

Making the network: implementing AIS

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According to the International Association of Maritime Aids to Navigation and Lighthouse Authorities (IALA): "AIS is an autonomous and continuous broadcast system, operating in the VHF maritime mobile band. It is capable of exchanging information such as vessel identification, position, course, speed, etc. between ships, between ships and shore and through information broadcasts. The system can provide many benefits, including increased situational awareness, improved navigational safety and automatic reporting in areas of mandatory and voluntary reporting schemes."

Setting up the AIS network

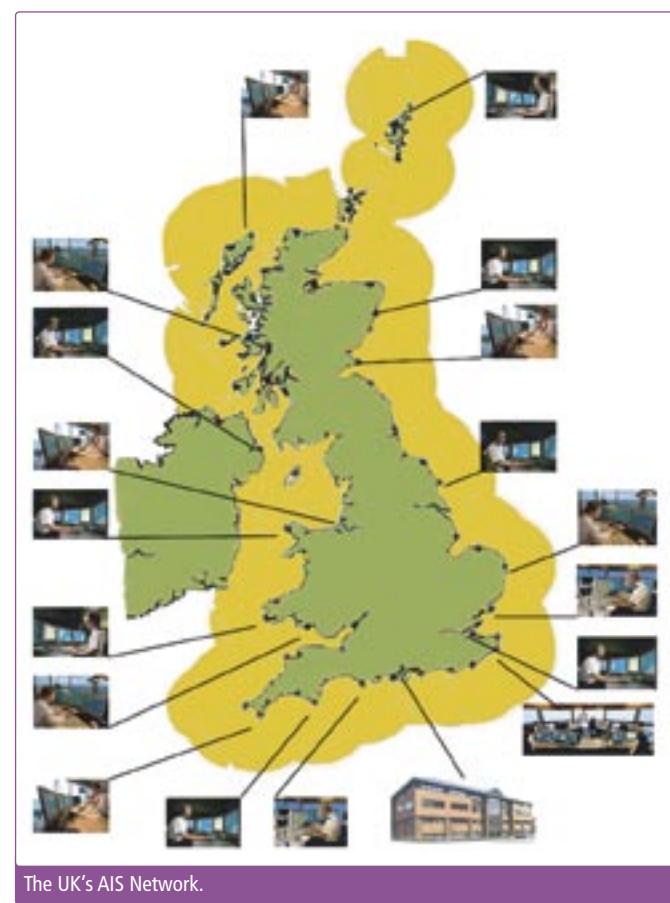
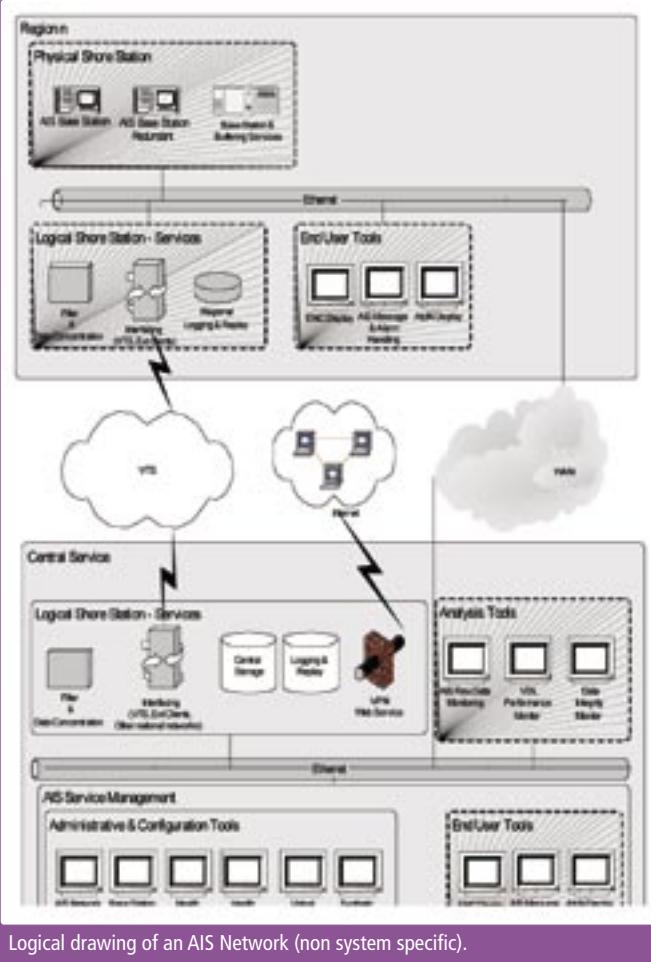
In order to harness the numerous benefits that accurate and uninterrupted AIS data can provide, it is essential that it is disseminated and delivered in a timely, coherent and useful fashion. Understanding this, the MCA started an engineering trial of a network of AIS Base Stations, network control functions and an AIS Database to assess the requirement of the Vessel Traffic Monitoring Directive and related EU legislation in June 2003, with the goal to confirm the feasibility and identify central data storage requirements. A key factor in the construction of an AIS network, is the huge amount of data entering the system, which requires sorting, packaging and delivering to the network operators. It is quite possible for

a small network of 10 base stations to generate hundreds of millions of messages per annum. In larger AIS networks the number of clients receiving AIS data can be huge and each has to have their own 'filter' to remove AIS data that they do not want or are not allowed to access.

The MCA required a robust architecture to handle this, and employed Norcontrol IT as the trial partner, following the successful implementation of the hardware and software that make up the Channel Navigation and Information Service (CNIS) at Dover. The Dover CNIS is a VTS system based on Norcontrol IT's VTMIS5060 software, with AIS integration that enables an even clearer, better informed view of one of the busiest maritime domains in the world.

The combination of the data volume, combined with the need for flexible 'filtering' and routing of AIS data calls for a unique software solution, and one that is found in the AIS5060 Network Software.

The AIS5060 Network Software employs an open system architecture, maximising use of commercial-off-the-shelf (COTS) components and runs on the Microsoft Windows 2000® and XP® operating software. These features when combined with compliance to industry standards and approved Quality Assurance procedures ensure minimum Total Cost of Ownership, long-term availability and the maximum degree of technology proofing, i.e., the system makes best use of budget and can be expanded in the future.





The network was based on the MCA's existing Wide Area Network. For the purposes of the trial, the Dover CNIS acted as 'AIS Gateway' for the other MRCCs.

The initial trial

The initial remit for the trial consisted of 15 AIS Base Stations, network control functions and an AIS. The network was based on the MCA's existing Wide Area Network and consisted of Dover and nine other Maritime Rescue and Co-ordination Centres (MRCC). For the purposes of the trial, the Dover CNIS acted as 'AIS Gateway' for the other MRCC's.

The systems provided coped well with the data capture, transmissions and storage demands. The initial system was thoroughly tested, pushed to its limits for the purposes of the trial but the infrastructure stayed solid and drastically improved operator awareness, prompting the MCA to initiate the full implementation of the AIS network. The tender for a completed network of 53 aerials, network architecture and AIS hardware based at the MCA's 19 MRCCs around the UK coastline was won by Norcontrol IT through EU procurement. The network is nearing completion and due to go live in Spring 2006.

Objectives of the AIS network

The AIS network is based on the Norcontrol IT AIS5060 platform, with its main objectives being:

- Complete AIS coverage in the designated area
- Enhance safety within the service area
- Alarm handling for the AIS tracks in the area
- Health monitoring capabilities of the AIS network
- Technical services capabilities for the AIS network
- Redundant set up of the AIS services
- Assist in ensuring the highest possible level of security and efficiency for the vessel traffic in the designated area
- Easily expandable
- Minimise life-cycle costs

In addition, the AIS5060 Network solution will enable the following objectives to be met:

- Complete co-ordination of all UK MCA MRCCs

- Improved logistics and functioning of SAR operations
- Integration with SARIS safety tool already in use with MCA
- Improve safety and communications at sea on Aids to Navigation
- Research into marine communications and safety at sea through the use of AIS technology and traffic pattern analysis
- Research and test the performance and coverage patterns of AIS in the marine environment
- Increase awareness of the potential benefits of AIS for non mandatory users such as fishermen and leisure users
- Co-operate with National and International bodies to advance shared knowledge of AIS capability and performance

AIS5060 software components

The AIS5060 is made up of several components. The AIS information service consists of Logical AIS Shore Stations (LSS) which process the data derived from the different physical AIS shore stations (PSS) and fixed base stations and repeaters. On top of these applications there is a layer called the AIS Service Management (ASM), which controls the AIS information service, essentially the core of an AIS network.

The shore-based AIS information service can function as a stand-alone system or it can be integrated with an existing or new Vessel Traffic Service (national or multiple regional), traffic management schemes, Search and Rescue operations (such as SARIS, already used by the MCA) or other shore-based safety related services. The system also supports secure two-way interfacing to other AIS Networks provided by other authorities.

Leading by example

The Maritime and Coastguard Agency is clearly at the forefront of installation and use of AIS, to improve Maritime Domain Awareness. A major area that the network software addresses is that the AIS data has several destinations over any possible number of clients. As far as safety is concerned, the key destinations are the MCA Headquarters at Spring Place and the UK MRCCs, but the



The Channel Navigation and Information Service (CNIS) at Dover.

network will have a wider role with AIS data able to be delivered to other authorities such as the General Lighthouse Authorities for Aids to Navigation and 3rd parties for security, efficiency and operational improvements.

Currently, enhanced safety through improved visualisation is at the top of the agenda for the UK AIS network. The MCA is the first national authority to implement real-time 3D monitoring to its Maritime Domain Awareness application. Developed during implementation of the AIS network, the C-Scope 3D operator display is the first in a long line of advanced monitoring applications forthcoming from Norcontrol IT.

The C-Scope Operator Display is a Graphical Information System designed to provide real-time situational awareness for tracking vessels and their consignment on sea and land. The real-time 3D picture, with graphical vessel and terrain representations has a wide scope for increasing everything from security to efficiency, and its implications for improving SAR operations are just as valid.

As a high performance track display application C-Scope collects, filters and displays objects tracked by radar, AIS and



AIS5060 Network Software.

Inmarsat C. Optimum situational awareness is provided in a single graphical display for real-time observation, planning and analysis activities within the maritime domain.

The C-Scope Display together with the AIS5060 Network software supports integration of other sensors taken from the VTS industry, and makes it possible to enhance the system further by means of radars, meteorological and hydrographical sensors, Direction Finders (the system will be interfaced to existing VHF/DF sensors), Management & Information Systems etc.

An important benefit to SAR operations is the ability for MRCCs to view the Recognised Maritime Picture (RMP) from anywhere within the service area, even from onboard a vessel. This provides an even clearer understanding of a situation, therefore enabling increased confidence of SAR Mission Co-ordinators (SMC). With the ability to watch a vessel's progress from a virtual onboard position, C-Scope also allows for the possibility of MRCCs assisting a vessel before an incident occurs. A better understanding of what a vessel is doing and most importantly why a vessel may be about to do something, is provided by making the shore-based operators view more flexible.

ABOUT THE AUTHOR

Harry Leslie forms the link between MCA Operations and provision of Systems. This includes anything from AIS to MF Radio. He has been in this newly created post for 6 months and has represented the MCA both nationally and internationally at various fora including IALA at Paris and various outreach missions to Europe and South America. He is an occasional speaker at Southampton Solent University on applications of digital technology. Additionally he talks to various parts of industry on current operational requirements and SAR strategy.

Prior to this Harry was the Area Operations Manager for the South Coast of England with the task of maintaining Search and Rescue adequacy on the busiest part of the UK coastline. He has been a Coastguard Officer for 15 years. During which time he played a large part in the establishment of the new Coastguard SAR service on the River Thames. He also carried out the instruction and configuration of the DOPRA 2000 Integrated Coastguard Communication System around the country.

ABOUT THE ORGANISATION

The MCA is responsible throughout the UK for implementing the Government's maritime safety policy. That includes co-ordinating search and rescue at sea through Her Majesty's Coastguard, and checking that ships meet UK and international safety rules. They work to prevent the loss of lives at the coast and at sea, to ensure that ships are safe, and to prevent coastal pollution Safer Lives, Safer Ships, Cleaner Seas.

The MCA are putting increasing effort into prevention work and a measure of their success is when accidents do not happen, or when they intervene to minimise their impact.

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