

## Paper for Consideration by NIPWG

## MARVELOWS - Maritime Applications exploiting Reliable VHF data Exchange LOW cost System

<b>Submitted by:</b>	Italy (presented by ITSLAB-SIRM)
<b>Executive Summary:</b>	This paper summarizes a project idea which could be demonstrated within a demonstration project named MARVELOWS. The idea is to leverage the feature of the future VDES communication terrestrial and satellite infrastructure to provide a new nautical information delivery service which take into consideration predefined navigation areas and vessel routes to optimise transmission of additional, local and compressed data not already included in official Nautical Publications.
<b>Related Documents:</b>	ITU-R M.2092-0 Recommendation on "Technical characteristics for a VHF data exchange system in the VHF maritime mobile band" IALA Guidelines on "User Requirements for VHF Data Exchange System (VDES) related applications"
<b>Related Projects:</b>	MARVELOWS Feasibility Study funded by European Space Agency (ESA)

**Introduction / Background**

In the framework of GMDSS modernization a new standard is in progress named VDES – VHF Data Exchange System aimed to enhance AIS capabilities and increase the performance of two-way maritime data exchange on top of reliable VHF channels, using low cost technology. At the same time, IMO eNavigation initiative promotes the introduction of electronic, computational and telecommunication means "*to enhance berth to berth navigation and related services for safety and security at sea and protection of the marine Environment*". Moreover, the ongoing digital transformation is introducing changes in the way processes are performed, within private corporates and public organizations, and services are managed and provided to 'digital customers'. All these factors are on the basis of the MARVELOWS Service Platform and the so called 'dematerialization' service concept which is the subject of this paper.

**Analysis/Discussion**

The first point to be analysed is if and when the VDES communication system under standardization can support National Hydrographic Offices (NHOs) providing new digital services. The current roadmap provided by ITU-R foresees the VDES Terrestrial Initial Operation Capability, including also satellite Application Specific Message (ASM) uplink channel, in 2020 and VDES Full Operation Capability, including satellite ASM uplink and satellite two-way VDE-SAT channels, in 2022. Thanks to the use of satellite constellations VDES Full Operation Capability shall guarantee a worldwide coverage all over the seas: a European trial involving one mini-satellite and one maritime modem on a vessel is already in place. Despite the narrowband performance (up to 100Kbps) benefits using VDES will be: high reliability, business continuity (hybrid: terrestrial and satellite); shore-to-ship multicasting, low cost, small and light on-board equipment; low cost communication. So that we can say *VDES is a cheap solution for low volume data broadcast on a global level*. At the same time, cannot excluded at all the necessity/opportunity for NHOs to exchange high data volume, such as a full Nautical Publication files (eNPs) to vessels connected via broadband communication equipment, such as Ka-/Ku-band VSAT and/or L-band FBB. This is the reason why a wider scenario is highlighted where *VDES can be seen as part of a Multichannel Communication Infrastructure capable to exchange data by means the best available communication channel*, enabling high data volume exchange only when high throughput network data link is available (e.g. commercial vessels sailing on deep sea, via VSAT; leisure boats and fishing vessels sailing along the coasts, via 4G/LTE mobile).

Taking into account the above considerations a new digital service for NHOs can be defined, named 'dematerialization'. The name comes from the dematerialization of Nautical Publications (eNPs already exist) however it goes beyond and considers on two different layers the full (large volume) official eNPs and (low volume) information not already provided by current official Nautical Publications. The latter can be related to e.g. up-to-date coastal views, harbour plans, entrance to harbour in different conditions (including photos), NPs local update and could be georeferenced and

displayed also as overlay of ENCs, outside (tbc) the ECDIS. The above low volume unstructured information could be organized in 'Geo.Info.Package' so that is shall be possible to associate them to National Nautical Service Areas (see Annex A) and multicast via VDES to all vessels which are or will be sailing on such Areas and subscribed the service. An enhancement could include messages relaying information already published by third-party Content Providers or Authorities, such as digital NtM already issues and published by National Coast Guards. The first point to be underlined is that some of the above data could be, individually, already available on the web an accessible via Internet, however they are not integrated in Geo.Info.Packages and, above all, their publication is not correlated to their usage: publication and usage are independent process. The MARVELOWS dematerialization service intends to change this paradigm and assist/facilitate the usage of Geo.Info.Packages, automatically forecasting the requested information on the basis of the current route of vessels. In such a way, it shall also be possible to benefit from a multicast narrowband communication channel, such as VDES, scheduling data transmission so that data are fully available at destination when they need, even if not always quickly. Data compression and protection are two key technical points shall be considered in detailed design and implementation of MARVELOWS Dematerialization Service: this activity could be part of a demonstration project to be initiated in the next months.

### **Conclusions**

The MARVELOWS Service Platform can support NHOs providing new digital services by means of a decoupled two layered architecture: a digital Dematerialization Service Layer, aimed to make available to NHOs a new way to deliver nautical information not already included in Official Nautical Publications to sailing vessels (service subscribers), taking into account of their 'user profile' and routes; a Multichannel Communication underlying environment supporting business continuity in short-sea/deep-sea thanks to terrestrial and satellite telecommunication assets.

### **Recommendations**

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### **Justification and Impacts**

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### **Action Required of NIPWG**

The NIPWG is invited to:

- a) Note the paper;
- b) Provide any feedback deemed necessary.