**Paper for Consideration by NIPWG9**

**Intended use and distribution of S-1xx products**

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| ***Submitted by:*** | NIPWG Chair |
| ***Executive Summary:*** | At HSSC 13, NIPWG offered to create a paper to describe the operational aspects of the future S-100 environment. This work will help tell the S-100 story and reduce the ambiguities of the intended use of each S-100 product within the S-100 environment. |
| ***Related Documents:*** | S-100 and S-1xx product specifications |
| ***Related Projects:*** | S-100 Architecture, S-100 Roadmap |

## References

IHO NIPWG S-100 architecture
IHO S-100 Brochure
IMO Resolution MSC.232(82) – ECDIS Performance Standard
IHO Roadmap for the S-100 Implementation Decade
IHO HSSC14 Report

## Background

At HSSC 13, NIPWG offered to create a paper to describe the operational aspects of the future S-100 environment. This work will help tell the S-100 story and reduce the ambiguities of the intended use of each S-100 product within the S-100 environment. The work can be used for discussions both inside of IHO and outside while engaging stakeholders such as IMO and IALA. This work was recorded at HSSC13 as action 13/41 and was renewed at HSSC14 as 14/49. A first version of this work should be presented at HSSC15.

When consensus has been reached on this phase of the work, more efforts can be put towards the descriptions of IMO's Maritime Services in context of e-navigation to ensure that the S-100 products that are under IHO remit are correctly captured in the relevant Maritime Services descriptions. Moreover, the work can inform the development and maintenance of the S-98 Interoperability Catalogue.

## Discussion

The NIPWG report to HSSC 13 noted "*The focus of the paper is the description of how products work together in an S-100 based environment. This environment envisaged complexity, more interoperability and the use of the information for purposes beyond navigational purposes. The paper should further address the internal and external data contributions, data stream aspects and legal questions* ". This paper focuses on the first part of this work to highlight the purposes of the S-1xx products and will support the next step of the HSSC action 14/49 with describing the data sources of each product in a general way.

Any detailed description of the intended use of a product created from a S-100 based product specification tends to be too complex and verbose for a simple overview of what the product is supposed to do. Such detailed descriptions may even be a hinderance to discussion with stakeholders. Therefore, in an effort to simplify such description, this paper aims to develop two tables (see Annexes A and B) that gives an overview of the intended use in a navigation setting in simple terms, how the information they contain is updated and how the products will be distributed.

The content of the two tables utilize terminology that may need further definitions to sufficiently convey the intended message. A proposed set of definitions are listed below, but it should be noted that further definitions may be needed as the tables develop.

*Base layer* – is the fundamental data layer that contains the minimum data necessary for the S-100 ECDIS to work as a navigation tool. The information in this layer is generally drawn first during the rendering process.

*Overlay* – is an additional data layer that augment the portrayal of data in the base layer according to predefined rules, for example as defined in S-98 Interoperability Catalogue.

*Replace* – in the context of an S-100 ECDIS environment means to suppress the display of the information that is being replaced (usually in the ENC) and portray instead the information that is replacing the original information as per rules contained in an S-98 Interoperability Catalogue. An example of how this can work is found in S-100 Ed.5.0.0 16-B-2.6 'Skin of the Earth replacement'.

*System Database* – means a database, in the manufacturer's internal ECDIS format, resulting from the lossless transformation of the ENDS contents and its updates. It is this database that is accessed by ECDIS for the display generation and other navigational functions, and is equivalent to up-to-date ENDS (NCSR 9-16-1)

## Recommendations

The content of the two tables in Annexes A and B should be reviewed and amended as appropriate and consideration should be made as to the appropriate time to request input from other working groups.

Definitions of terms used in the tables should also be reviewed and amended as appropriate.

Once the content of the two tables in Annexes A and B has been agreed upon, it should be used to develop further materials that show the most common sources of data used in each product to highlight the data dependencies of the S-100 environment.

## Action Required of NIPWG

The NIPWG is asked to:

1. Note this paper
2. Consider the recommendations made in this paper

**Annex A – Table with basic information on the intended use of S-1xx products**

Table 1 – Basic intended use of S-1xx products

| S-1xx | Utilization | Notes |
|---|---|---|
| S-101 | Electronic Navigational Chart - Base layer for navigation systems | Global coverage by utilizing several scale bands.<br>Updates are issued as delta changes as by producer as needed. New information may require several weeks processing time before update is ready. |
| S-102 | Bathymetric chart overlay that replace depth areas, depth contours and soundings. | Local coverage – high resolution.<br>Regional coverage – medium/low resolution.<br>Updates are issued as replacement datasets generally as per survey schedule of the particular area. Turnover from survey completion to dataset can be as low as 24h or less. |
| S-104 | Water level information overlay that replace water level information in ENC and can be used to augment depth information on ENC and S-102 | Local coverage – high resolution.<br>Global coverage – lower resolution.<br>Available as forecasts several times a day, e.g. every 6 hours.<br>Information is based on measurements and interpolation.<br>Can be predictions or near real time observations. |
| S-111 | Surface current overlay that replace current information on ENC | Local coverage – high resolution.<br>Global coverage – lower resolution.<br>Available as forecasts several times a day, e.g. every 6 hours.<br>Information is based on measurements and interpolation.<br>Can be predictions or near real time observations. |
| S-121 | Maritime limits and boundaries. | Developed as a means to exchange information about maritime limits and boundaries claims.<br>Not for navigation, but may be source for similar information in navigation products. |
| S-122 | Marine protected areas overlay that replace MPA information on ENC. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. May require several weeks processing time. |
| S-123 | Marine radio services information that overlays and enhance ENC for route planning and relevant subsets of information can be recalled at specified points during route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. May require several weeks processing time. |
| S-124 | Navigational warnings that overlay ENC and that is always on during both route planning and route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as new datasets that either introduce new information or replace/cancel old information. |

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| | | Available within minutes of source information becoming known. |
| S-125 | Marine Aids to Navigation status information overlay, including outages and planned changes, that enhance AtoN information on ENC for both route planning and route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. Available within hours of source information becoming known. |
| S-126 | Physical environment information overlay that enhances ENC information for both route planning and relevant subsets of information can be recalled at specified points during route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. May require several weeks processing time. |
| S-127 | Marine Traffic Management information that overlays and enhance the ENC for route planning and relevant subsets of information can be recalled at specified points during route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. May require several weeks processing time. |
| S-128 | Catalogue of nautical products information that provides information about nautical products available in an area and enable the navigation system to verify how up-to-date the navigation information in the System Database is. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. Available within hours of source information becoming known. |
| S-129 | Underkeel clearance management information that overlay the ENC for route planning and route monitoring. | Local coverage.<br>Scale independent information specific to a vessels passage plan.<br>Updates are issued as whole dataset replacement as per service schedule; a dataset may be issued weeks before passage for planning purpose, while during passage new datasets may be issued e.g. every five(5) minutes. |
| S-130 | Sea area identifiers | A modern replacement for S-23.<br>No names intended to be included in the standard, just identifiers for polygons meant to represent commonly agreed sea areas.<br>Not for navigation. |
| S-131 | Marine Harbour Infrastructure information that overlays ENC for route planning and relevant subsets of information can be recalled at specified points during route monitoring. | Global coverage.<br>Scale independent information.<br>Updates are issued as whole dataset replacement as needed. May require several weeks processing time. |
| S-98 | Interoperability catalogue | Global coverage.<br>No scale impact.<br>Updates are issued as whole catalogue replacement as needed. |
| S-412[1] | Weather warnings that act as not intrusive overlay that is always on during both route planning and route monitoring. | Global coverage.<br>Scale independent information. |

[1] Under WMO remit, but included as an important part of MSI

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| | | Updates are issued as new datasets that either introduce new information or replace/cancel old information.<br>Available within minutes of source information becoming known. |
| S-421[2] | Route plan that is used by the navigation system to hold references to relevant information at the appropriate section of the route. | Unique product to a journey. Can be amended onboard and may be exchanged with external parties, or received from external parties. |

[2] Under IEC remit, but included as an important part of route planning and monitoring

**Annex B – Table with basic information about how S-1xx products will be distributed**

Table 2 – basic intended means of exchanging S-1xx products

| S-1xx | Primary means exchange | Notes |
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| S-101 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)). |
| S-102 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)). |
| S-104 | Data is packaged as exchange sets. Distribution of the forecasts issued multiple times a day is not clear within the RENC model. | RENC model seems to currently work best for information that is not frequently updated, but have some ambiguities for how it can work for information with several updates per day.<br>Data distribution must consider end user access and prepare for MASS. |
| S-111 | Data is packaged as exchange sets. Distribution of the forecasts issued multiple times a day is not clear within the RENC model. | RENC model seems to currently work best for information that is not frequently updated, but have some ambiguities for how it can work for information with several updates per day.<br>Data distribution must consider end user access and prepare for MASS. |
| S-121 | Data is packaged as exchange sets. | Not for navigation.<br>Data might be used as source for navigation products and distribution might be limited. |
| S-122 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)).<br>In some nations it may not be the hydrographic office that is responsible for this service. |
| S-123 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)).<br>In some nations it may not be the hydrographic office that is responsible for this service. |
| S-124 | Data is packaged as exchange sets and made available via a MSC.467(101) compliant service. SECOM is the intended communication channel[3]. | Unclear if SECOM will be included in ECDIS performance standard. Awaiting NCSR10 discussions.<br>Data distribution must consider end user access and prepare for MASS. |

[3] Intended by S-124PT and still to be approved by WWNWS-Sc and IMO. The last mile link (access to the ECDIS) is still under debate.

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| S-125 | Data is packaged as exchange sets and made available via a MSC.467(101) compliant service and/or RENCs. | Both hydrographic offices and AtoN authorities are possible data producers.<br>Data distribution must consider end user access and prepare for MASS. |
| S-126 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)). |
| S-127 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)).<br>In some nations it may not be the hydrographic office that is responsible for this service. |
| S-128 | Catalogue is packaged as exchange set. | Creation and distribution of S-128 exchange set depends on who makes it. There is an ongoing debate on how it should work. Several options possible, including getting the information from multiple sources. Receiving system would then need to de-conflict information. |
| S-129 | Data is packaged as exchange set and distributed from the specific service. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)).<br>In some nations it may not be the hydrographic office that is responsible for this service. |
| S-130 | Unclear, but exchange set packaging is expected. | Not for navigation.<br>Data might be used as source for navigation products and distribution might be limited. |
| S-131 | Data is packaged as exchange sets sent from hydrographic offices to RENCs, which after validation makes the information available to VARs using bespoke means sent the data to end users. | Unclear if method is compliant with IMO e-Navigation principles (Res MSC.467(101)). |
| S-98 | Catalogue is packaged as exchange set and made available from IHO. | The path to end user system is somewhat unclear. May be sent by OEM to end user system. |
| S-412[4] | Data is packaged as exchange set. | Unclear what plans WMO has for data distribution, but assume it will align with one of the methods described, probably S-124. |
| S-421[5] | Data is packaged as exchange sets and made available via a MSC.467(101) compliant service. SECOM is the intended communication channel. | Unclear if SECOM will be included in ECDIS performance standard. Awaiting NCSR10 discussions.<br>Data distribution must consider end user access, cybersecurity and prepare for MASS. |

[4] Under WMO remit, but included as an important part of MSI since the means of data exchange should be near identical.

[5] Under IEC remit, but included since the means of data exchange (SECOM) can be utilized by S-1xx products.