

FUGRO CASE STUDY

Project is based on the VMS SHAM tracking results from 9th - 11th of July 2011 and represents a starting point for any further SatAIS solution development at EMA's development corner.

Project requirements:

A number of vessels are required to be tracked constantly throughout several different voyages within the Arabian Gulf area but over a range that exceeds the normal AIS VHF capability.

VHF reception range is subject to Troposphere conditions and as whilst in the Arabian Gulf area very good conditions are normally encountered, there may be times when the range is reduced and the vessel cannot be located from land based receiving stations. The availability of high sensitivity VHF antenna arrays does provide increased coverage, however even the extended range of the high sensitivity receiving stations does not provide the coverage required for this project (>200 nm).

The solution proposed by Fugro Survey comprises of a hybrid AIS (VHF) and Satellite transponder having the capability of being switched from VHF to Satellite when out of normal range of VHF reception. The Satellite transponder has the capability of tracking the vessel anywhere in the world via the Iridium satellite constellation.

Real time display of the vessel position can be provided either via a web browser or on the Fugro ChartViewAIS application or both.

The ChartViewAIS application is both a viewing and analysis application which receives displays and stores the AIS signals in real time from multiple sources and makes the data available for historic playback for analysis, incident reporting, movement reporting and vessel track display. A number of analysis functions are available including Grid analysis for speed, heading, journeys etc. and analysis of vessel movement (via histogram) in any user defined area.

The demonstration of the satellite tracking capabilities was carried out through the installation of the hybrid unit on MV SHAM. The hybrid unit was configured to operate in satellite only mode with a reporting frequency of 15 minutes. The vessels existing AIS transponder was working normally throughout the test.

The satellite transponder was mobilized on MV SHAM on 8th July 2011.

Tracking commenced from the time of mobilization and an overview of the tracking parameters is shown below

Name: FugroTest

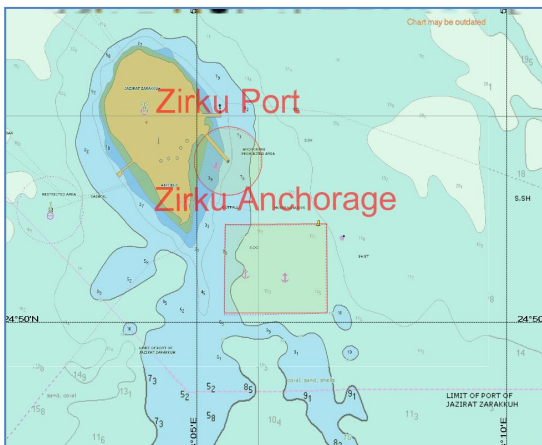
Number of fixes: 544

Start time: 7.7.2011 9:13:06

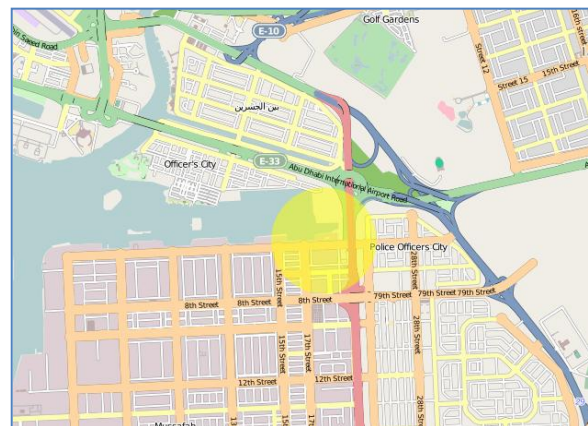
End time: 12.7.2011 19:23:57
 Elapsed time: 5.10:10:51
 Distance Travelled: 180,5 nm
 Average GPS speed: 5,8 kts
 Maximum GPS speed: 35,8 kts
 Number of stops: 11
 Zones crossed: Abu Dhabi Base, Zirku Port, Zirku Anchorage

A number of zones were set up to demonstrate the recording of the vessel when entering and leaving the defined zones. Zones can be either circular or polygonal and can be digitized using the underlying map as a guide. Alternatively the circular zones can be digitized from a centre point and a radius thereby giving exact control of the zone extents.

The extent of the zones digitised for this project is shown below.



Zirku Port & Zirku Anchorage



Abu Dhabi Base

The recording of vessel movement both in and out of the Guard Zones is displayed both dynamically on screen...

NAME	MMSI	TIME	ASPECT	LAT	LOX
CLIPPER PACE	212400000	03 Aug 2011 13:28:50	Leaving GzName	53.552613	-3.925274
CLIPPER PACE	212400000	03 Aug 2011 13:19:02	Entering GzName	53.552841	-3.854917
NORBANK	246213000	03 Aug 2011 13:00:19	Leaving GzName	53.537173	-3.855334
NORBANK	246213000	03 Aug 2011 12:51:20	Entering GzName	53.546485	-3.925442
EUROPEAN ENDEAV...	311054700	03 Aug 2011 11:44:30	Leaving GzName	53.557194	-3.925148
EUROPEAN ENDEAV...	311054700	03 Aug 2011 11:36:47	Entering GzName	53.556941	-3.854808
MSC JOY	248811000	03 Aug 2011 08:58:13	Leaving GzName	53.513157	-3.855974
MSC JOY	248811000	03 Aug 2011 08:49:27	Entering GzName	53.511383	-3.926408
CLYDE FISHER	311855000	03 Aug 2011 07:36:23	Leaving GzName	53.508218	-3.856106
CLYDE FISHER	311855000	03 Aug 2011 07:19:43	Entering GzName	53.506847	-3.926533
AL HUSAM	470828000	03 Aug 2011 07:11:41	Leaving GzName	53.502806	-3.856250
KATHLEEN AND MAY	235036333	03 Aug 2011 06:18:21	Leaving GzName	53.502806	-3.856250
HELIAL 5501	371214000	03 Aug 2011 05:54:19	Entering GzName	53.495732	-3.926839

Clear Data Close

and in a log file...

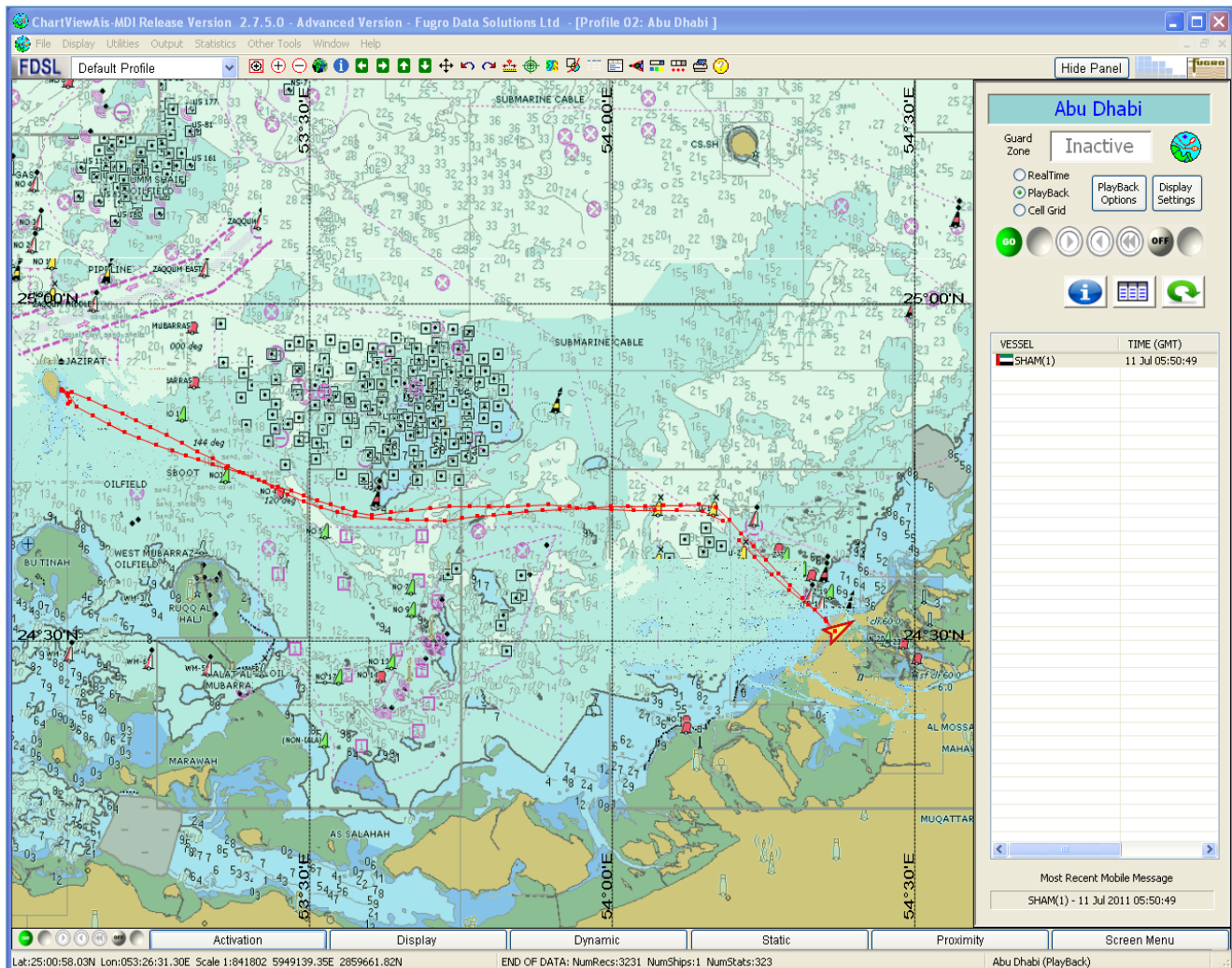
```
GZ status: ON - Operating Mode:PLAYBACK (now: 05 Aug 2011 09:32:45) from SQLA190511.dsn start time: 20 Jul 2011 19:20:00...
Guardzone Crossings Interpolated

20 Jul 2011 19:22:55, 377441000, 53.57980, -3.92453, Leaving GZName, CLARITY
20 Jul 2011 19:30:31, 311054700, 53.53868, -3.92566, Entering GZName, EUROPEAN ENDEAVOUR
20 Jul 2011 19:38:12, 311054700, 53.53115, -3.85549, Leaving GZName, EUROPEAN ENDEAVOUR
20 Jul 2011 20:03:26, 235008440, 53.60136, -3.90814, Entering GZName, M/T KEEWHIT
20 Jul 2011 20:15:48, 235008440, 53.57886, -3.85422, Leaving GZName, M/T KEEWHIT
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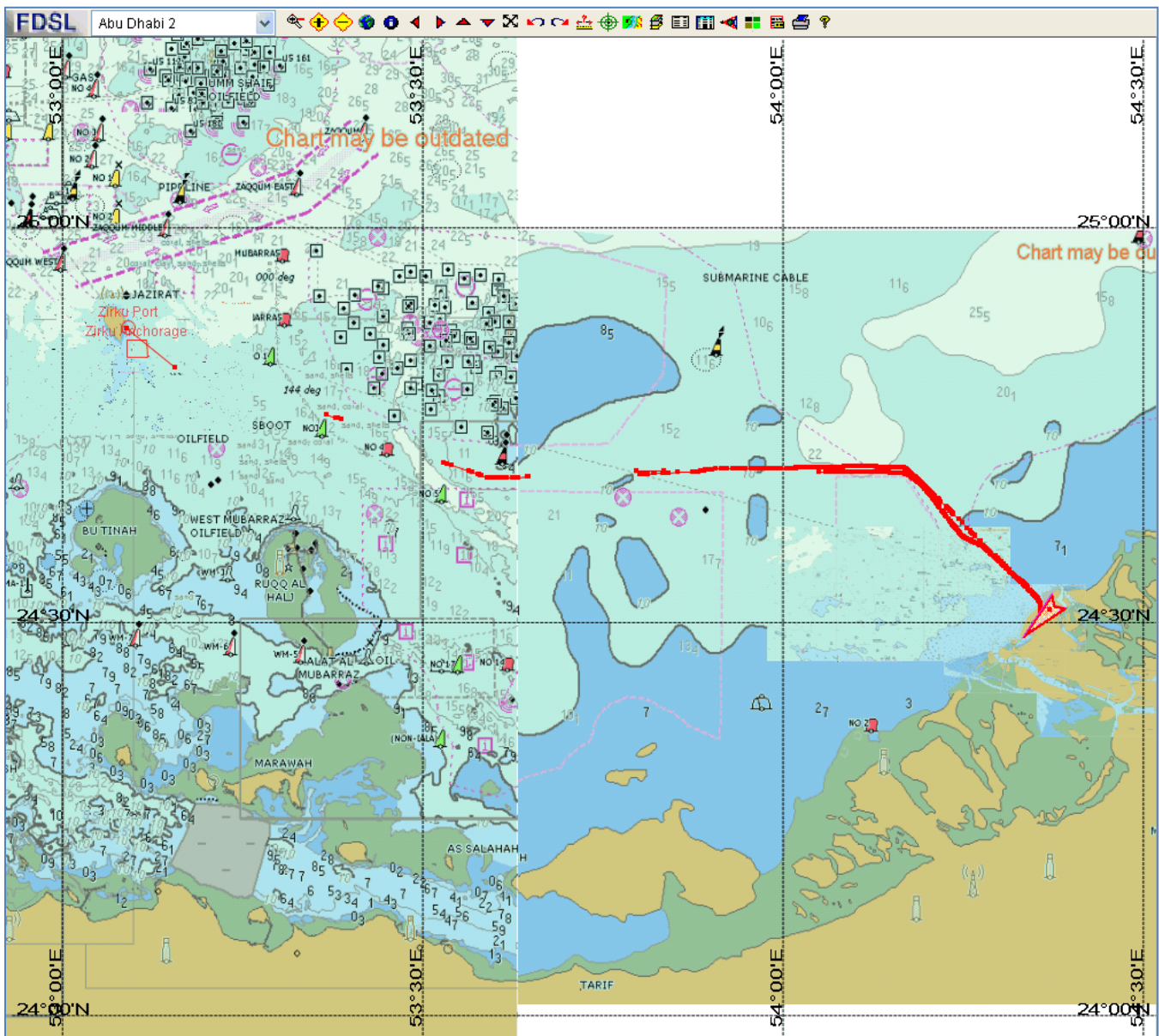
The above examples are taken from North Wales Data and do not relate to MV SHAM.

The following images compare the signals received from the Satellite only system to the AIS system and demonstrate clearly the complete coverage of the vessel voyage. Atmospheric and Tropospheric conditions do not have an effect on the reception capabilities of the satellite system.

Voyage Track of MV SHAM (satellite Tracking)



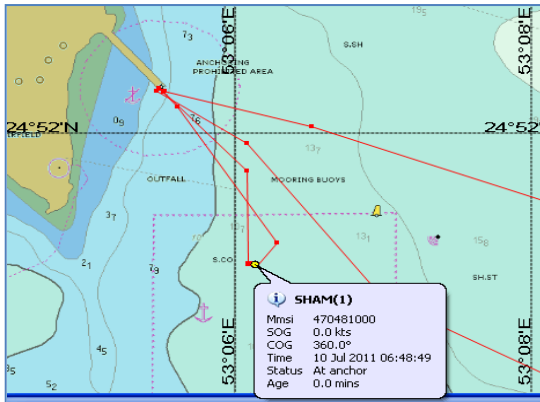
The track shown above has position reports every 15 minutes throughout the entire voyage with no break in position reporting, compare this to the track received from the AIS receiving station shown below.



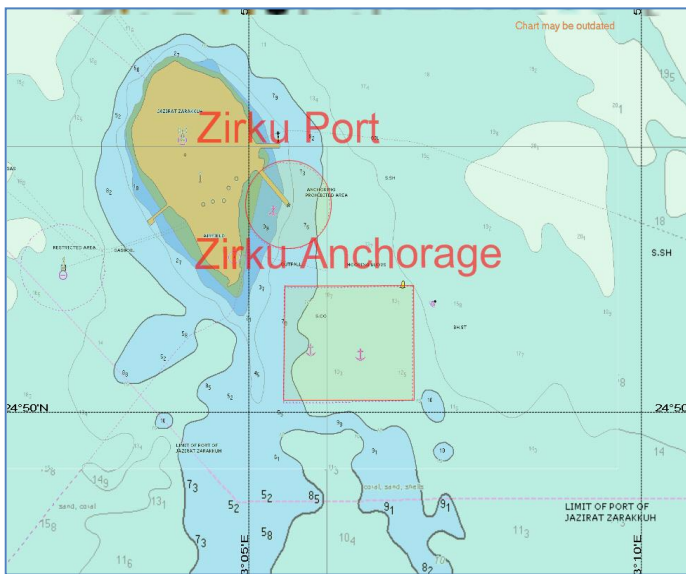
The break in signal can be clearly shown and this is due to limitations of VHF reception.

The difference in the density of the received signals is due to the reduced frequency that was set for the satellite transponder. The frequency is user definable and can be set to any value.

Position reporting was set to 15 minute intervals; each point on the Chart represents a fix location and can be interrogated for exact position and time.



If used in conjunction with AIS signals the satellite system can be set to transmit only when outside the range of AIS. This range is variable and influenced by atmospheric conditions, therefore a conservative range would be specified.

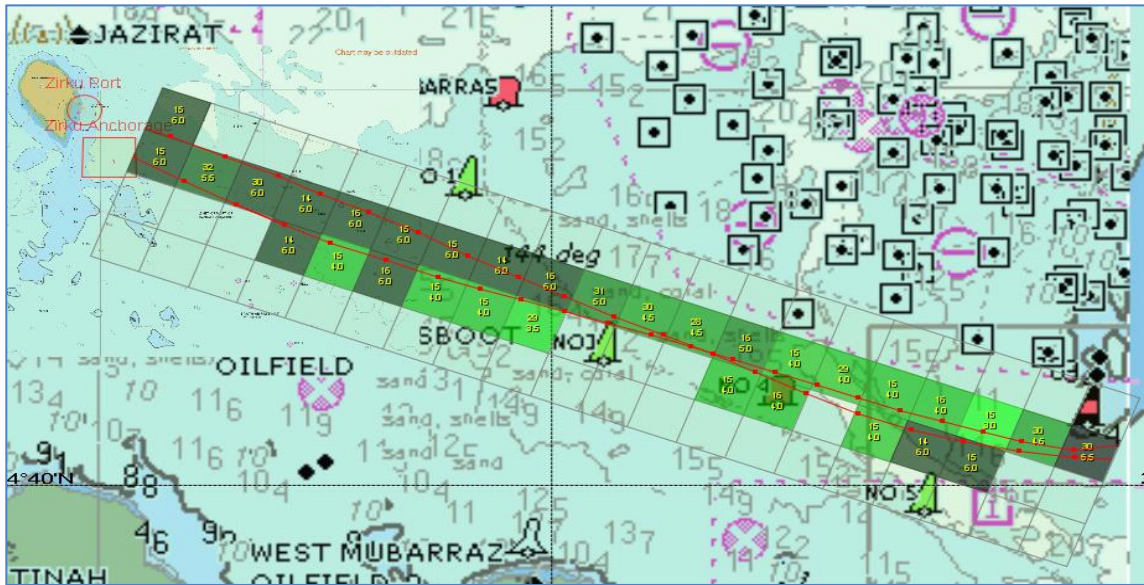


Guard zones can be specified at any location and reporting of vessel entry and exit to Guard Zones is reported.

Details of vessel activity within these guard zones can be reported both visually and audibly and a record is written to a Guard Zone log file for future reporting.

Any number of Guard Zones can be configured as either circular or polygonal areas.

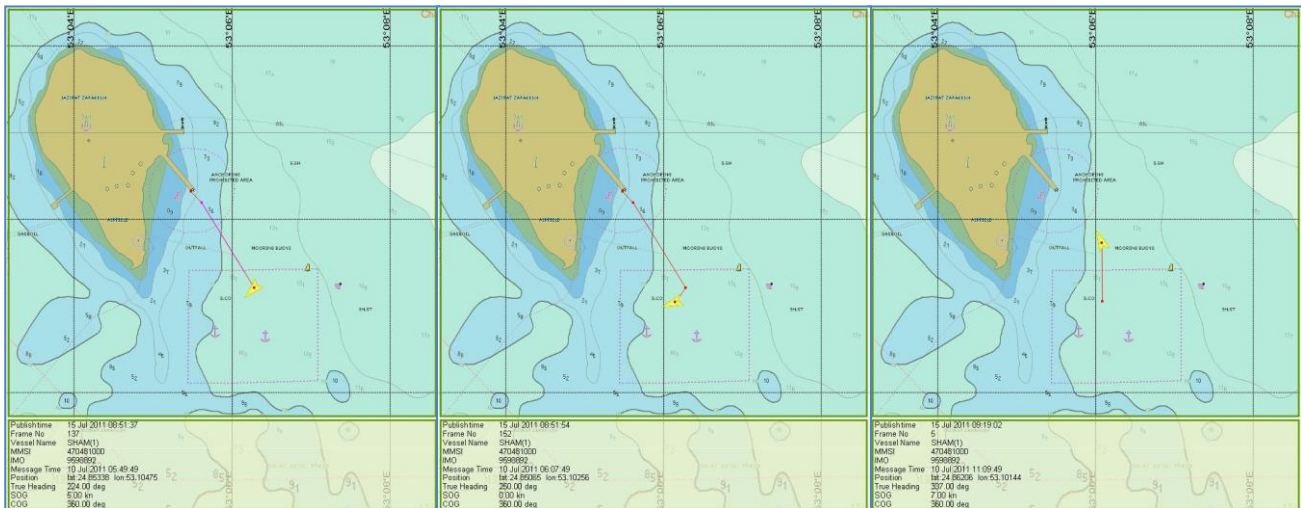
To demonstrate one of the analysis functions of ChartViewAIS an analysis of the vessel speed approaching Zirku was carried out and the results shown below.



The Grid cells show the vessel speed and the number of data points used in the analysis. The cell coloring indicates different speed ranges.

For more specific reporting such as required following an incident, analysis of individual reporting parameters can be carried out and presented as either a series of frames or combined into a movie.

An example of frames is shown below:



Each frame shows the data received at the specific point and any number of frames can be combined into a single movie file for replay.

These are just a few of the analysis functions of ChartViewAIS which together with the data storage capability provide a complete monitoring package for the Vessel or fleet operator.