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10 – TECHNICAL ACTIVITIES

10.10 – TECHNICAL UPDATE

10.10.1.– Overview of the Maritime Connectivity Platform and progress report

Note by DTEC

1. INTRODUCTION

This note provides the Council with an overview of the Maritime Connectivity Platform (MCP), its current status, and the supporting role of DTEC.

It is important to understand that MCP is a set of concepts defining a specific type of digital communication platform. It is not a mandatory infrastructure or system to be operated by IALA. Information providers and consumers may make use of the MCP concepts without restriction. Interested parties may utilize MCP instances to provide reliable and secure platforms for digital communication in the global maritime environment.

2. DIGITAL SERVICE AND PLATFORMS

Digitalisation has the power to increase the safety, efficiency, and sustainability of shipping. Broadband communication provided by Low Earth Orbit (LEO) satellites, Maritime LTE, and others is a central enabler of digitalisation by providing a necessary means of data transfer between vessels and shoreside authorities and infrastructure. Systems with sufficient bandwidth allow for more secure communication than is possible through legacy communication technologies like Automatic Identification Systems (AIS) and NAVTEX by providing the opportunity to exchange authentication information like digital signatures for messages.

A digital service is defined simply as a computer system that communicates information to another computer system on request. Digitalised services will provide means to exchange necessary information and are the basis for a safe cooperation ship to ship, ship to shore, and shore to shore. Digital services are fundamental in implementing the Maritime Services in the context of e-navigation as defined by IMO (MSC.1/Circ.1610).

Important enablers for this are:

1. A way for users and machines to securely verify identities and authenticate messages.
2. A method to increase the discoverability of services to mariners.
3. An efficient way to exchange information and deliver new digital functionalities.

It is anticipated that digital services will become more and more independent of communication carriers over time, increasing availability and service quality. Examples of digital services may include:

- A computer system on board a vessel can request a weather report for a particular area from a digital service provided by a computer system on shore.

- Coastal state authorities are able to provide Maritime Safety Information (MSI) or updates on AtoN to mariners in a secure way.
- Vessels are able to exchange information on routes and intended behaviour with each other and/or VTS Centres; VTS Centres can provide information for optimal traffic flow.

A digital communication platform that makes use of MCP core features provides a foundation for the development of digital maritime services.

3. MARITIME CONNECTIVITY PLATFORM (MCP)



Figure 1: Overall Concept of the Maritime Connectivity Platform

MCP leverages proven internet standards to support maritime navigation and transportation systems. It is a decentralised framework that will enable efficient, secure, reliable, and seamless digital service provision and information exchange between all authorised maritime stakeholders across various communication systems (e.g. VDES, LEO, 4G/5G). It will enable maritime actors to use digital services to exchange both public and private information and is predicated on open, standardised, and powerful vendor-neutral technologies. MCP was initially created to address the goals of IMO's e-navigation initiative. However, MCP has the potential to support digitalisation across a much wider maritime domain using the concept of Web Services for identity and service management. MCP consists of three core components, as described below (See Figure 1). The core services may be used in concert, individually, or a combination thereof.

- **Maritime Identity Registry (MIR)** – MIR supports authentication for secure and reliable exchange of information by managing trusted identities and digital certificates. MIR is used across all digital services to facilitate confidentiality, integrity and authenticity in information exchange between machines (users).
- **Maritime Service Registry (MSR)** – MSR provides a means for registering and discovering relevant e-navigation services (commercial and non-commercial). MSR can be seen as a

sophisticated ‘yellow pages’ phone book of maritime services that can be searched using a number of different criteria.

- **Maritime Messaging Service (MMS)** – MMS allows maritime stakeholders to send and receive messages in an efficient, reliable, and seamless manner using various communication technologies. MMS may be used in conjunction with a variety of communication technologies (e.g. VHF Data Exchange System – VDES), including those with limited bandwidth.

4. BUILDING A DIGITAL INFORMATION SUPPLY CHAIN FOR THE MARITIME WORLD

Digital communication platforms, such as MCP, will support an “information supply chain” and exchange between ship(s) and shore. The platforms should be agnostic to the communication method used (LEO, Maritime LTE, etc.) As a common example, someone accessing a secure online banking service does not need to be concerned as to whether the digital communication is using 4G/5G, fibre, copper Asymmetric Digital Subscriber Line (ADSL) or Wi-Fi. The online banking service is discovered using a domain name service, and the communication channel is secured through a public key architecture (PKI).

4.1. Maritime Services (MS)

The concepts presented in this document provide a technical means to implement Maritime Services (MS) in the context of e-navigation (MSC.1/Circ.1610). Digital information delivered as part of a Maritime Service (e.g. Maritime Safety Information - MSI) should be available and presented through electronic navigation equipment integrated navigation system (INS) or ECDIS. Information is provided through technical services run by coastal agencies, retrieved by the systems on board and presented through the INS/ECDIS.

IALA Guideline G1128 provides information on how to make specifications of e-Navigation Technical Services. An MS can be implemented by one or more e-Navigation Technical Services.

4.2. CMD5 and S-100

The implementation and harmonization of e-navigation in a global maritime environment requires a Common Maritime Data Structure. The IHO S-100 Data Framework was selected by IMO for this purpose. Technical Services use data structures defined in S-100 based on Product Specifications being developed collaboratively by IHO, IALA, and other maritime stakeholders.

4.3. Secure Digital Communications

Security in the context of digital communication is generally discussed in terms of confidentiality, integrity, and authenticity. Confidentiality means that information is encrypted and can therefore not be read by other parties. Integrity means that you can trust the information is coming from the correct source. Authenticity means that it is guaranteed that information is not altered. Together these three aspects provide security. In the context of public navigation information, where it is desired for everyone to be able to read the information, only integrity and authenticity are desired. Digital signatures allow machine-to-machine validation, ensuring that information is derived from the correct source and that messages are genuine.

Security is a feature that is missing in many existing maritime communication technologies like AIS, NAVTEX, etc. These are very simple to spoof as they work without standardized authentication and signed messages.

4.4. VHF Data Exchange System (VDES)

Maritime Messaging Service (MMS) can be delivered over VDES, as was identified in IALA Guideline G1117 VHF Data Exchange System (VDES) Overview. MMS allows the connection between various

communications technologies, such as VDES and other systems using Internet Protocol (IP) networks. VDES can use MIR and its Public Key Infrastructure (PKI) to secure communication.

4.5. SECOM

SECOM is an IEC standard for secure communication with navigation equipment. It is the envisioned way to securely deliver digital information to ECDIS and INS. MCP provides Identity and Services Registries required by the SECOM standard.

5. MANAGEMENT AND ADMINISTRATION OF MARITIME CONNECTIVITY

Digital Platform providers, such governmental organisations or private bodies, operate core services for Identity and Service Registries and Maritime Messaging (MIR, MSR, MMS). These platform providers have the important role to generate and protect trust from users of their digital platform(s). MCP facilitates this role by providing means to manage and operate core services and vetting procedures.

6. ROLE OF IALA AND IALA MEMBERS

It is not required or expected that IALA has an operative role with MCP. IALA supports MCP through the work of the DTEC Committee to define standards, recommendation, and guidelines used by other IALA committees. IALA members can make use of digital platforms to implement maritime services in the context of e-navigation and for other needs like pilot operations, port collaboration, etc.

IALA members can adopt the concepts of MCP for the provision of digital services. IALA members are encouraged to apply existing G1128 based technical service specifications for their digital service(s).

IALA Members, who produce technical equipment can adopt MCP concepts to enhance standardization of interfaces. IALA members are invited to become members of the Maritime Connectivity Platform Consortium.

7. ROLE OF THE MARITIME CONNECTIVITY PLATFORM CONSORTIUM

The concepts of digital platforms and MCP have been discussed and developed for more than 10 years. Initial resources came from various European Commission-funded research projects around the world and significant contributions from IALA members and others. The Maritime Connectivity Platform Consortium (MCC) is a group of institutions that joined forces to foster the development of MCP. The MCC is not a legal body, but more than 40 members are working collaboratively toward a common global end, and any activity is done by and on behalf of the members themselves. The working procedures are defined by a consortium agreement.

Members of the MCC maintain a reference implementation, operate a public demonstrator for MCP core services and endorse MCP Service Providers. MCC members also collaborate to develop input papers for IALA, IEC, RTCM and IHO.

8. STATUS

Specifications for MIR have been adopted by the MCC and are being submitted from DTEC2 to Council for approval. This is the Document C80-10.6.2 Guideline on the provision of MCP identities.

Operational instances are run by an MCP Service Provider (Navelink) which has been endorsed by the MCC in May 2022.

The MCC has developed a draft specification and a running prototype of MSR. The specification will be submitted as an input document to DTEC3.

The MCC has developed a draft specification and a running prototype of MMS. The specification will be submitted as an input document to RTCM.

The Open Digital Incubator Initiative provides a forum through which several service providers develop technical services that utilize MCP.

9. RELATED DOCUMENTS

- R1019 Provision of Maritime Services in the context of e-Navigation in the Domain of IALA
- G1117 VHF Data Exchange System (VDES) Overview
- G1128 Specification of e-Navigation Technical Service
- G1157 Web Service based S-100 Data Exchange
- G1159 Ed2.0 Ship Reporting from a Shore-based Perspective
- G1161 Evaluation of Platforms for the Provision of Maritime Services
- G1164 Management of Maritime Resource Name Organisation Identifiers
- MSC.467(101) on Guidance on the definition and harmonization of the format and structure of Maritime Services in the context of e-Navigation
- MSC.1/Circ.1610: Initial Description of Maritime Services in the context of e-Navigation.
- The Maritime Connectivity Platform (MCP) Conceptual Overview
(<https://maritimeconnectivity.net/mcp-documents/>)
- W3C Web Service Architecture <https://www.w3.org/TR/ws-arch/>
- X.509 Public Key Infrastructure Certificate Policy and Certification Practices Framework
<https://datatracker.ietf.org/doc/html/rfc3647>
- S-100 IHO Universal Hydrographic Data Model

10. THE COUNCIL IS REQUESTED TO

NOTE the information provided in this and related Documents.