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Formerly Saint Germain Output 02

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| **Radiocommunication Study Groups** |  |
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| International Association of Marine Aids to Navigation and  Lighthouse Authorities | |
| Liaison Note to ITU-R WP 5B | |
| Regarding tHE JUSTIFICaTiON OF THE CHANNEL PLAN FOR VDES UNDER AGENDA ITEM 1.16 | |

# 1 Background

IALA thanks ITU-R WP 5B for the opportunity to contribute to studies and the work for WRC-15 agenda item 1.16. This liaison note provides an evaluation of the three channel plans. Annex 1 is the criteria for evaluating each channel plan. Annex 2 provides Use Cases evaluating each channel plan performance in supporting those Use Cases.

# 2 Discussion

IALA has reviewed a list of channel criteria developed by ITU-R WP5B in Annex 37 to document 5B/475. Each channel plan was evaluated against each criteria as appropriate. The criteria evaluation can be found in Annex 1.

IALA has further reviewed six different Use Cases, spanning the needs for ship to ship as well as ship to shore and shore to ship information transfer either by terrestrial or satellite. The Use Cases took into account potential implementation and variations and realistic variations in data volume. Operational priorities were considered to enable design of VDES to support a future modernized GMDSS if so desired. The primary considerations relate to the protection of the integrity of the function of the AIS system and the potential effects on other services, or other maritime services such as VHF voice communications. During the deliberations it has become clear that voice VHF service may have significant effects on the effectiveness of the VDES as well as the existing AIS if not addressed. This concern has become the primary factor in selecting the preferred channel plan. The Use Cases and the evaluations can be found in Annex 2.

While each channel plan has merits, Channel Plans B and C are unacceptably susceptible to interference from VHF voice communications.

# 3 Conclusion

After careful review IALA supports Channel Plan A as it supports the elaborated Use Cases and fulfils the criteria requirements.

# 4 Action requested

IALA request ITU-R WP 5B consider these Annex’s during the finalization of the CPM text.

Annexes: 2

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ANNEX 1

JUSTIFICATION FOR THE CHANNELING PLAN FOR VHF DATA EXCHANGE SYSTEM UNDER AGENDA ITEM 1.16

This Annex contains a number of criteria that are considered of importance when assessing the proposed VDES channel plans. The criteria can be found in Annex 37 to document 5B/475.

| Criteria | Description |  |
| --- | --- | --- |
| System Aspects |  |  |
| AIS 🡨🡪 VDE dependency | The overall dependency of the existing AIS system with VDES.  This includes ASM and LR-AIS.  Could a high AIS load take VDES capacity away?  Could a high VDES load take AIS capacity away?  Does VDE need to be coordinated with AIS? If so,  Do they have to be interfaced?  What would happen in case of a AIS failure/overload? Would the VDE stop working? And vice versa | Could a high AIS load take VDES capacity away?  Channel Plan A: No  Channel Plan B: No  Channel Plan C: No  Could a high VDES load take AIS capacity away?  Channel Plan A: No  Channel Plan B: No  Channel Plan C: No  Does VDE need to be coordinated with AIS?  This is not a function of the channel plan. A protocol must be defined that takes into account the ability to maximize AIS reception aboard ship; A ship receiver will be desensitized when transmitting however care must be taken to ensure that the collision avoidance aspects of AIS are maintained (near ships must be heard);  Care must be taken to ensure that the Sat downlink does not interfere with ASM channels;  Do they have to be interfaced?  Yes – coordination is required, especially between ASM channels and AIS; This is true for all three channel plans;  What would happen in case of an AIS failure/overload? Would the VDE stop working? And vice versa  Failure is defined as over a 50% load on the AIS; The VDE would not be impacted with all three channel plans; |
| VDE-Terrestrial 🡪 SAT-AIS interference | Interference level caused by VDE terrestrial transmissions to SAT-AIS reception. This includes reception of LR-AIS, ASM1/2, AIS1/2. | Will interference caused by VDE terrestrial transmissions perturb SAT-AIS reception? This includes reception of LR-AIS, ASM1/2, AIS1/2.  The only possible interference is to LR-AIS; This is not an issue for any of the channel plans; |
| VDE-SAT 🡪 SAT-AIS interference | Interference level caused by VDE satellite transmissions to SAT-AIS reception. This includes reception of LR-AIS, ASM1/2, AIS1/2. | Will interference level caused by VDE satellite transmissions perturb SAT-AIS reception? This includes reception of LR-AIS, ASM1/2, AIS1/2.  VDES transmissions will effect reception for AIS/ASM and this is true for all channel plans; LR-AIS will not be impacted; There are available channels for satellite uplink; |
| VDE-SAT 🡪 VDE-Terrestrial interference | Interference level caused by VDE satellite transmissions to VDE terrestrial communications. This includes ship2ship, ship2shore and shore2ship. | Will interference level caused by VDE satellite transmissions perturb VDE terrestrial communications? This includes ship2ship, ship2shore and shore2ship.  Channel plans A and B would be impacted. Sharing studies must be conducted. Channel plan C would not be impacted; |
| Capacity | Throughput (at system level) achieved by the proposed plan. | Throughput (at system level) achieved by the proposed plan  Channel plan C is simplex for terrestrial VDE, ship and shore must share but satellite is dedicated; Channel plans A and B are semi-duplex and ship and shore may have to share with satellite; |
| Shore Aspects |  |  |
| Shore-VDE 🡨🡪 Shore-AIS interference | Co-site interference between AIS and VDE.  Ease and cost of taking countermeasures and adapting shore equipment. | Co-site interference between AIS and VDE.  Co-site interference is an issue with all three channel plans and impact is dictated by installation considerations. Channel plan C simplifies these issues; |
| Ship Aspects |  |  |
| VDE resilience to VHF voice communications | Can the VDE withstand VHF voice interference? | Can the VDE withstand VHF voice interference?  Channel plan A and B provide adequate protection; Channel plan C is subject to heavy impact on the VDE from voice; As long as the duty cycle is kept to a minimum VDE communications should not impact voice; |
| AIS 🡪 VDE interference | VDE resilience to AIS transmissions. | All channel plans must coordinate between AIS and VDE; |
| VDE ship2ship / ship2shore 🡪 AIS interference | Impact of VDE communications to the AIS probability of detection and capacity. | Impact of VDE communications to the AIS probability of detection and capacity  Channel Plan A: No;  Channel Plan B: No;  Channel Plan C: No; |
| VDE ship2ship 🡪 VDE-SAT downlink interference | Amount of VDE-SAT downlink capacity that is taken away by VDE ship2ship communications. | Amount of VDE-SAT downlink capacity that is taken away by VDE ship2ship communications.  Channel plan A may not accommodate sat downlink during ship2ship comms; Channel plans B&C sat downlink does not impact ship2ship comms; |
| VDE-SAT uplink impact on AIS | Impact of VDE-SAT uplink to AIS probability of detection and capacity. | Sat uplink and AIS probability of detection may only be effected by VDE-SAT downlink on channel plans A&B; |
| VDES box complexity | Design, testing and certification. | Channel plans A&B may require sharing with satellite – if required, this will drive complexity. |
| Satellite Aspects |  |  |
| Is it possible to combine SAT-AIS and VDE in the same satellite? |  | None of the channel plans support simultaneous operation with AIS1/2 however, it would be possible for LR-AIS (AIS3/4); |
| Commercial Aspects |  |  |
| Ease of migration from existing shipboard equipment | Is it necessary to interface the VDE box and the AIS box?  Is it necessary to replace the existing AIS box? | Is it necessary to interface the VDE box and the AIS box?  All three channel plans require an interface between VDE and AIS/ASM;  Is it necessary to replace the existing AIS box?  This is not required for any of the three channel plans; |
| Modularity | Does the proposed channel plan/system allow product diversity? i.e. does it allow to have and sell a VDE box separately from the AIS box?  or a VDES Rx-only unit? | Does the proposed channel plan/system allow product diversity? i.e. does it allow to have and sell a VDE box separately from the AIS box?  or a VDES Rx-only unit?  All three channel plans support diversity. |

ANNEX 2

CHANNEL PLAN PERFORMANCE AGAINST USE CASES













