



# 14<sup>th</sup> Meeting of the WENDWG

## **Stakeholder session**

### **View of Furuno**

**on**

## **Expectations from Mariners and End User Service Providers on ENDS provision**

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WENDWG14, Norfolk, US, 20 – 22 February 2024



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# INTRODUCTION/BACKGROUND

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Organization

## FURUNO as ECDIS OEM for S-57 based ECDIS generation

- Own technology, focus on end user performance
- One of the first in the market
- Customer driven
  - S-57 ENC
  - S-57 AML
  - CMAP
  - ARCS
- S-57 ENC part has always been based on reading IHO format (i.e. no SENC delivery)
  - Result is that probably the Furuno ECDIS installation base has been the largest open market for competition by various S-57 chart delivery operators (for example Navtor, Chartworld, etc.)
- Furuno has always provided possibility for S-57 ENC chart delivery by Furuno as “distributor”
  - “distributor” offers content as available from RENC (AVCS or PRIMAR) or as available directly from an individual HO. This means no need to digitally sign by Furuno
  - “Gate-1” onboard device for cyber secure online delivery
  - Payment or licensing alternatives: Traditional selection of charts or Pay as you goes



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# BENEFITS OF S-100 ECDIS

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## Expected benefits

- Planning based on tidal and water level windows (S-102, S-104)
- Possibility to gain free speed based on surface currents (S-111)
- Possibility to have deeper draught and more cargo (S-102, S-104, S-129)
- Later in phase 2 also digital integration of Nautical Charts and Nautical Publications for each voyage



## Essential functionality for usability

- Machine can check and inform about up-to-dateness of holdings
- Product catalogue ([S-128](#)) should serve also as sales catalogue, about what is available

## Simple model for liability

- **End-to-end cyber security**
  - **Signed by the original source**
  - **Authenticated** by final end user (=ECDIS) **against the original source**
  - **No playing by the delivery chain** => no additional liable parties
  - **No additional digital signatures by the delivery chain**
- **IMO SOLAS:** *... nautical charts and nautical publications **adequate and up-to-date** for intended voyage ...*
  - Product catalogue ([S-128](#)) shall support capability for machine support about
    - checking holdings against available coverage (= [adequate](#)) and
    - checking holdings against [up-to-dateness](#)



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# ABOUT CURRENT DELIVERY METHODS

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**Original CD/DVD delivery** is soon close to be only history

**Online delivery** is becoming de facto method

- Note that online delivery **use the folder structure of the original CD/DVD** as that structure is known by every ECDIS

**Digital signature** of the current S-63 provides “**end-to-end**” cyber security

- Original source has signed the content
- Final end-user (=ECDIS) authenticates
- No possibility for additional cyber security vulnerabilities from middle actors



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# **DISTRIBUTION ALTERNATIVES CURRENTLY IN USE**

## **VAR = Value Added Reseller**

- Can play with all material: Add, remove or amend the content compared to the original source from HO for the delivery to ECDIS user
- Amendments require digital signing by the VAR

## **Distributor**

- Provide only transfer service “as it was” from HO or RENC to ECDIS user
  - Can optimize which charts or updates are transferred based on traffic area or route plan of the ECDIS user
- Availability and coverage information (S-63 or S-128) is unmodified “as it was”
- All digital signatures are unmodified from HO or form RENC from HO or RENC

HO – **RENC** – **VAR** – ECDIS

For example, HO – PRIMAR – Transas - ECDIS

HO – **RENC** – **Distributor** – ECDIS

For example, HO – PRIMAR – [Furuno](#) - ECDIS

HO – **RENC** – **VAR** – **Distributor** – ECDIS

For example, HO – IC-ENC – UKHO AVCS – [Furuno](#) – ECDIS

HO – **VAR** – **Distributor** – ECDIS

For example, HO – CMAP – [Furuno](#) - ECDIS

HO – **Distributor** – ECDIS

For example, NOAA webpage – [Furuno](#) - ECDIS

HO – ECDIS

For example, NOAA webpage - ECDIS



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# CYBER SECURITY – ALREADY REQUIRED TODAY

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Today we cannot ignore cyber security

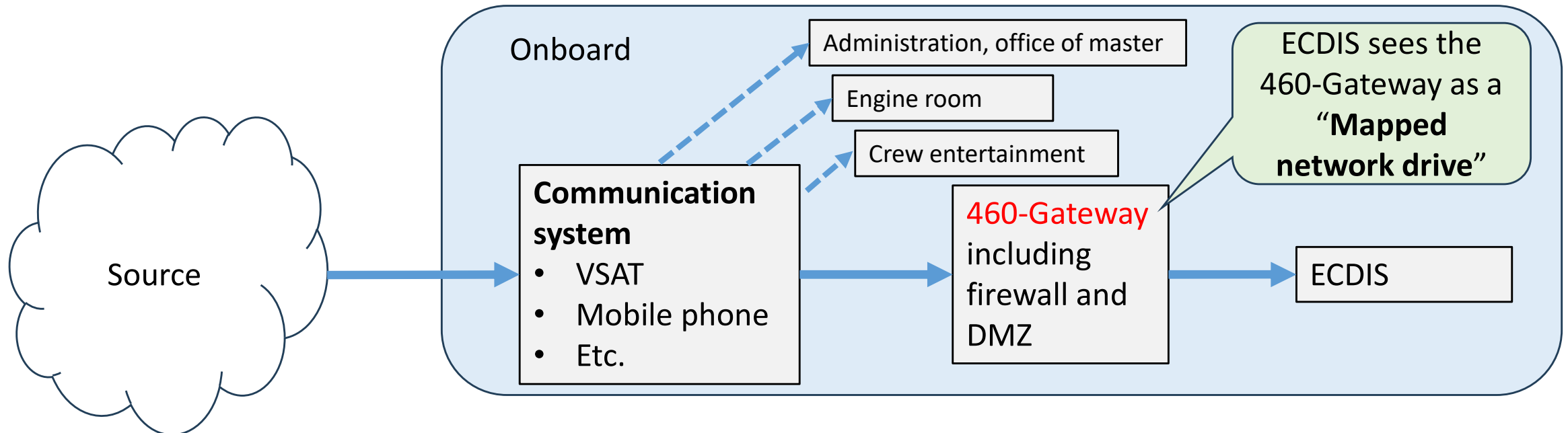
- The time period of **email attachments** and **USB memory sticks** is ending

**IMO** does not yet require mandatory hw/sw implementation of cyber security

But **classification societies** (DNV, Lloyds, etc.) require cyber security (see **IACS UR E26** and **IACS UR E27**) as mandatory from **1<sup>st</sup> Jan 2024** for all new classification agreements (**new buildings** and **retrofits**)

Typically, the onboard box (for example, **Furuno Gate-1**) is a **type approved 460-Gateway** (see **IEC 61162-460**)

Typically, the onboard box (460-Gateway) is seen by ECDIS as a **mapped network drive** (for example “E:”) and the **content is arranged as specified by S-57 and S-63 for delivery of ENC charts by CD/DVD**





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# INFORMATION SOURCES FOR S-100 DUAL-FUEL ECDIS

ENC charts:

**S-157, S-101** by **HO**, **S-125** by **AtoN authority**

Detailed bathymetry and water level:

**S-102, S-104** by **HO** or by **Port authority**

Surface currents

**S-111** by **HO** or by **responsible government agency**

Navigation warnings

**S-124** by **Nav area coordinator**

Weather information

**S-411** by **Met area coordinator**

**S-412, S-413** by **responsible government agency**

UKC management

**S-129** by **UKC management service provider**

Route plan exchange

**S-421** by **VTS centre** or by **Rescue centre**

Nautical publications

**S-12x series** by **HO** or by **responsible government agency**

Port call agreements

**S-131** by **Port authority**





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# FUTURE NEEDS FOR DISTRIBUTION OF S-100 PRODUCTS

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Within the **"S-57 only ECDIS"** period all information for ECDIS originated from HO

Arrival of **Dual-fuel S-100 ECDIS** adds a lot of new original sources of information

- As listed in previous slide

## **New issue is how to arrange all this**

From ECDIS user point of view the solution **should be simple to manage**

- Probably preferable limited number of service providers
- Clear method to know, if parallel availability, when to use S-101 or S-57

## **Could there be just a single source service provider for a given ship**

- HO information could go through a single RENC
- Streaming information (S-124, S-411) may not be suitable for going through a RENC
- Difficult to forecast to whom of the new original sources a given ship need connection
  - VTS centres, Rescue centres, Port authorities, etc.



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# WHEN TO USE S-101 OR S-57

**Reality is that provision of S-57 ENC charts will continue as long as there is no declared sunset of S-57**

- The S-101 coverage will grow to be available in parallel to S-57
- This is not a problem for “S-57 only” ECDIS
- But this is a challenge for S-100 compliant “Dual fuel ECDIS”

## **Challenges for the method to select S-57 or S-101 priority**

- There is no equivalence at chart cell level
  - Use of **S-57** is based on “**navigational purpose**”
  - Use of **S-101** is based on “**scale range**”
- A **generic selector** “always use S-57” or “always use S-101” **will not fit for purpose**
- The selection method **should be machine-managed** (or at least machine-assisted)
  - Expected place for specification of the method for ECDIS is “**S-98 Annex C**”
  - But the method in the S-98 Annex C will be based on available meta data, for example included in
    - S-63 “PRODUCTS.TXT”
    - S-128
    - Metadata from each S-57 or S-101 cell
- **These details are totally unclear and not yet set**



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# GUIDANCE GIVEN BY IMO FOR TRANSFER OF INFORMATION

IMO has not specified how the S-100 information from the HO shall be distributed

But IMO has a plan to require implementation of **IEC 63173-2 SECOM** as [mandatory method for exchange of S-421 Route Plans between government authorities \(VTS centres, Rescue centres, etc.\) and ships](#)

- Drafted by IMO NCSR-10, 2023
- [Final endorsement by IMO MSC-108, May 2024](#)
- For IMO, SECOM is a part basic functionality of a type approved ECDIS
  - Type approval includes all onboard parts of the SECOM implementation
  - One or multiple boxes is not the issue, but if many boxes, then all boxes must be presented together for type approval

## SECOM

- [Payload agnostic](#), can transfer anything based on files => suitable for all S-100 based products
- [Include cyber security based on IHO S-100](#)
  - Provide support and facilities for “public keys” of individual ship, VTS centres, Rescue centres, Port Authorities, Ship owners, etc.  
=> Key feature to enlarge user groups
- Connects to registries specified by IALA Maritime Connectivity Platform (MCP)

SECOM is a possible way to implement worldwide standardization for the delivery chain



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# EXISTING SECOM IMPLEMENTATION

## Navelink as SECOM service provider

- SECOM originates from Sweden lead Sea Traffic Management (STM) validation testbed
  - Close to 300 vessel participated
- SECOM was drafted based on lessons learned from STM validation testbed project
- After the end of the STM validation project, the key persons from implementation of the shore server for STM validation established Navelink

At IHO S-100WG, Nov 2023 meeting, **Australia (AHO)** demonstrated fully working implementation of S-124 Navigational warning distribution and display

- AHO claimed that implementation based on IEC 63173-2 was easy and took less than 6 months
- Source of Navigational warnings (S-124) was Australian government authorities
- Onboard display was by application developed by AHO
- Transfer was by SECOM implementation by AHO

## Multiple SECOM implementations ?

- The issue is same as one or many RENC implementations
- Coordination is probably needed for original source connection sharing
  - It is mainly about sharing content of “Identity register” and “Service register” of the “IALA MCP” concept



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# PUSH OR PULL FOR TRANSFER

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## Push from shore to ship

- **Shore is responsible** that products are received by onboard arrangement/ECDIS
  - Include repeated sending of missing parts
- **Always open onboard interface is a big cyber security vulnerability**
  - Always available for hackers to knock the door and to get inside

## Pull from ship

- **Ship is responsible** that products are received
  - Easy to understand what is missing and to ask re-transmit of just the missing part
- **High cyber security as there is no open interface of port available for hackers**
  - Onboard pull-process knows the addressed from which to pull
- Pull method is based on **timer activation**
  - Based on timer the onboard pull process 'check if the shore has new content for downloading



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# CONTROL OF AVAILABILITY AND UP-TO-DATENESS

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## Streaming style products, for example S-124, S-411, etc.

- Looks like that instead of S-128 they will have something called as “bulletin”
  - Drafting of the “bulletin” has just started

## Products intended for an individual ship, for example S-129, S-131, S-421, etc.

- No need for availability or up-to-dateness control by “bulletin” or by S-128

## Nautical charts, Nautical Publications

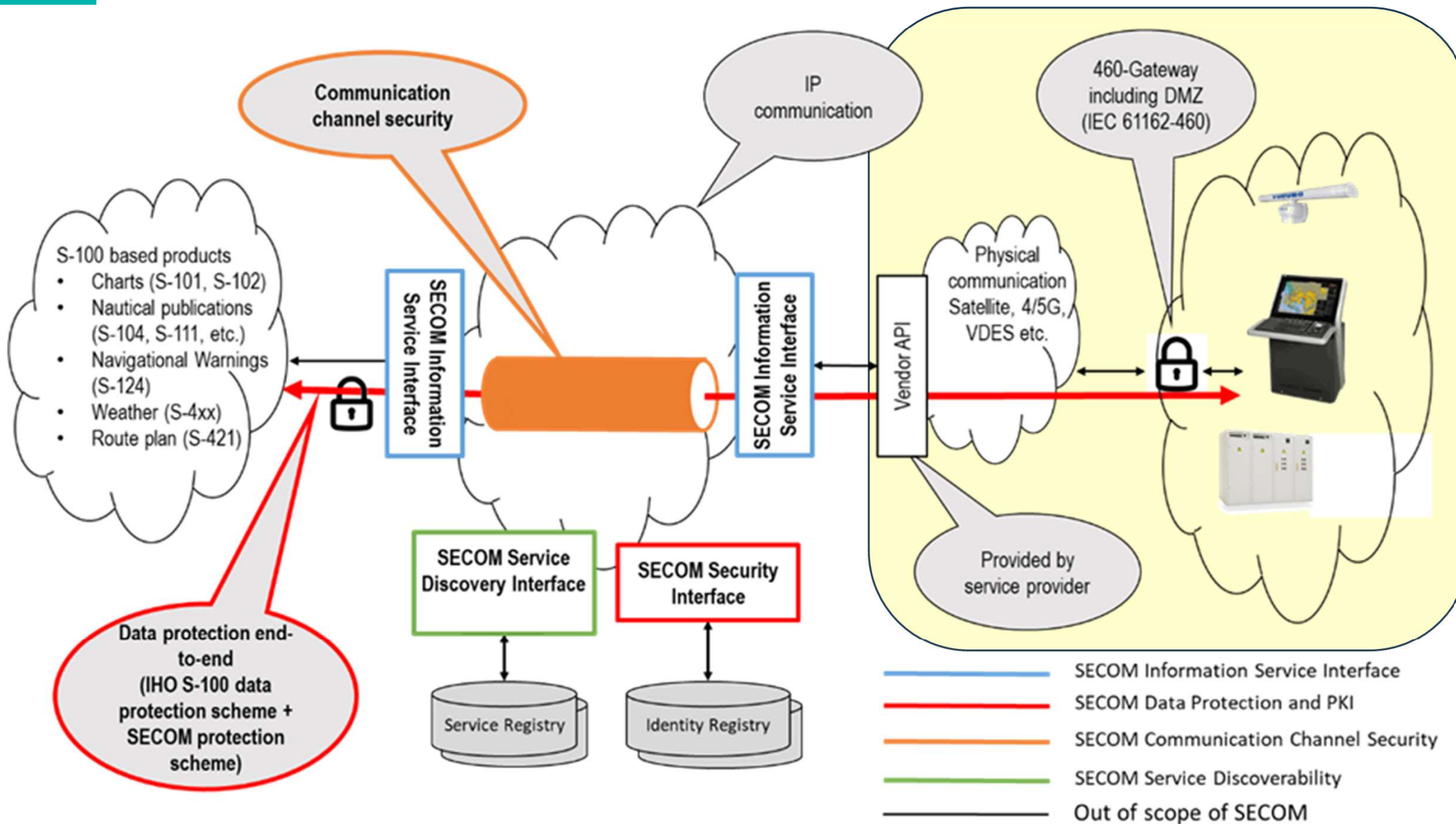
- Will use S-128 for availability and up-to-dateness
- As with “PRODUCTS.TXT” of S-63, an ECDIS is prepared to merge internal version from multiple S-128
  - Line-by-line process
    - Each entry in the ECDIS internal version have added “issue date of entry”
    - Add new entry if the product is not yet in internal version
    - Update entry if the issue date of S-128 file is newer than in ECDIS internal version
    - Note that warning about too old up-to-dateness information is also checked line-by-line
- From ECDIS point of view the result is same if S-128 contains everything in the whole world or if multiple smaller S-128 files incrementally update the content of the internal version
  - Each country and organization can select how to operate



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# SECOM IMPLEMENTATION – “VENDOR”/SERVICE PROVIDER

International Hydrographic Organization

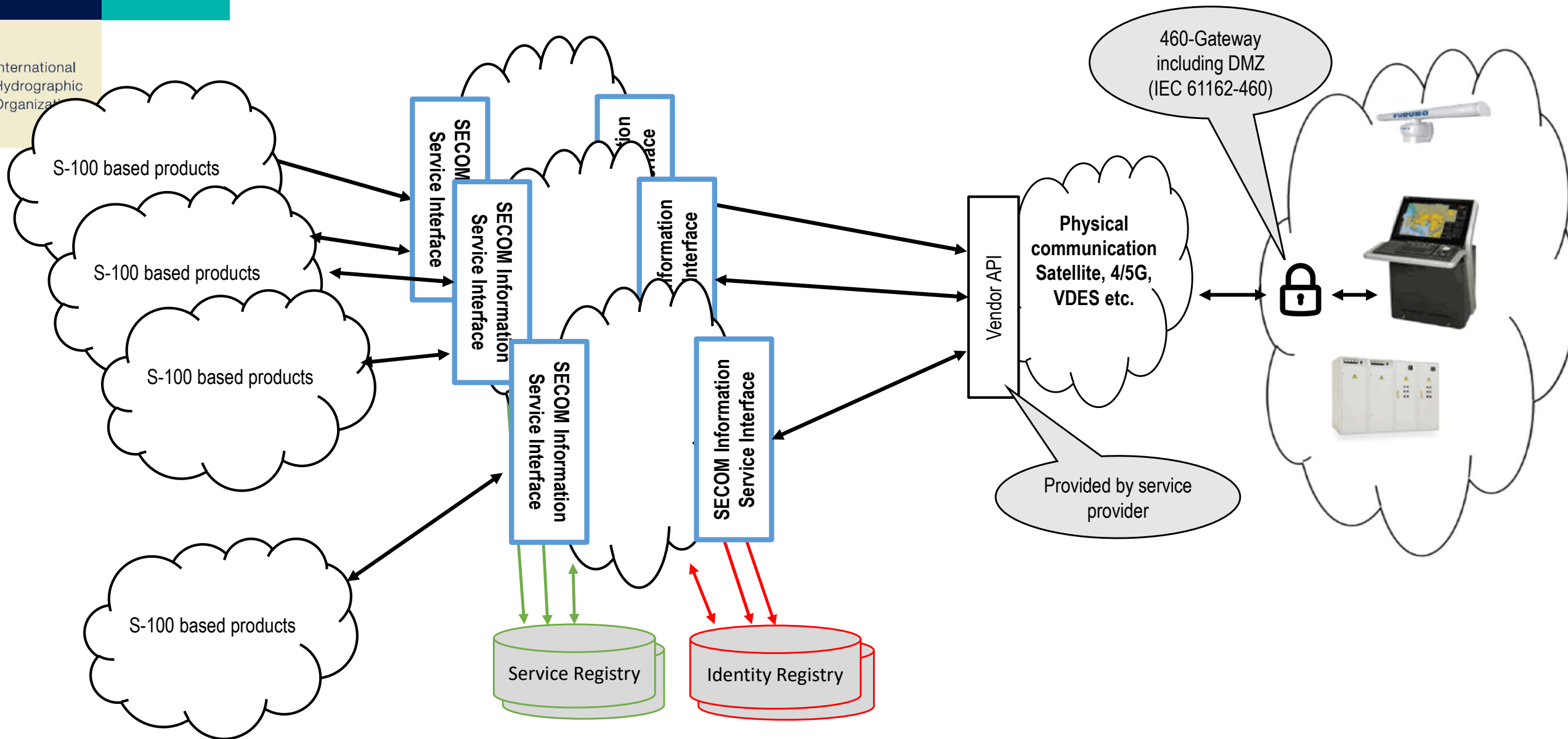




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# SECOM IMPLEMENTATION - MULTIPLE SOURCES

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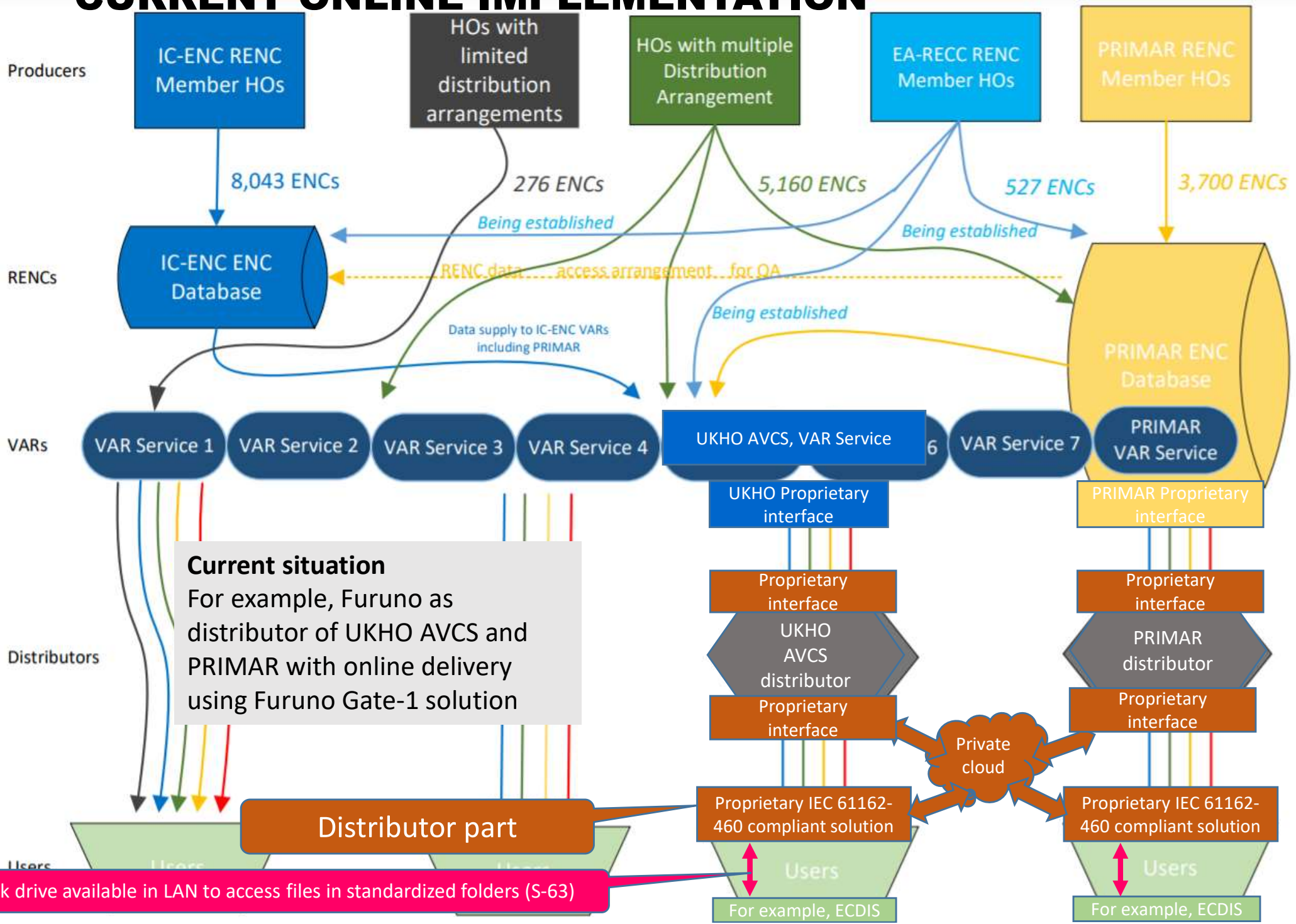






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# CURRENT ONLINE IMPLEMENTATION

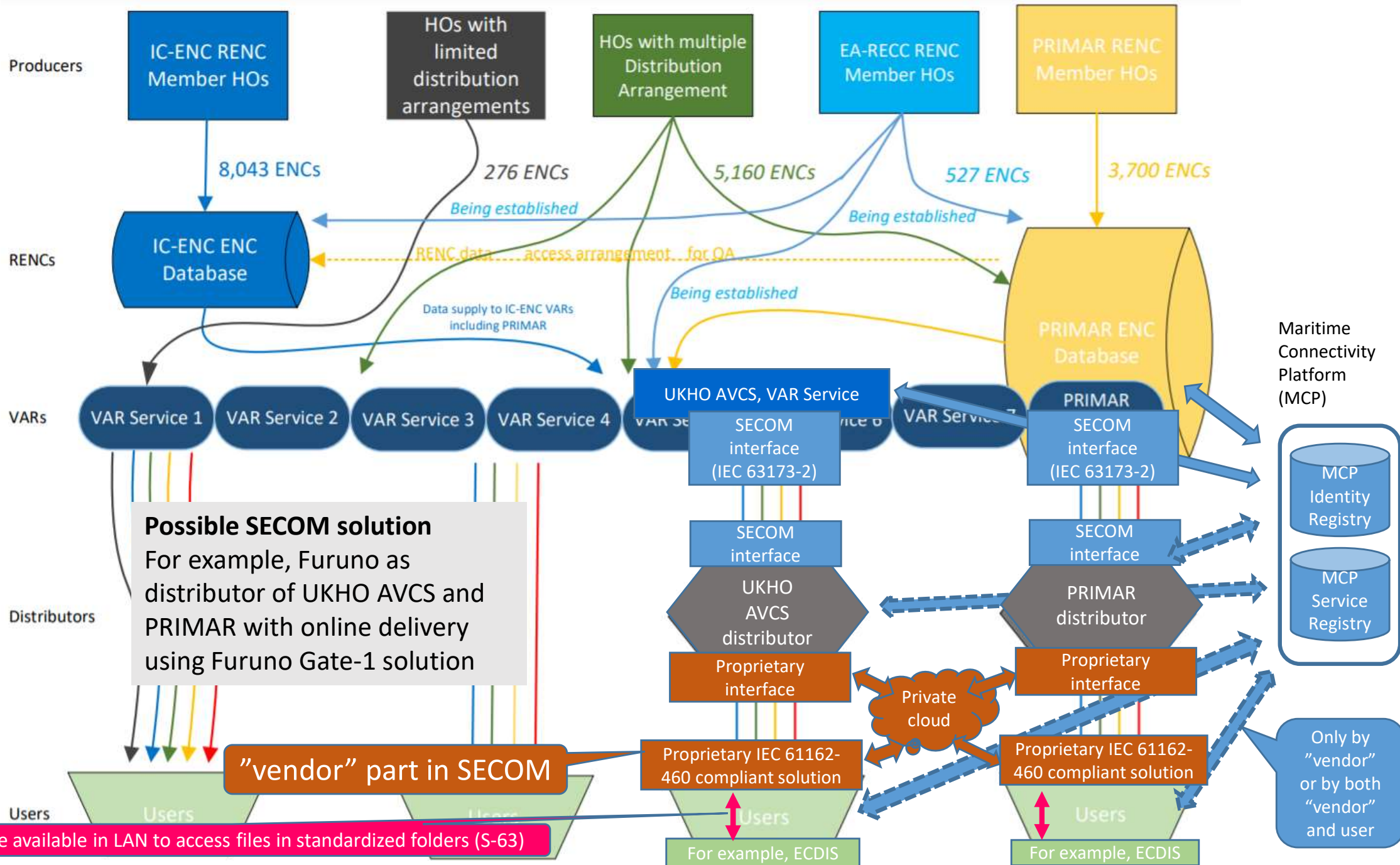




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# ONLINE IMPLEMENTATION – POSSIBLE SECOM SOLUTION

International Hydrographic Organization





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# **VISION ON STANDARDIZED SERVICE FOR ECDIS**

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## **RENCs will stay as coordinating and integrating actors**

- Interface to download information will be based on SECOM
- Like today some products will be stored by RENC (S-101, S-102, Nautical publications, etc.)
- But for some products RENC will offer an address from which download is possible based on SECOM
  - Someone else than RENC will store the downloadable content
  - This style could be for “streaming”-type products like S-124, S-411, etc.

## **VTS centres, Rescue centres, Port authorities**

- Probably some information may go through RENC, but majority will be available as an address from which download is possible based on SECOM
- Nautical publications (i.e. sailing directions, coastal pilots, etc.) will provide the addresses (like today they provide VHF radio channels, telephone numbers, etc.)