Ocean Signal ATB1 and ACR CB2 with Long Range Message (LRM)

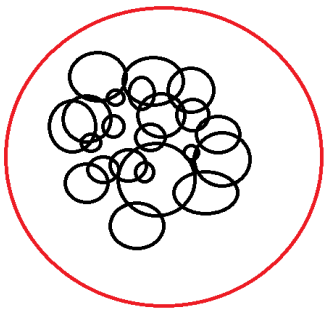
AIS has been initially developed as an anti-collision and avoidance system. Implemented in 2002 by the IMO for commercial vessels over 300GT and passenger vessels regardless of size.

AIS has developed more and more over time, New possibilities have been added and developed to make life at sea as safe as possible. AIS class B (2006) AIS AtoN's, AIS Sarts, AIS MOB's and AIS EPIRBS. We will see AIS becoming an important system within the general safety equipment on board vessels and VTS.

With the development of AIS, coverage became a hot topic. Not only for the ships themselves but also for monitoring purposes. Unfortunately, these two aspects bite each other. Whereas a ship would like to know information such as speed and course within a 15NM area. Monitoring bodies would like to see a much wider area. This is where satellite based AIS comes into play. Companies like ORBCOMM and ExactEarth have developed satellites that are capable of receiving AIS signals worldwide. Although this seems easy, receiving these signals simultaneously and decoding them it is not straight forward.

From the receiving point of view within the satellites:

The challenge for AIS satellite operators is the ability to receive very large numbers of AIS messages simultaneously from a satellite's large reception footprint. The TDMA radio access scheme (more on this topic in a future article) defined in the AIS standard creates 4,500 available time-slots in each minute but this can be easily overwhelmed by the large satellite reception footprints and the increasing numbers of AIS transceivers, resulting in message collisions, which the satellite receiver cannot process.



- The black circles represent the vessels equipped with AIS, the rings vary mainly due to different heights of antennas.
- The red ring represents the footprint of a satellite equipped with AIS receiving capabilities.

How to get better results for monitoring and tracking purposes; ***Long Range Messaging***.

Both the Ocean Signal ATB1 and the ACR CB2 are equipped with the ability to make use of Long Range Messaging (LRM). The increased power output (5Watts for a SOTDMA Class B, compared to a 2 watt for a CSTDMA Class B) already makes a difference but with LRM you immensely increase the possibility for receiving messages by satellites equipped with AIS receivers.

Message 27 is used for transmitting LRM. The content of the message is similar to Message 1,2 and 3 (MMSI, Name, Position, SOG COG etc.) except message 27 does not have a time stamp and misses some functionality such as RoT (Rate of Turn).

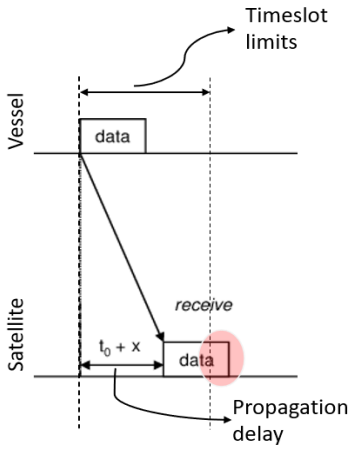
The difference lies within compressing the number of bits used to compose the message. Whereas Message 1 uses a total of 168 bits and both message 2 and 3 use the same amount, Message 27 is compressed to a total amount of 96 bits. This principal allows for increased propagation delay.

To explain this very limited and easy:

Propagation delay is the time difference between broadcasting a signal (AIS Messages) and it being receiving. Radio waves travel with a maximum speed, (the speed of light: C). 1 transmission of AIS (1 timeslot)= 26.7ms, 256 bits. An average AIS satellite orbits at an altitude of 950 km.

Under normal circumstances the messages will collide with adjacent timeslots because there is not enough "buffer" between the different transmissions (less propagation delay)

With the decreased bitesize the amount of time needed is 17ms. This "extra" 9ms will be sufficient to allow the satellite to receive messages in separate timeslots without time overlap.



The figure shows a red area where the data will collide with the next timeslot. When compressing the data, the transmission will fall between the boundaries set for a timeslot. This will improve the reliability for reception by AIS satellites.

Not only for fun purposes (tracking your seagoing adventures by the home front) but also Search and Rescue authorities will be able to track your movements in case of emergencies!

Overall increasing your safety whilst doing long passages over our oceans!

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