, this would imply that one node must be identified as being responsible for all platform-level management ELI messages (i.e. a “manager” node that is responsible for knowing the state of the entire platform).

The architecture shown in Figure 1 is one example; Figure 2 highlights another possible solution. In this example each platform is identified as either a client or server (for any given connection) and two way communications occur over a single connection.

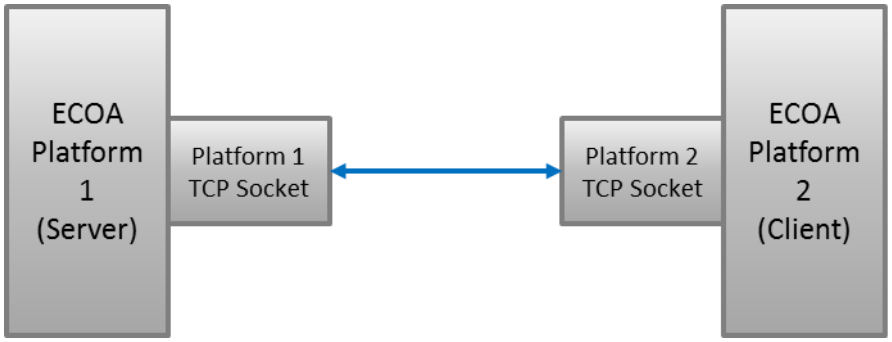

Figure 2 - Example Single Connection Binding

7 Summary

This document presents one method of using the TCP/IP transport mechanism to support ELI. This example aims to illustrate the concept; there are many network topologies which can be used and may be more or less suitable for any given deployment.