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## Questions and answers (mainly dPMR at the moment)

### What impact will dPMR technology have on AIS? How does this present to the mariner?

The point was raised during the trial in Rotterdam probably asking if the dPMR channel could also carry AIS traffic in a more spectrally efficient manner – ie in a ¼ channel. The answer is no, as the channel bit rate is 4800 bps for dPMR and 9600 for AIS.

As far as the technology goes, The dPMR probably will not have any impact on AIS at all. Operationally, the ability of marine dPMR to include MMSI id, position data and small messages with every transmission would allow for a confidence check with any AIS transmission from the same station and a certain level of redundancy in a critical situation should the AIS transmitter or antenna fail for instance.

The new range of radio's will have interfaces that could connect to other systems so a complete integration of the bridge would be feasible. The radio's might have different interfaces and protocols(languages) to communicate with each other. NMEA 0183 and/or NMEA 2000 would be an option for data, if they also want to implement voice the knowledge at the moment for this is insufficient to state which interfaces and/or protocols will be used. But it probably will be IP based.

The radios are dual mode, both analogue and digital and so can be switched to either mode. The interfaces would be the same as for existing DSC/Voice radios, with the addition that the digital radio could route the voice in and out over a suitable digital interface, similar to Voice-over-IP and provide a data port for SMS or file transfer.

### Advantages of dPMR technology over standard VHF.

The major advantage is the ability to use 4 voice channels in the same spectrum that currently allows only one. This was the initial driving criteria as the implementation of VDES means that the number of channels available for voice is reduced.

### Which extra features/functionality are possible

There are a extra features within dPMR and the question which one we will use. Depending

on decisions made by IMO, ITU and proposals by IALA there could be in some features now done within the GMDSS branch. We already mentioned some of them in the presentation. Two good features will be a full identification number (MMSI) embedded in the signal and a position report. These data with the data on shore and ship from radar and AIS could give a fuller 'situational awareness' picture. Systems could add fi which ship or station is transmitting.

For instance own ID and position can be conveyed at the same time as the voice is being transmitted. Pre-defined status messages can be transmitted easily and quickly (eg: Status msg may mean "leaving berth", 6 : "pilot requested", 7: "pilot on-board" etc". SMS messages are possible, with a normal 280 character SMS taking less than a second of air-time. Short file transfers are available, but limited by the overall transmit time allowed, so a 3 minute max length call could transfer  $2400 \times 60 \times 3 \text{ bits} = 54\text{k bytes}$ . Long file transfers are also part of the dPMR standard, but it is debateable whether we should include this functionality in the marine version.

## **Equipment required, would this require a new kit such as change out of existing VHF's or upgrade of existing.**

Although some of the current radio's are digital they don't support digital transmission what means that the VHF radio probably should be replaced by a digital (dPMR) radio. But because for the connectors will be the same as the old VHF/DSC box/radio (except for extra features) most of the old installation (cabling, power and antenna) could be reused. Also the 'box' will be the same size so with pre defined radio's for the standard operation (analog VHF radio) will be a kind of 'take the old box out and put in the new box and sail'. If you want to use features like integration to the bridge systems, transmitting location of the radio and small data service there will be additional installation (cabling and configuration) needed but probably only within the cabinets on the bridge.

The operator procedures are essentially the same as well, chose a working channel, check for pre-existing traffic, and then press PTT and talk. Nothing much changes, except if you chose a dPMR working channel, then the radio can check for pre-existing traffic itself. If you want to set up a ship-ship call, it's the same as you would with the existing DSC mechanism, the only change is to specify a dPMR working channel instead of an analogue voice one. The channel numbering scheme that allows this is already defined by ITU. There are no changes required to RF cables, antennas, couplers etc.

## **When is it likely to be implemented and over what period? Would migration require both types carried for a while?**

The implementation is depending on the 'regulatory issues' but for now the frequency aspect is scheduled for a final discussion in the World Radio Conference in 2027. There is one in 2023 but for the moment this is not a topic for this meeting. With migration of Appendix 18 for making the frequencies available (ITU agreed this from 1th January 2019 and IMO from the 1th of January 2024) for The Netherlands this will take a lot of changes and also will limit/totally fill up the space left on other frequencies. So for The Netherlands we need more (digital) voice channels in the future. But mostly a migration period after the decision taking

into force by IMO will take about 10 years. But given that ships have an average life of 20 years or so, the migration period could be even longer, remember that these radios work in both analogue and digital modes, so although an old radio obviously cannot use the digital channels, the new digital radios can use both, so a ship equipped with a new radio can still work ok in parts of the world where there are no digital channels available and could communicate with the older analog radio's.

As the radios are dual mode, they can still operate on any analogue channel, channel 16 would be an obvious candidate for staying analogue, and could still send a DSC alert as well on channel 70. So no changes required for operational procedures. This all depends on the decisions made by IMO and ITU.

## **How is going to be implemented internationally? Will it require ships to have both VHF systems during the changeover period?**

If the dPMR capable radio's are also wheelmarked for analog VHF radio you only need a digital (dPMR) radio which is also capable of analog. Because the dPMR radios are dual mode, so only one piece of equipment will be required, which will directly replace the existing VHF/DSC radio.

## **How could this technology 'limit mistakes'**

There are different possible options. First the radio operates just like the current VHF radio so the users are familiar to it. Next to this these radio's have functions like a maximum transmission time, embedded identification and position, remote shutdown (if accepted), possible automatic switching to the right channel (if accepted), but there might be more. We can discuss this with the users on ship and shore what functionality in the radio would help them to limit the mistakes.

## **Prioritising for emergency use? Would this be a dedicated channel or some other override capability?**

dPMR already has the concept of a priority call, the marine version could copy the "category" schema implemented by DSC calling. It could be used for emergency calling, but that would really depend on how many stations in the distress area are equipped with digital radios, or it could be used in parallel with the existing DSC capability. Its an operational feature that could be used at some stage, but probably not for some time, and possibly never. But the capability is there if you want to use it, If you don't want use it, then it can be disabled. This all depends on the decisions made by IMO and ITU.

### **Language**

English