

## Paper for Consideration by S100TSM9

### Observations on S-128

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Executive Summary:	Drafting of S-164 and considerations for dual fuel mode operations of S-100 ECDIS have implications for S-128.
Related Documents:	S100WG7-4.3
Related Projects:	

#### Introduction / Background

This paper describes some observations noted during the drafting of S-164 concerning how S-128 affects the operation of the ECDIS. Only considerations relating to S-100 ECDIS operation are noted here, no other S-128 use cases are described. Some could be addressed through S-128 itself, others through updates to S-98 in respect of how it manages S-128 on S-100 ECDIS.

#### Analysis/Discussion

S-128 has multiple purposes on an S-100 ECDIS and it is useful to begin analysis by considering those. The purpose of S-128 within S-100 ECDIS is:

1. To define the content of the ECDIS Update Status Report (ENC and ENP). This informs the user of the status of each S-100 dataset installed and whether it is “up to date” in respect of the “service”..
2. For this purpose the S-128’s “issue date” (as defined in the CATALOG.XML) is the reference date/time marking the date to which the system database (was “SENC”) is updated to. Anything which is marked in S-128 as more up to date than something installed is marked as “not up to date”. Anything without an S-128 entry is marked as “unknown” status.

Under S-57/S-63 this function was carried out by the PRODUCTS.TXT and SERIAL.ENC files, a system evolved in a number of iterations by stakeholders.

S-128 is GML encoded. Under S-100 Part 10b GML files can be “updated”. The update mechanisms allows GML files to be marked as an update (to a particular edition) and any GML members then are either added or replace elements in the current edition. This addresses one of the biggest issues with the PRODUCTS.TXT approach where each delivery to the ECDIS had to contain a complete database of all elements in the service often larger in size than the data payload of the exchange set.

Therefore, using edition/update numbers of the S-128 enables service providers to keep systems current with all changes necessary to generate efficient update status reports without the need for a complete replacement every time an update is sent to the ECDIS.

#### Coverage

S-128 has the ability to carry coverage information (although the modelling needs some adjustments to bring it into line with that provided by CATALOG.XML). This is useful for the following reasons.

- It is useful for some ECDIS to have a graphical catalogue which contains boundaries of products which are available but not installed on the ECDIS (S-98 forbids this but it should be considered as it is a common requirement on current ECDIS).
- The update status report can be run on routes as well as across the SENC as a whole (and is more likely to be run over routes). This requires a spatial intersection to be run between installed (and available)

products and the revision information contained in S-128 (or from dataset coverage installed in the ECDIS).

This means that ALL products which are used in the Update Status Report must have a defined “coverage” – the area over which data may be defined or it is impossible for the system to say whether a particular area is current in respect of an individual data product or whether no data is defined in that region (e.g. S-124 and S-129). So, the presence of “coverage” in S-128 needs to be addressed and resolved explicitly for the support of the Update Status Report (if these coverage polygons are replicated from those in datasets, then some form of validation between S-128 and the products would need to be in place to ensure consistency between the ECDIS operation and the Update Status Report).

Whatever is decided in respect of S-128 should keep in mind size issues. Including detailed coverage may make S-128 datasets very large (particularly when an entire service is being transmitted).

It is recommended that in, general, as much commonality between S-128 and CATALOG.XML as possible is achieved to help compatibility and avoid ambiguity in the entries between CATALOG.XML (that which is being delivered in the exchange set) and S-128 (reflecting the status of the service as a whole).

### **Producer Codes**

S-100 mandates unique dataset filenames. The general form is :

Dataset naming shall follow a standard pattern to give implementers the assurance of unique names for incoming datasets.

XXXXXXXXXX[EXT]

- XXX is the product code (for example, 123 is for Maritime Radio Services; 101 for ENC)
- YYYY is the producer code according to the Producer Code Register
- XXXXX is an arbitrary length unique code in alphanumeric characters including any differentiating characters as required. The code shall be unique for the data producer (that is, different data producers may use the same code) and not re-used.
- EXT is the file encoding specific file extension

So, from the ECDIS point of view the S-128 content, when imported is specific to a “data producer”. This is most likely to be the “Service Provider” acting as the data producer of the S-128 data. So, it is entirely within the remit of the Service Provider to define the content of the S-128 data, although in the vast majority of cases much of the information will be supplied by their individual data providers. For example a RENC may receive S-128 data from individual hydrographic offices, for others they may compile it themselves but ultimately an aggregation of the individual S-128 elements will be produced and sent with the exchange set delivery to the ECDIS (this is similar to how CATALOG.XML will be aggregated by service providers). This S-128 would then hold the producer code of the RENC.

There are no standards for S-128 file naming over and above the S-100 requirements noted. There probably does not need to be any further requirements but the ECDIS is expected to “merge” different S-128 datasets together (should it receive multiple S-128 datasets), and should keep different service providers separate in the system database. This mirrors the requirement under S-57/S-63.

Should the ECDIS load an exchange set without an S-128 component then anything installed should be marked as status “unknown” reflecting the fact that although it is installed and can be used it is not known whether it is the latest revision available. Such datasets can (in theory) be installed and should not affect the operation of the ECDIS outside the update status report. A separate paper has been written offering a mechanism for determining whether to load such datasets.

### **Update/Edition numbers**

If the S-128 is defined wholly by the service provider it allows them to maintain a set of revision delivered to the ECDIS and manage services with the end user. The use of update and edition numbers can ensure the ECDIS only loads exchange sets which are compatible with those already in place and can point out where out-of-sequence or gaps exist. This also mirrors how most services operate today.

The main types of exchange set content delivered to ECDIS today are:

1. “Base” exchange sets – these comprise the entire content of a service provider’s service. The ECDIS is then able to unpack and import those for which a licence is owned. These are reissued periodically.
2. “Update” exchange sets – holding a **cumulative** set of all updates since the last Base exchange set. This is cumulative because new customers can then be issued with a single Base/Update combination which contains the entire service simplifying considerably how a new customer is brought “up to date”
3. “Incremental” exchange sets – an exchange sets holding all the changes issued since a defined point in time. For example, in a weekly service an incremental Week 24 exchange set holds all data changed since Week 23. In this scenario a new user (or a user who only periodically receives/installs updates) must ensure they have ALL the incremental exchange sets since their last full (i.e. Base) installation.

“Tailored” services are subsets of these types where the service is restricted either geographically, or just to a user’s individual holdings. In this way services are built up by service providers.

The observation with S-128 is that the edition/update number mechanisms is capable of supporting each of the major types of service, including tailoring. It is up to individual service providers how they manage update/edition numbers of S-128 data. For each of the categories listed.

1. Base exchange sets are likely to be new editions of named S-128 datasets
2. Cumulative updates can be incremental updates or reissues of S-128 datasets
3. Incremental updates should be numbered S-128 updates as they identify an edition to which they apply, and they can trap out of sequence or missing updates.

In all cases the latest S-128 issue date is used as the reference for the update status report.

### **Equivalence**

An area missing in S-100 as a whole is how to establish if a dataset is “equivalent” to another dataset. Under dual Fuel operations S-98 mandates the loading of the S-101 “version” of an ENC in preference to the S-57 “version”. However, no explicit mapping exists between such ENCs which the ECDIS can use to determine which to load. S-128 offers an opportunity to define such mappings. This should take one of the two forms:

1. S-128 contains entries for all ENCs in both S-57 and S-101 form, an association in the S-128 model then defines equivalence between an S-57 dataset and one or more S-101 datasets. This would also allow multiple S-57 datasets to map to a single S-101 dataset.
2. S-128 only contains S-100 products. Equivalent datasets are held as attributes of S-101 datasets.

This mapping informs the ECDIS import process but does not affect the loading strategy. The ECDIS loading strategy begins from the point of having S-101 (and, potentially, S-57) datasets loaded in the System Database. S-128 is used by the ECDIS at import time to determine which cells to import. This then allows new equivalent S-101 datasets to be installed on update.

### **Charts?**

An additional consideration is classifying all S-100 data within a service as either

- “Chart” data (currently S-57, S-101 or S-421 but theoretically this list could be expanded)
- “Chart Related” data, non chart data but which is extremely closely related, predominantly those layers used in Water Level Adjustment and User Selected Safety contour e.g. S-102, S-104 and S-111
- “Overlays”. Designed to overlay chart data, be incorporated within the interoperability catalogue e.g. S-124, S-127, S-131 etc.

Such classifications are useful for the ECDIS to understand what is a chart (and therefore a foundation of the portrayal to the user) and which products are designed to overlay the chart. The fundamental point to make is that

in all areas of portrayed data, the foundation (drawn first) is the chart and portrayal of layers without a chart is prohibited.

### **Conclusions**

- With the addition of S-57/S-101 equivalence S-128 offers a flexible approach to service providers for delivery of exchange sets to end users with the added advantage of not requiring complete delivery with every exchange set (as is required with PRODUCTS.TXT).
- More modelling of S-128 accompanying exchange sets needs to be done to check that ECDIS is always given an unambiguous set of data and that any errors/warnings can be generated as necessary.
- Better guidance should be given to ECDIS manufacturers via S-98 and through the S-164 tests to make sure scenarios reflect operational services.
- A classification of each product is required on the ECDIS for data management.
- Equivalence between S-57 and S-101 is necessary and makes it explicit to the ECDIS which cells to import to the System Database.

### **Action Required of S-100WG TSM**

The S-100WG TSM is invited to:

- Note the paper and discuss proposed changes to S-128 and S-98.