Marine Data Systems

Netherlands Project

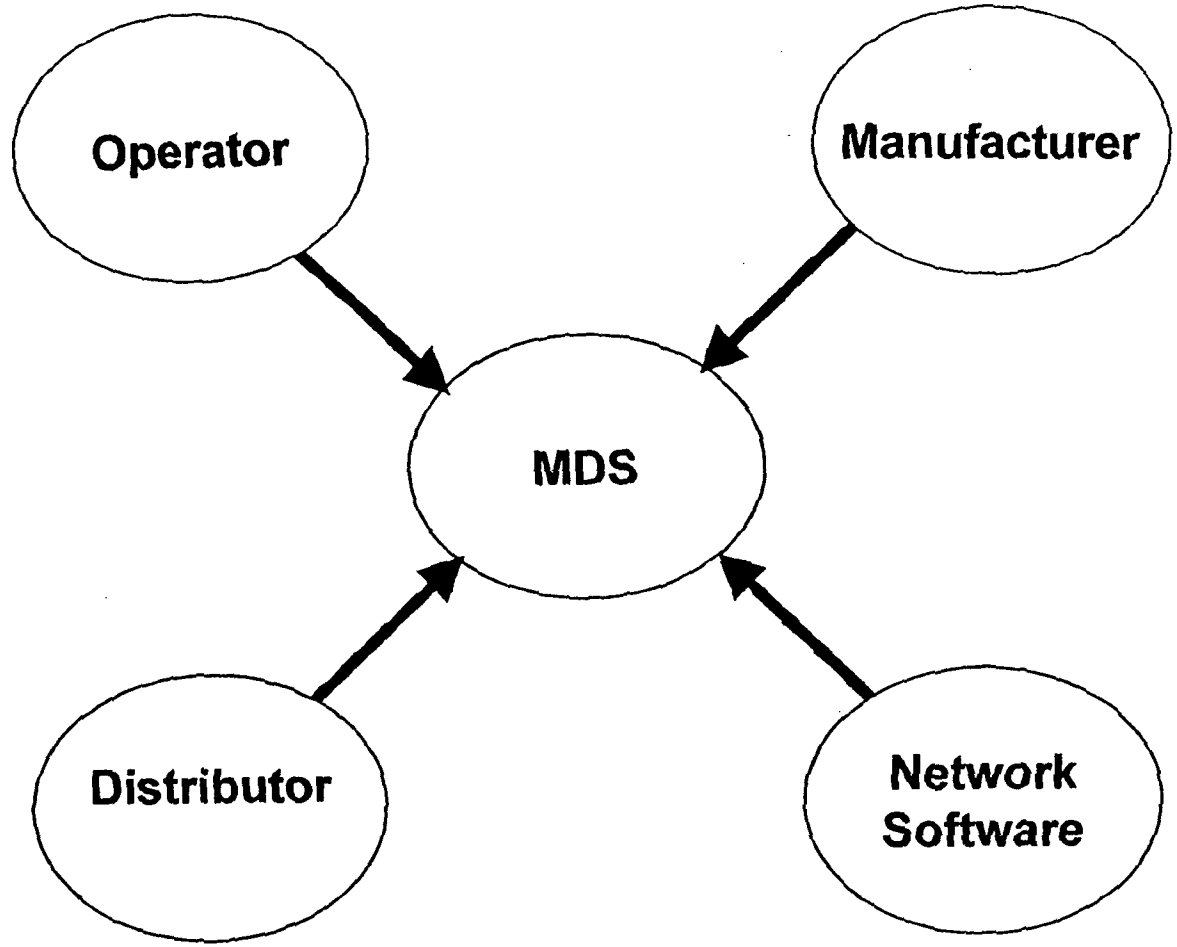
Presented by Steve Nell

Project Manager

WHO IS MDS

- A South African based company
- 80% owned by Transnet (Government owned transport company) and 20% privately held
- Started in 1991
- Incorporated in 1993
- Presently has a staff compliment of 40
- 21 design, development and system engineers focused on UAIS
- 6 world wide distribution offices
- Presence in >200 ports though sub-agents (being trained over the next six months)
- Many strategic partners in the maritime and information technology industries

THE MDS ENVIRONMENT



WHERE IS MDS

- Representative Offices in
  - Johannesburg,
  - Cape Town
  - Pretoria
  - Houston (USA)
  - London (UK)
- Appointed distributors in
  - Sidney, Australia
  - Perth, Australia
  - Houston, USA
  - Vancouver, Canada
  - Singapore
  - London, UK

THE MDS NETHERLANDS PROJECT

- WHY THE NETHERLANDS DEMONSTRATION SYSTEM
  - To provide input and support to the development of UAIS working groups and involved parties
  - Build the required expertise in UAIS / VTS integration
  - Prove UAIS functionality in congested environment
  - Assist VTS manufacturers in solving the UAIS / VTS integration problems
  - Assess the use of UAIS in congested environments and Inland waterways
  - Assess the response to information provided to the vessel in congested environments
  - Assess the use of AIS for applications other than the primary safety applications

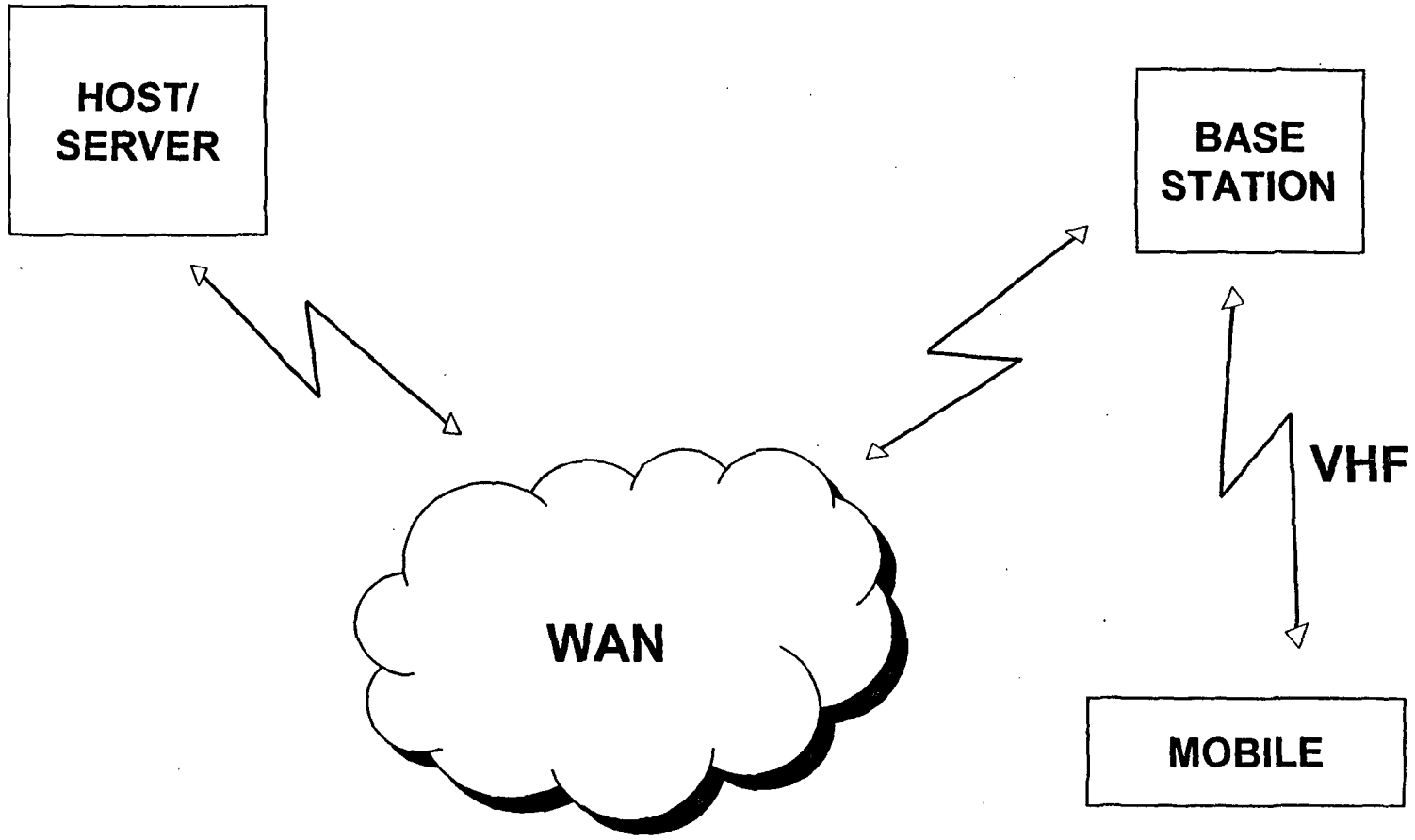
TRAFFIC DISPLAYED ON ECDIS

Henry please forward me the DEMO 19009 ecdis photo

NETHERLANDS SYSTEM
DESCRIPTION

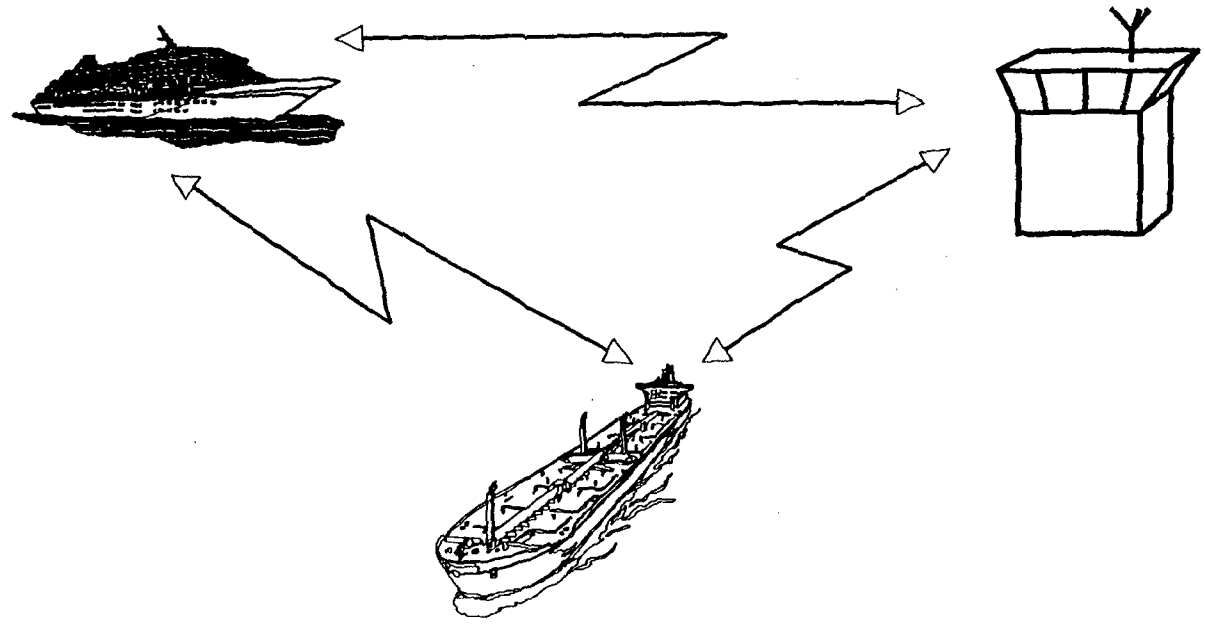
- 10 Base Stations
- 2 x UAIS base stations integrated UAIS / VTS Centres (Dordrecht and Milligen)
- Coverage area of approx. 130 km of inland waterways and partial coverage of the Rotterdam Harbour
- 30 Mobiles
  - Patrol Vessels
  - Commercial cargo vessels
  - Chemical Tankers
  - Pleasure Craft
- Some vessels fitted with onboard ECDIS systems with messaging facilities
- Contract managed by AVV (Mr. Cas Willems) and integrated into the EU INDRIS Demonstration Project.

SYSTEM DESCRIPTION



OPERATION

- Ship to Ship
- Ship to Shore



COVERAGE AREA

Map of the inland river to follow

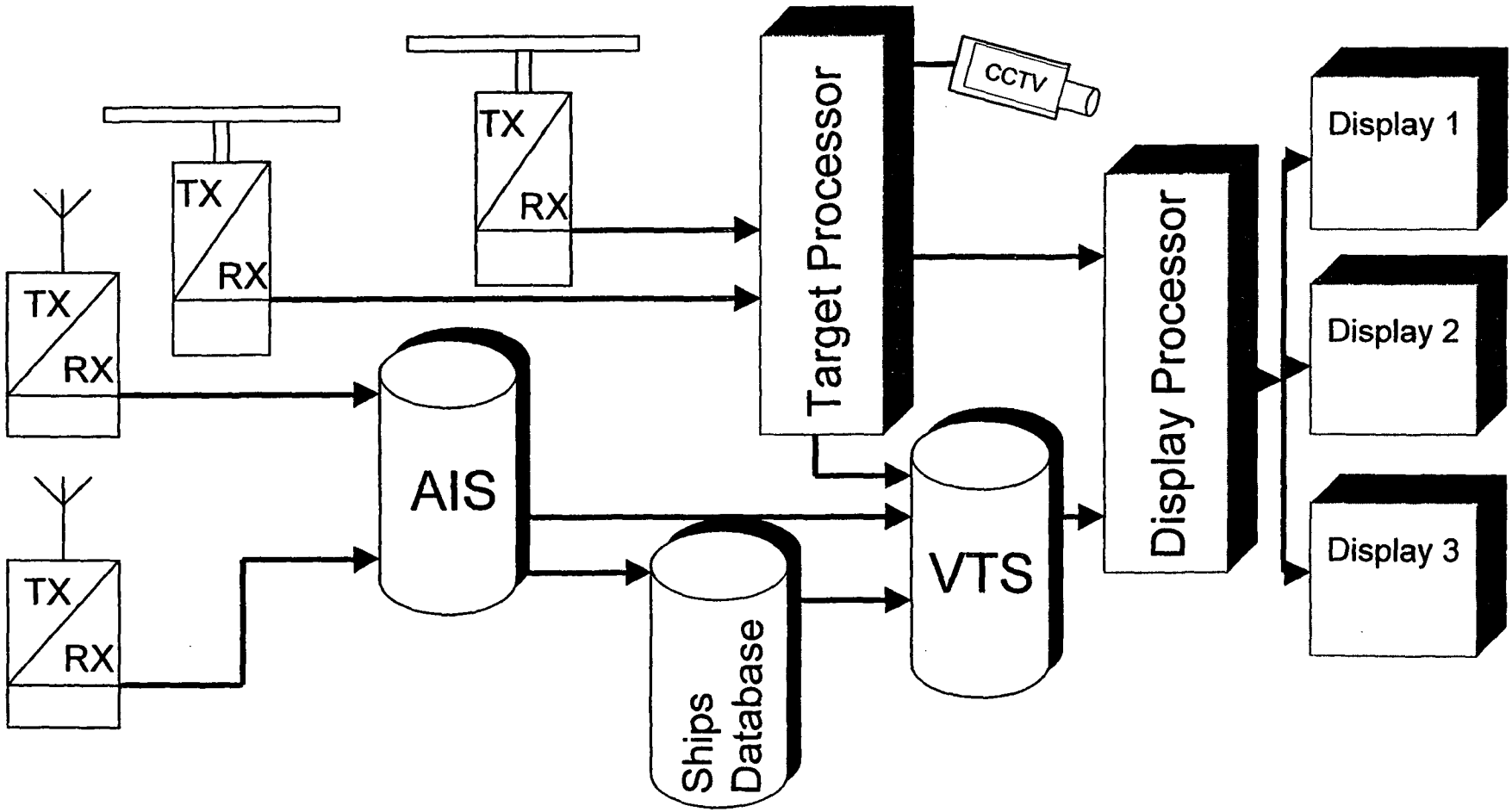
FUNCTIONALITY

- FATDMA
  - Mobile update rates set at 2 seconds per update
  - Base station update rates for VTS images at 72 targets per three seconds
- SOTDMA / RATDMA
  - Text messages (SMS) 196 characters

FUNCTIONALITY

- WHY NOT SOTDMA
  - A full slot map is the only way to test load, throughput and coverage. SOTDMA introduces variables that are difficult to quantify when analyzing the data later
  - The use of a full slot map tests the equipment at 100% loading (2 second updates)
  - The use of a full slot map tests all the interfaces at 100% loading (2 second updates)
  - The use of a full slot map tests the external applications at 100% loading (2 second updates)
  - The use of a full slot map tests the accuracy of tracking, positions and position reporting of navigational systems and display systems

VTS INTEGRATION



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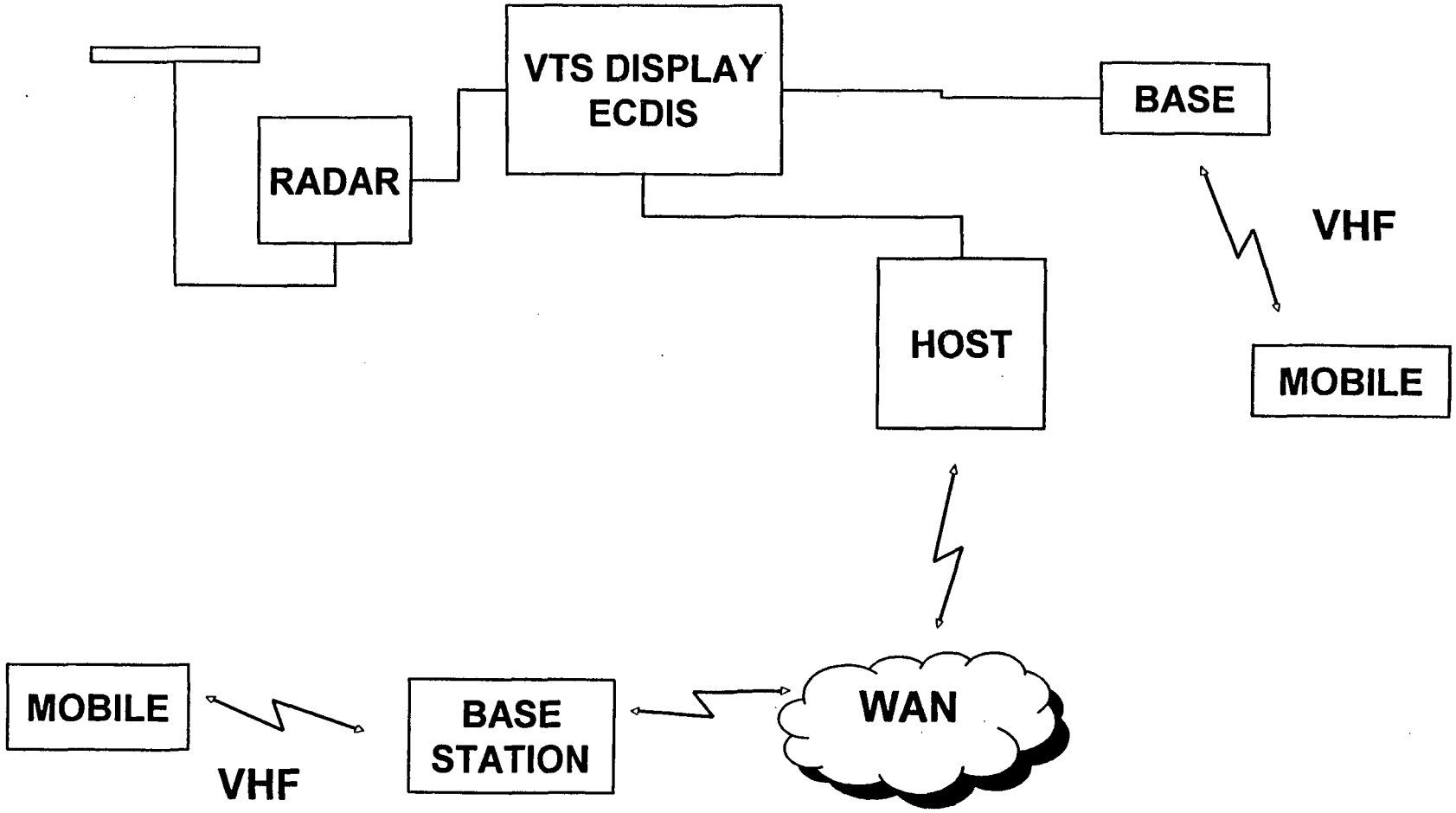
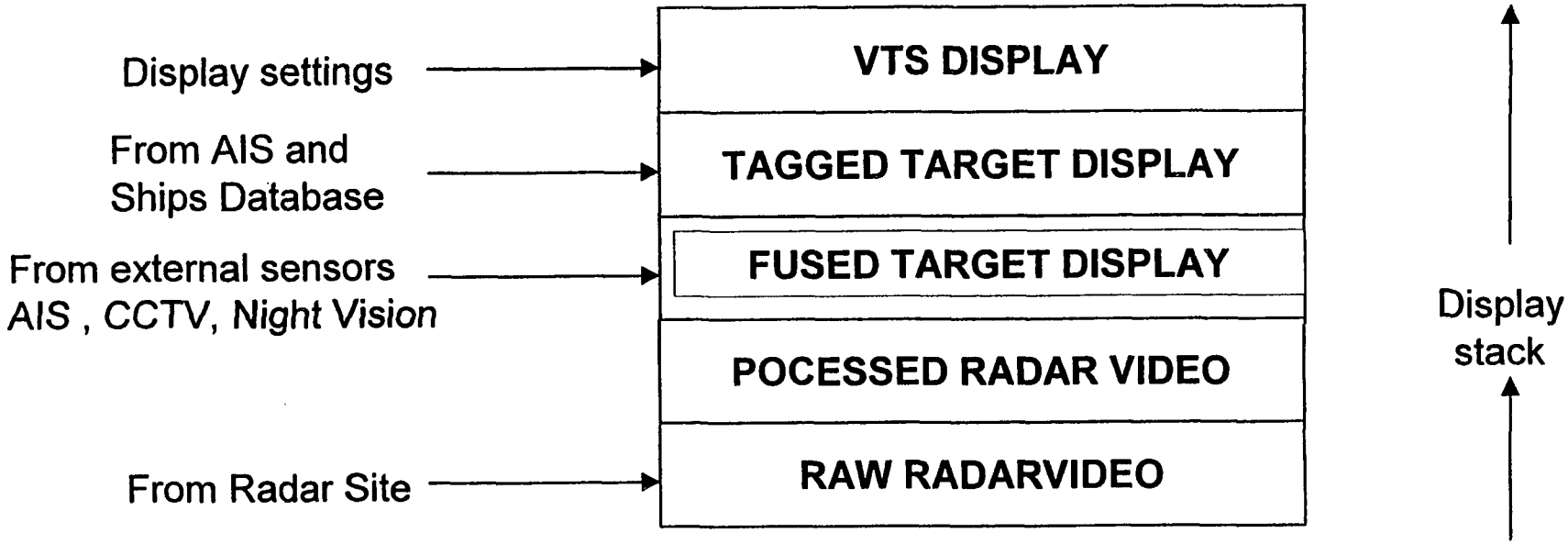
VTS INTEGRATION



Marine Data Systems

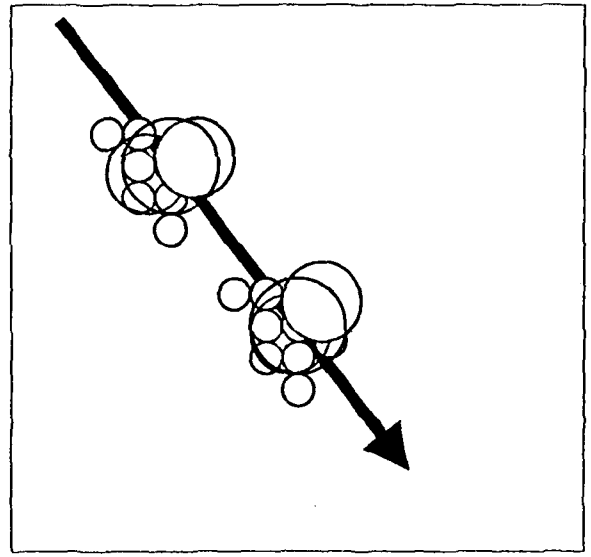
VTS INTEGRATION



VTS INTEGRATION

EXAMPLE OF SENSOR TARGET FUSION

Display fusion



Radar position = position X
CCTV position = position Y
AIS position = position Z

$$\text{Displayed position} = \frac{X+Y+Z}{3}$$

THINGS LEARNED

- That VTS/UAIS integration is a complex process that requires extensive understanding of the UAIS and VTS environments and takes into account the constraints of both systems
- That the load placed on the UAIS system needs to be very carefully quantified and engineered
- Detailed planning needs to be done to mitigate the effects of the various failure modes of VTS and UAIS systems
- Installation of UAIS systems needs to take the local radio environment into account
- Coverage of the area of interest needs to be very well planned and then engineered
- Training of target market at all levels needs to be paramount

TRAINING

- MDS provides extensive training that covers:-
- Operation of the UAIS
- Installation of the UAIS
- System design for integration of UAIS
- Repair and maintenance of the MDS UAIS

FUTURE

- MDS sees UAIS in the future as follows:-
  - Becoming a world wide standard and being adopted by the many facets of the maritime world including pleasure craft
  - That the price will decrease with volumes
  - That feature set will increase with the increasing complexity in the associated vessel information systems

MDS will continue to be involved in worldwide projects and has thus committed a large number of UAIS units worldwide, for pilot projects

THE END

MDS wishes to thank you for your attention and trust that all the information that has been provided has added to the wealth of information that you already have.

Should anyone have any questions or requires any further more detailed information, please contact:-

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PRESENTER

Steve Nel is a project Manager (International) for MDS and has been responsible for a number of MDS UAIS projects around the world. The most prominent of these is the Netherlands system.

INTRODUCTION

MDS is a South African company and initially became involved in the maritime transponder business in 1991 and was incorporated in 1993. The company has since been focusing on the design and manufacture of an IMO compliant UAIS transponder. Much of its development time has been spent in testing concepts and systems with the intent of feeding back this information to the international UAIS working groups.

MDS has grown to a staff compliment of 40 of which 21 are Engineers. MDS has offices in Cape Town, Pretoria and the Head office in Johannesburg.

MDS has distributors and agents located in :-

- Houston, Texas (USA)
- Vancouver, Canada
- London, UK
- Singapore
- Perth, Australia
- Sydney, Australia

MDS has over the years built many strategic relationships in the software, hardware and manufacturing environments. These partners have helped MDS refine its product.

THE MDS ENVIRONMENT

MDS having its focus on the UAIS has been involved in software development, small-scale manufacturing, test UAIS networks and the setting up of global product distribution and product support networks.

MDS initially installed a trial UAIS system in South Africa that has some 25 base stations and a number of fixed Mobile Terminal Units. The system is presently used for lighthouse monitoring. A lot of the initial MDS experience was built as a result of the work done with this system.

NETHERLANDS

MDS entered a contract with AVV to provide a test UAIS system on the inland waterway system in Netherlands.

The main goals of the project were: -

- To support the Netherlands Government in it's research on how to improve the safety in the inland waterways.
- To provide support to the International UAIS working groups which are dedicated to the development of UAIS standards
- Perform tests in the integration of VTS/UAIS systems
- Prove the functionality of UAIS and VTS/UAIS in congested traffic environments
- Assist the VTS operators in the managing of traffic, especially where two or more busy waterways converge.
- To supplement and integrate to the INDRIS Project, in which MDS was an AIS supplier.

NETHERLANDS SYSTEM DESCRIPTION

The Netherlands systems comprises of a central computer system, 10 base stations, 2 VTS integrated UAIS base stations and 30 mobile UAIS units.

The central computer collects all the data of the base stations and the mobiles. The mobiles communicate via VHF to the base stations, which in turn will send it's own information and that of the mobile to the host server, via a Wide Area Network. The host server will collect all the information and store it in a database. This data is accessed for many purposes such as ECDIS displays and Internet applications. The Network covers approximately 130 km of inland waterways. It also covers the Rotterdam Harbour, which is one of the biggest and busiest harbours worldwide. The 30 vessels that were equipped with mobile transponders vary from Patrol vessels, cargo vessels, chemical tankers and also private craft.

The system operates in the ship-to-ship and ship to shore modes, the so-called 4S communication method.

FUNCTIONALITY

Fixed Access Time Domain Multiple Access FATDMA was utilized for mobile and base station update rates and also for the broadcast of V TS targets. With this method we could dictate the update rate of the mobiles and the base stations. We could also transmit VTS targets from the VTS base station to all the mobiles in the coverage area.

The Self Organised Time Domain Multiple Access (SOTDMA) access scheme was employed to transmit text messages (SMS) for ship to ship or ship to shore communications. The text message feature proved to be an extremely helpful tool for sending important messages. In this system, the messages are free format. They could very easily be used for navigational warnings etc.

FATDMA was used in the tests so that all the slots were filled and MDS could be assured that every vessel transmitted every two seconds. This allowed MDS to test the following:-

- 100% load on the RF channel
- 100% load on the UAIS equipment
- 100% load on the UAIS network
- Potential interference from a fully occupied UAIS channel
- Measure message failure
- Measure message failure versus distance
- Actual coverage per UAIS fixed terminal unit
- The actual position of the vessel compared to the indicated VTS position
- The reliability of VTS image transmissions in critical environments
- The long-term effects of propagation anomalies (VHF skip)
- The long-term effects of weather conditions on coverage

UAIS / VTS INTEGRATION

The integration of the UAIS and VTS systems was a steep learning curve.

Many factors had to be taken into account when integrating the systems. From this perspective MDS learned the following:-

- Traffic studies and models need to be carefully done in the planning stages
- VTS integration should take into account the type of VTS and the RADAR image density
- The number of targets being tracked by the VTS
- The target fusion process
- The target display symbology
- Operator training
- UAIS RF environment

VESSEL INSTALLATIONS

Installations, both on board vessels and shore stations, had to be carefully planned, to ensure the optimum operation of the UAIS system. GPS and VHF antenna positions, antenna isolation and power supply constraints all required careful consideration and planning before all worked well.

FAILURE MODES

As the UAIS system is a critical system used for navigation in the waterway as well as providing critical information to the VTS and vessels, failure modes

needed careful planning and consideration. Much of this experience is still being collated and systems being tested and put in place to allow for a predicable system to be available.

TRAINING

Proper training of operators, users and associated parties needs to be in place before any UAIS system is installed. Failure in this leads to confusion and lack of co-ordination. The training should include all interested parties.

TRAINING MADE AVAILABLE

MDS provided extensive training to its distributors, agents and customers. The MDS training covers the total UAIS experience from installation through operation to system constraints and network design parameters.

It is only by providing this detailed training to all the parties associated with the MDS systems can the best results be obtained.

MDS provides the following training:-

- Introduction to UAIS (3 days)
- UAIS installation (1 day)
- UAIS integration (1 day)
- UAIS maintenance and repair (2 days)

FUTURE

MDS is currently involved in worldwide pilot projects, with the aim of supporting the UAIS international work groups and customers with whom it is associated detailed knowledge of the UAIS product and its implementation in various environments.

MDS has committed a large number of UAIS transponders to test projects around the world. Each of these tests have and will have unique outcomes that would assist MDS and its partners in the creation of effective and cost efficient solutions.

MDS is committed to producing a fully compliant AIS, including all adoptions and proposed changes in the IEC test specification number and the ITU test specification number.