



NAVELINK

Developer forum

23-03-2023

[Navelink.org](https://navelink.org)

Agenda

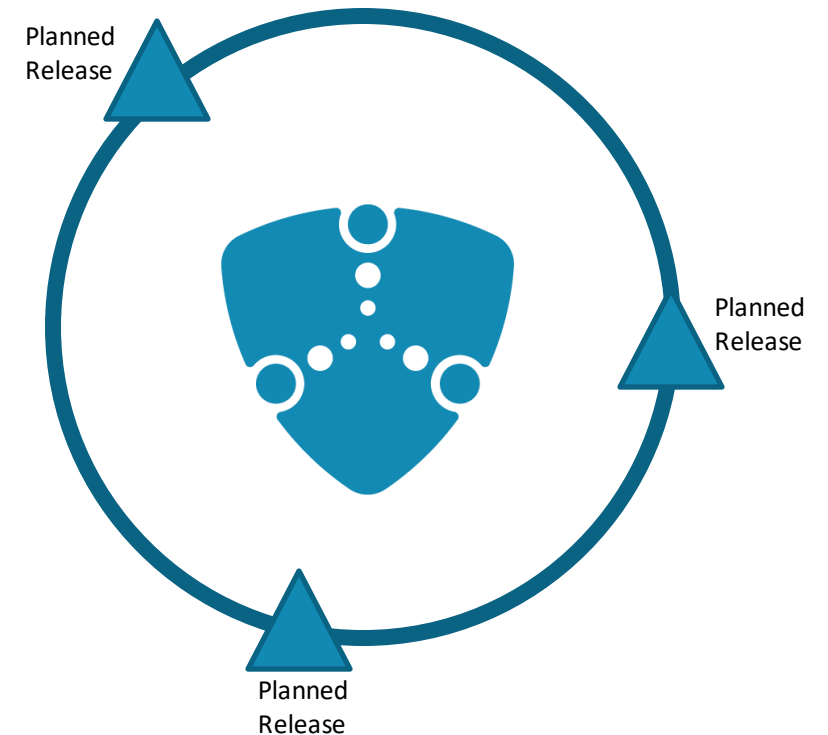
- 1) Navelink Platform status & update
- 2) Navelink Roadmap (Head of concept Navelink)
- 3) Service development discussions & information
 - a) Forum service developers (Each developer)
 - b) Forum security and interoperability (Each developer)
 - c) Ongoing work within the STM-community (Trello) (Each developer)
- 4) Overview of Navelink usage
- 5) Q&A
 - a) New questions (All)
- 6) Presentation
- 7) Discussion: Navelink + REST + MMS + VDES
- 8) Closing remarks

1) Navelink Platform status & update

- Since the last meeting:
 - Regarding the sporadic service disturbances, it appears to have been due to external factors and no similar disturbance has been detected
 - There were issues with certificate login on March 17th between 04.10 - 09.00 CET. We are currently investigating the cause. Apologies for any inconvenience.

Received questions

-



2) Navelink Roadmap



Add more Service Specifications and Designs

Increase VDES support

Add MMS support

Increase Traceability

Increase SECOM Compliance

Add SECOM Hotel

Refine Permissions Management

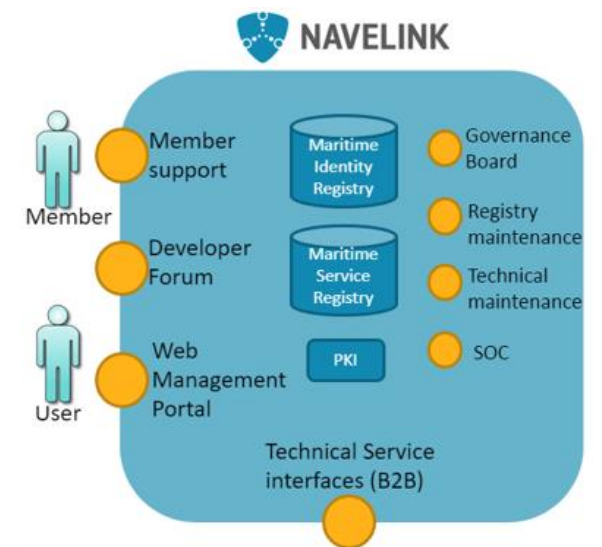
Add Service Ledger support

Enable subscription on Navelink technical notes

Enhance functionality to host payload formats

Add support for Geocasting

Add support for Service Payment



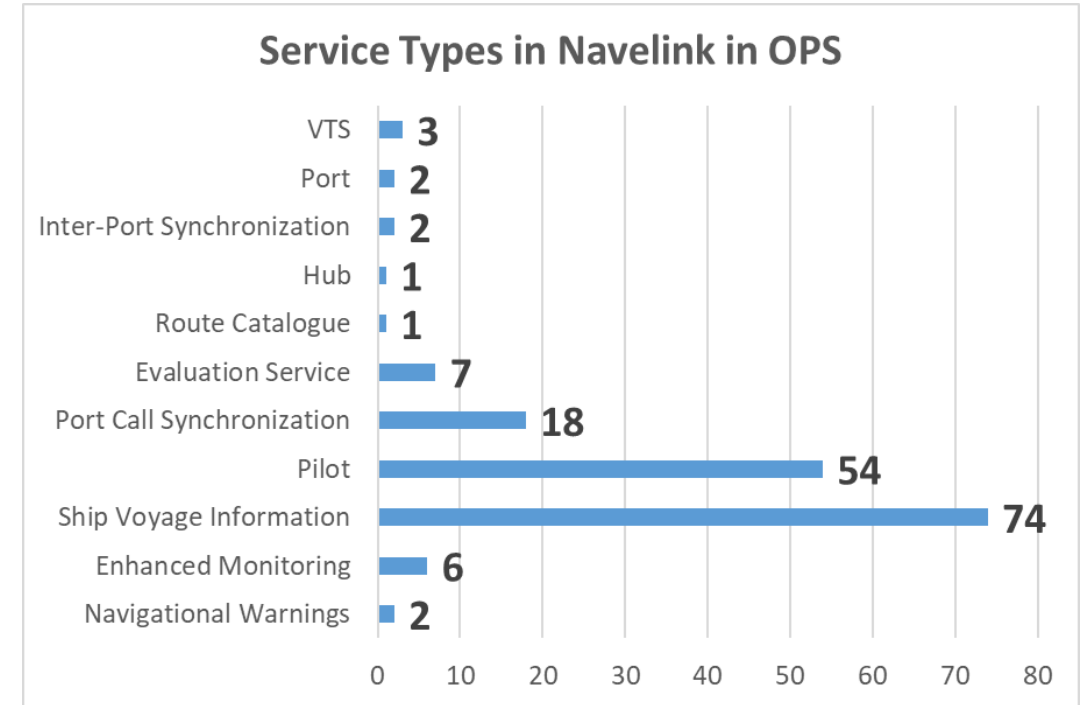
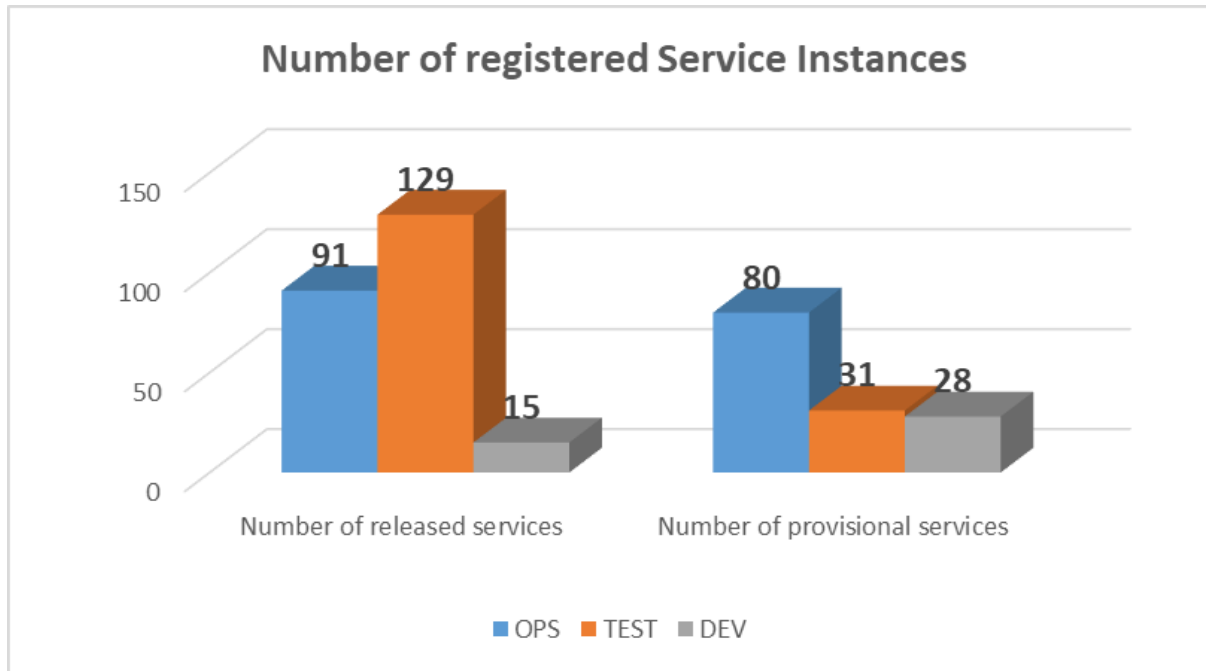
3) Service development discussions & information

- Forum service developers
 - Common discussions
- Forum Security and interoperability
 - Common discussions
- Ongoing work within the STM-community (Trello)
 - Trello check
 - Common standardization work: S-124, S-421, SECOM, General STM news



4) Overview on Navelink usage

2023-03-22



Events since last Dev Forum:

Created in OPS

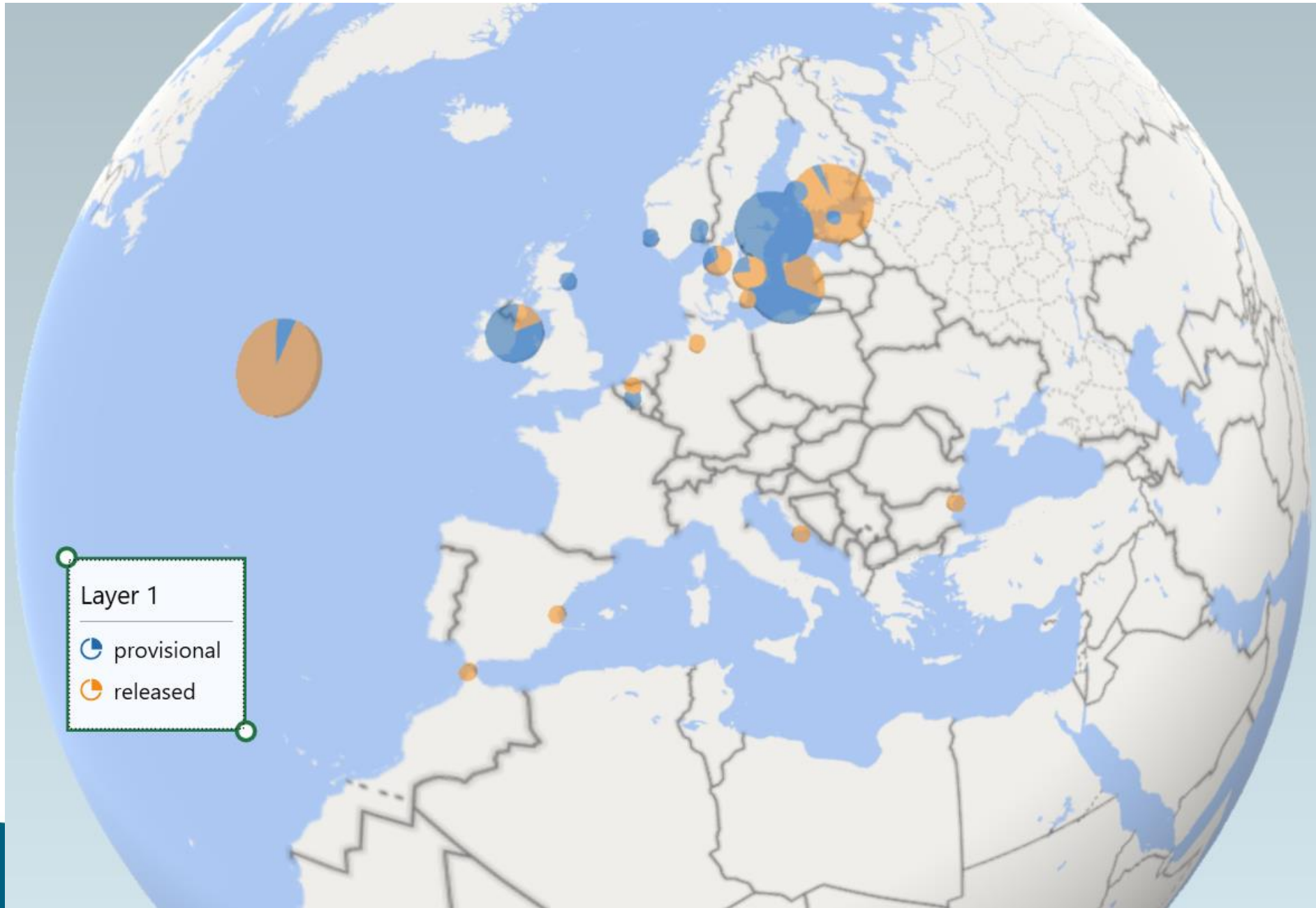
Navelink Operational environment Service Registrations

Service Specifications: 1 (Voyage Information Service v2.2)

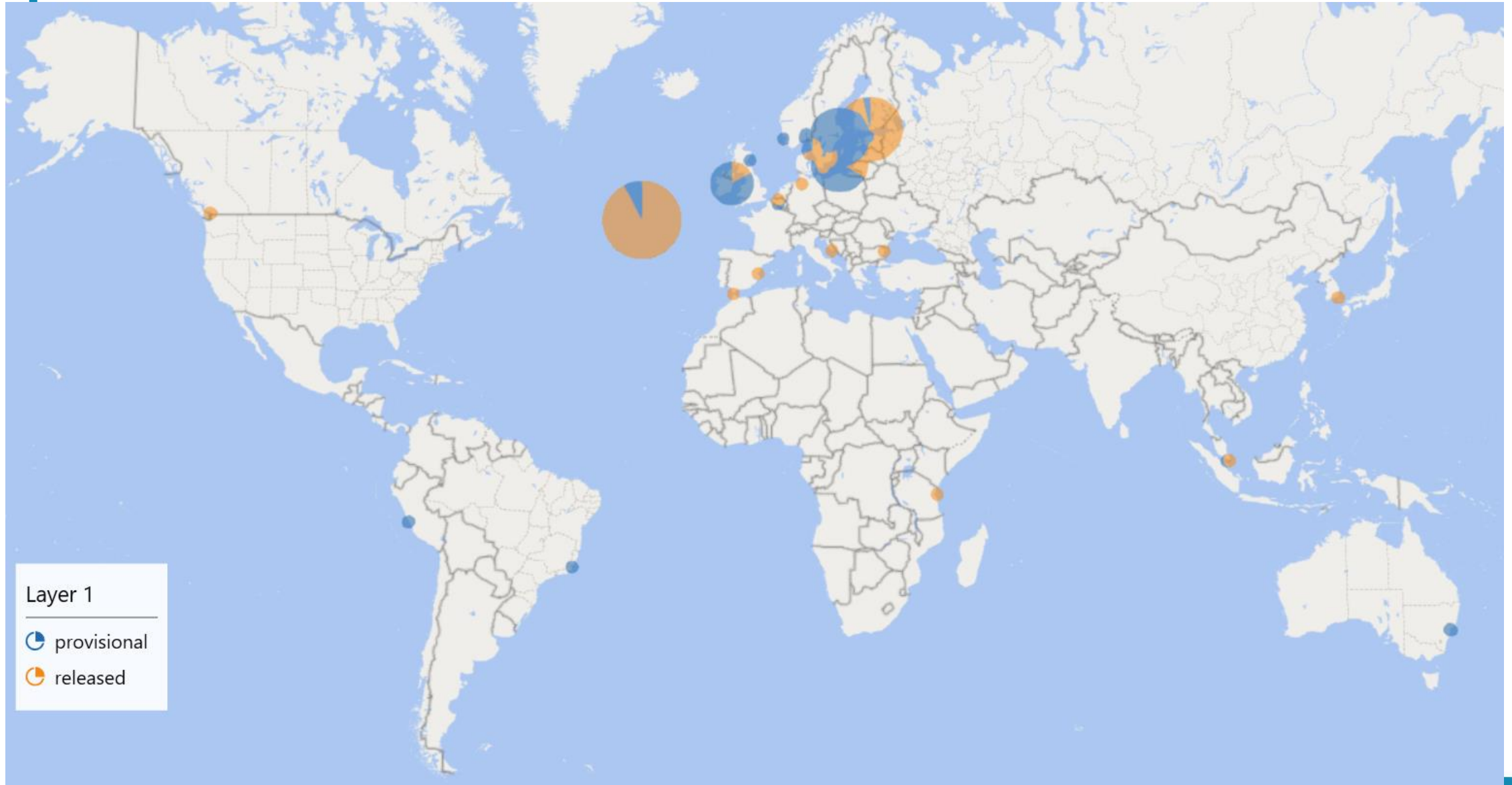
Service Technical Design: 1 (Voyage Information Service Design v2.2)

Service Instances: 171

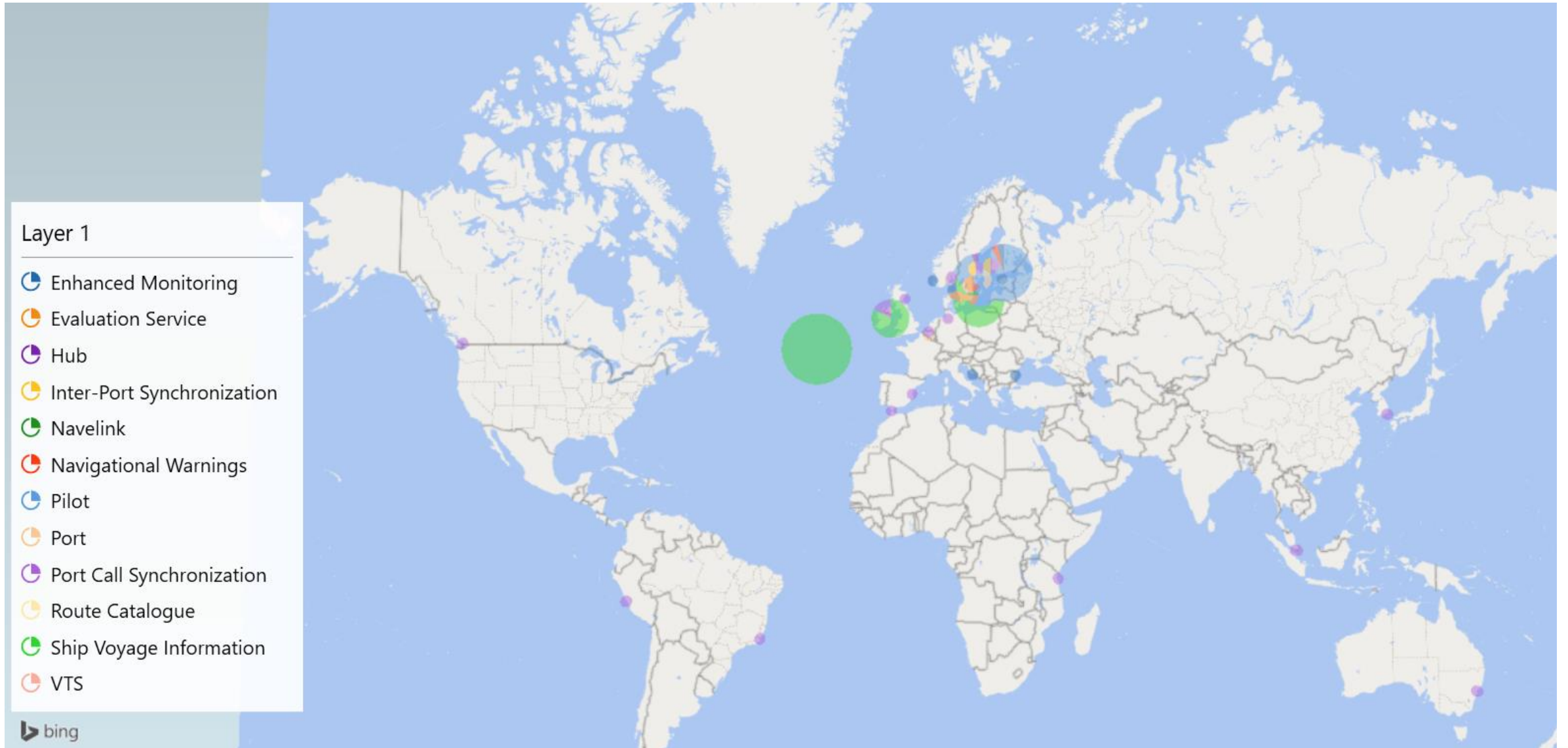
Geographical representation in Europa for services in Navelink



Operational environment



Operational environment



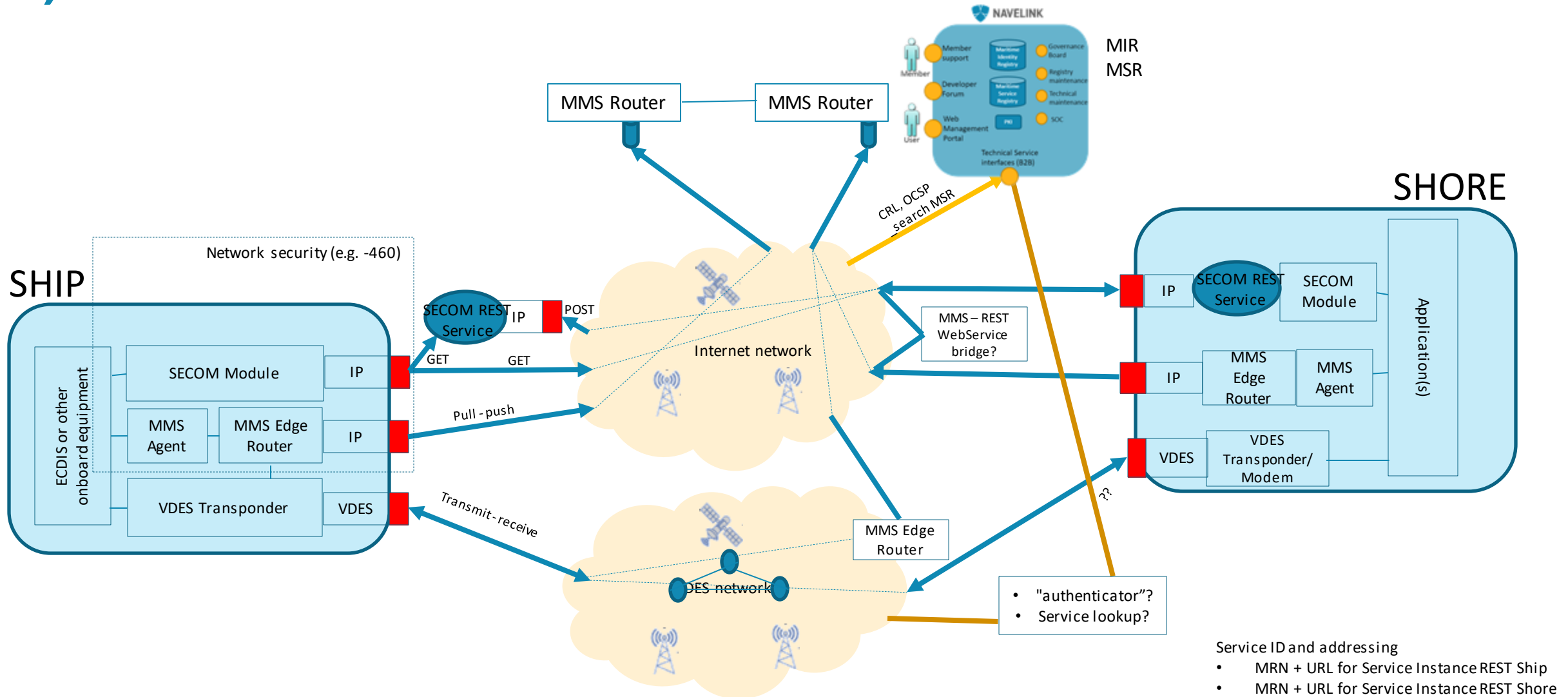
5) Q&A

- Any Questions? The floor is open.

6) Presentation

- Presentation by Peter Bergljung, Saab. (Presentation slides begin at slide 18)

7) Discussion: Navelink + REST + MMS + VDES



- Service ID and addressing
- MRN + URL for Service Instance REST Ship
 - MRN + URL for Service Instance REST Shore
 - MRN for MMS Queue Ship
 - MRN for MMS Queue Shore
 - MRN + URL for MMS Router

8) Closing remarks

- Next Developer Forum at 27/04-2023

Meeting notes (1/2)

- Navelink follows and supports the development of new service specifications and designs. Developments in both MMS and VDES is followed from Navelink perspective.
- In Navelink, we are discussing adding a SECOM hotel. The idea is that you can rent a SECOM service from Navelink but the customer will be the owner of the service. If you are interested in us adding this, please contact us.
- Peter Bergljung from Saab gave a presentation on VDES.
 - VDES Alliance – VDES is built by a community. Today there is a lack of interoperability between vendors today which may result in different dialects. VDES alliance hope to minimise this risk.
 - *If you want to become a member you can apply (see link in the presentation slides, starts at page 18)*
 - Saab together with other company are developing satellite to increase global VDES coverage.
 - The timeline is December this year to launch SpaceX Falcon 9 rocket
 - VDES is not type-approved yet but can be used in testbed software onboard.
 - With VDES you will have, Ship-ship, ship-shore, shore-ship, ship-sat, sat-ship communication
 - Navelink and VDES integration – According to Peter Bergljung, Navelink need to adapt to be able to "speak" VDES as it requires certificates, identify registry and service registry adaptations. For VDES, adaption to Navelink is important as at a higher level VDES needs some of the aspects that Navelink has today
 - Do you consider VDES a communication layer or do you consider a payload such as route exchange? - The edge router is a key component. The communication with the box can use IP but radio communication is special things for VDES to handle.
 - It is possible to connect directly to the router but then you need a lot of protocols, so it is more efficient if you send it via an edge router.
 - Open question to the audience: How to proceed? A joint EU project?
- In the MCC WGs, especially MMS WG, work are ongoing on creating support for VDES and MCP (Navelink), so if you are interested in this work please contact info@navelink.org

Meeting notes (2/2)

- For VDES, cyber security is important as it is the major difference between other systems. In the long run this is the only way to do it, to have very secure systems
- Do you foresee that Navelink certificates will need to be VDES specific? Do you have own security on VDES or do you intend to use Navelink?
 - What I (Peter Bergljung) can say is that we try to be very agnostic when we design our systems.
 - (Peter Tomsson) As I understand there is a section on VDES that is intended to contain a signature and how that signature should be created is not yet decided. The details are still open. If we use a certificate then somebody need to provide the certificate, so who would that be that we can trust.
 - (Peter Bergljung) I think we need to keep in mind that when the ship is in harbour you will, through ECDIS, be connected to 4g or 5g (allowing you to download big payloads) while you will use VDES during transit between harbours where the bandwidth is much lower.
 - (Mikael Olofsson) So the PKI key management part is what need to be looked over. How to get ships to be able to verify each other offline from internet..
- (Peter Bergljung) Maybe a ship will have Starlink onboard but he can never be sure that the other ship will also have Starlink. So that relation should also be added to the image (on slide 12). VDES will be AIS2.0.
- (Mikael Olofsson) How do you foresee that services are reflected on VDES? Will it be services behind MMS?
 - (Peter Bergljung) Not sure I can answer that question. I know Sternula will transmit some S100 messages but the protocol over S100 ... We will never have GB per second as the bandwidth will never be that high.
- Next meeting 2023-04-27



NAVELINK

[Navelink.org](https://navelink.org)

VDES (AIS 2.0)

VDES Alliance and Saab VDES

peter.bergljung@saabgroup.com, Saab AB, TransponderTech

2023-03-23, Navelink Developer Forum, Teams meeting



Agenda

- Introduction to VDES Alliance
- Saab R6/R60 AIS/VDES Stations
- VDES In Orbit Demonstration (IOD) Satellite
- NAVELINK and VDES integration
- Discussions



VDES ALLIANCE



Introduction of the VDES Alliance

Peter Bergljung

Strategy & Portfolio

Saab AB, TransponderTech

Co-chair in VDES Alliance



Agenda

- 1 Why VDES Alliance
- 2 How becoming a member of VDES-Alliance

Why VDES Alliance

- VDES technical working group progress in IALA, ITU and IEC is good, but lack "interoperability power" between vendors. Non interoperability of VDES units is a risk and VDES Alliance can mitigate this with physical test campaigns.
- Marketing of VDES need to be enhanced and IALA/ITU/IEC has not that "VDES focus".
- A global network of VDES stakeholders can stimulate the usage of the technology.
- Alliance types of non-profit organisation is "common" in advanced communication technologies, like Wifi Alliance, PNT alliance and 5G Alliance (5GACIA)

How becoming a member

Becoming a member of VDES-Alliance is a natural next step for your company to bring VDES products and services to the market.

Apply at www.vdes-alliance.org

Observer Membership: EUR 750/Annually

Contributor Membership: EUR 1500/Annually

Observer Membership: Designed for Non-Industrial Observers like Maritime Security organisations, governmental, Non Governmental organizations and Inter Governmental organizations such as IALA, Coast Guards etc.

VDES Alliance

Membership Comparison

Rights	Observer Membership	Contributor Membership
Newsletter	✓	✓
VDES Alliance internal documents access	✓	✓
General Assembly participation	✓	✓
Voting		✓
Workshop participation		✓
VDES Alliance confidential documents access		✓

Contact Information



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**THANK YOU
FOR ATTENTION**





SAAB

Our broad offering





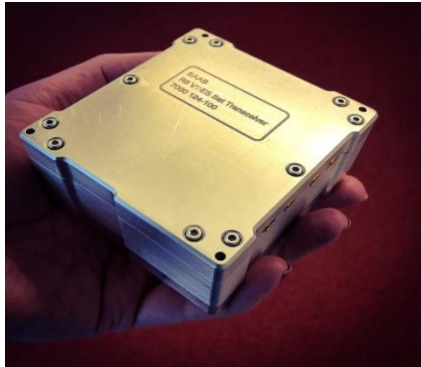
SAAB TRANSPONDERTECH INTRODUCTION

- Saab TransponderTech is part of Saab AB, Surveillance, Traffic Management
- Pioneers in AIS (Automatic Identification System) technology since 1995
- More than 25 years of continuous development of products and systems for the maritime domain
 - > 25,000 AIS (Class A) vessel transponder systems delivered
 - > 15,000 DGNSS NAV systems delivered (later introduced than AIS)
 - > 3,000 AIS base stations delivered to more than 50 countries
- Major supplier of airborne and shipborne AIS transponders
- Unique Secure AIS (encrypted) solutions
- Leading in VDES / AIS 2.0, the next generation of AIS



SAAB TRANSPONDERTECH

VDES Satellite Station



R6 VDES Satellite Transceiver for LEO

VDES Ship Station



R6 SUPREME AIS/VDES transponder

Link Id 26, 32, 33

Link Id 20, 21, 24

*Handshaking
Retransmission
Resource Request
Bulletin Board*

Link Id 11, 17, 19

R6/R60 SDR Technology

VDE

ASM

AIS

VDES Shore Station



R60 AIS/VDES Base station
AIS/VDES Network

Development path from VDES shipborne transponder to space IOD payload

Shipborne VDES (AIS 2.0)



R6 SUPREME AIS/VDES transponder

Typed Approved for AIS since sep 2022.

Including optional testbed for VDES ASM, TER-VDE and SAT-VDE

SPACE VDES DEMO



R6 VDES Satellite Transceiver for LEO

Cubesat form factor

Shipborne R6 SUPREME AIS/VDES as the base

Memory circuits: radiation compliant

Total Ionizing Dose (TID) tested

Thermal Vacuum Chamber (TVAC) tested

AOS Consortium, <https://aos-vdes.com/>

- Our Vision

Our vision is to create the first global maritime communication system, enabling great improvements for seafarers and their loved ones, the shipping industry as well as our planet.

- IOD project, supported by Swedish Transport Agency

We're building, launching and commissioning the first satellite in the IOD project, the satellite, Njord-1, is expected to be followed by a larger constellation of satellites that will form a new part of the maritime communication infrastructure.



Our Njord-1 / IOD project



ORBCOMM™

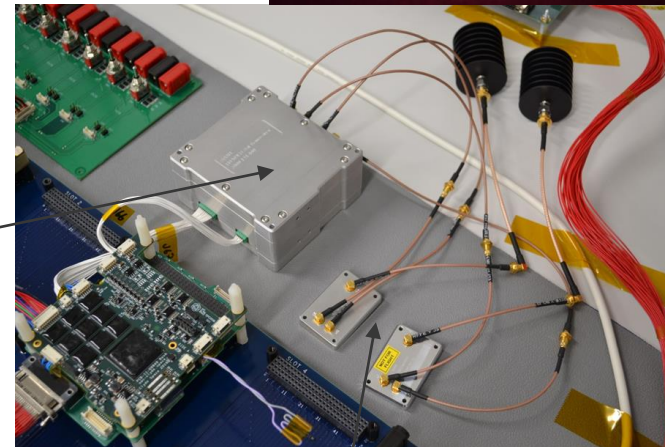
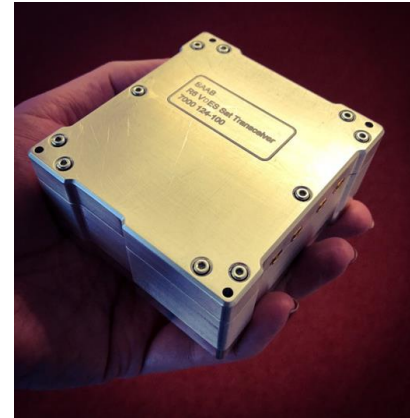


SAAB

Time Schedule

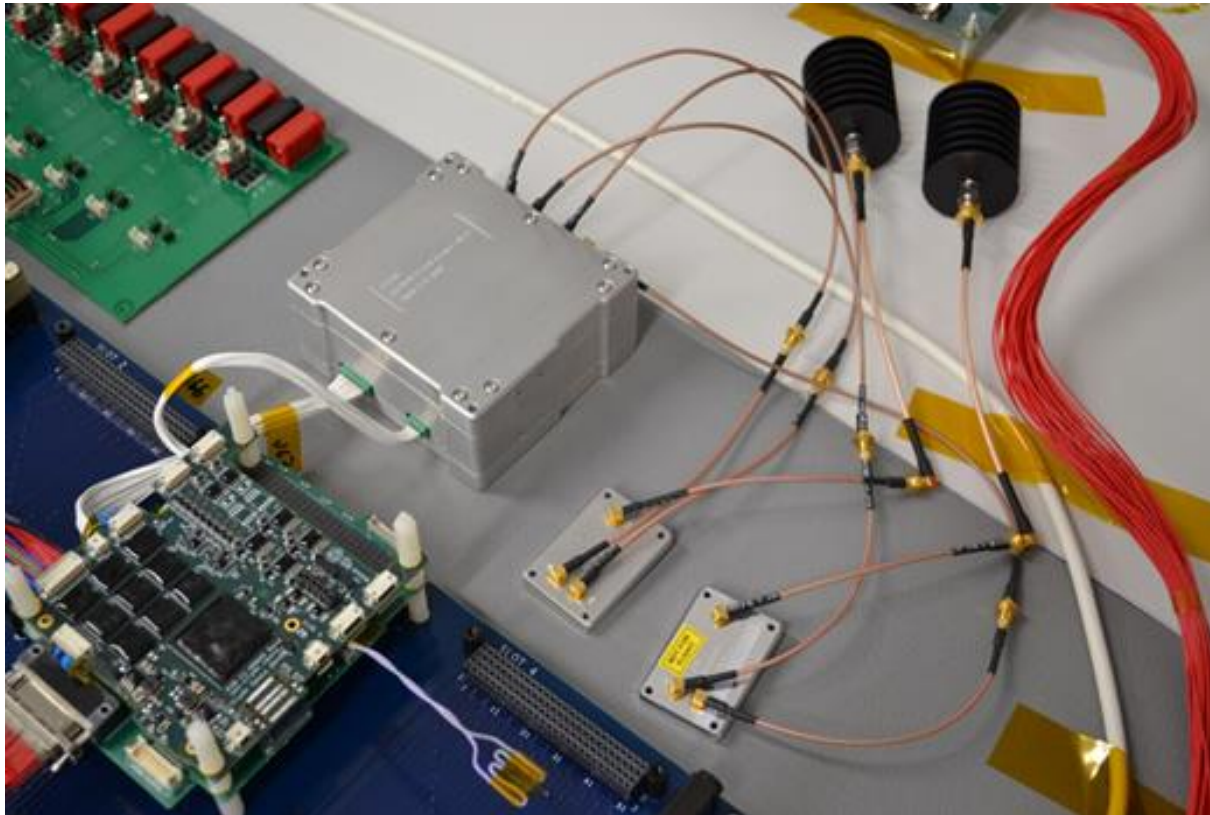
- SpaceX Falcon 9 rocket, Transporter-9 mission, will place our VDES IOD payload into orbit scheduled for launch 11 December 2023.
- Saab delivered VDES IOD payload to satellite company AAC Clyde Space in the beginning of December 2022.

VDES IOD payload



RF Front Ends (RFFE) to antenna interface

VDES IOD Payload Interface



Antenna Interface:

SMP RF connectors (2 x RX + 2 x TX),
vertical & horizontal polarisation

System Computer Interface:

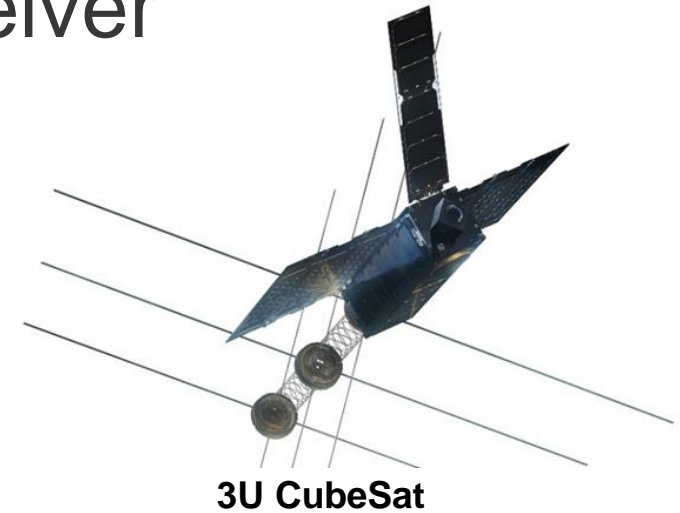
CAN: CubeSat Space Protocol (CSP)

RS422: In orbit FW upgrade for the
evolving VDES standard. In orbit VDES
RF raw data recording.

Ethernet: Used for config/monitoring,
data transfer and software update.

Saab VDES satellite transceiver

- Dimension: 93x88x48mm (CubeSat mechanical)
- Form factor: PC/104
- Enclosure: Aluminium
- Weight: <500g
- Power consumption: Average <10W, Peak 40W (during transmission)
- RX Functions: 2 x AIS, 2 x LongR AIS, 2 x ASM, 2 x VDE according to relevant parts of ITU R.M 2092, G1139
- Frequency range: 155 to 163MHz
- Channel bandwidth: 25/50/100/150kHz
- TX functions: VDE-SAT according to ITU R.M 2092, G1139
- TX output power: 1 to 6W average (configurable)



Leading in VDES technology – AIS 2.0

R6A VDES RX
R5A AIS



VDES Remote Control Link

Ship-Ship, Ship-Shore, Shore-Ship, Ship-Sat, Sat-Ship

- Ter-VDE in archipelago, up to 30 km – 300 kbit/s
- ASM at line of sight, up to 100 km – 19 kbit/s
- Sat-VDE at high sea, global coverage – 100 kbit/s



R60 AIS/VDES
Base Station



R6 SUPREME AIS/VDES
Shipborne transponder



R6 SUPREME AIS/VDES
Shipborne transponder



R6 VDES IOD



SAAB

NAVELINK and VDES integration

- Navelink is today a CA and a PKI but do not "speak" VDES.
- To "speak" VDES requires certificates, identity registry and service registry adaptation to Navelink.
- A VDES Control Station (base station or satellite) needs to be a part (cyber "middleman")
- Can "best practise" from SECOM (IEC 63173-2:2022) be used? Today SECOM is specified for S-100 payloads only.
- Open question to the audience – How to proceed ? A joint EU project?

<https://www.itu.int/rec/R-REC-M.2092>, 4.15 Digital signature of bulletin board

<https://www.iala-aism.org/product/g1117/> ANNEX B EXAMPLES OF VDE PROTOCOL FORMAT MESSAGES

CA Certificate authority

PKI: Public key infrastructure