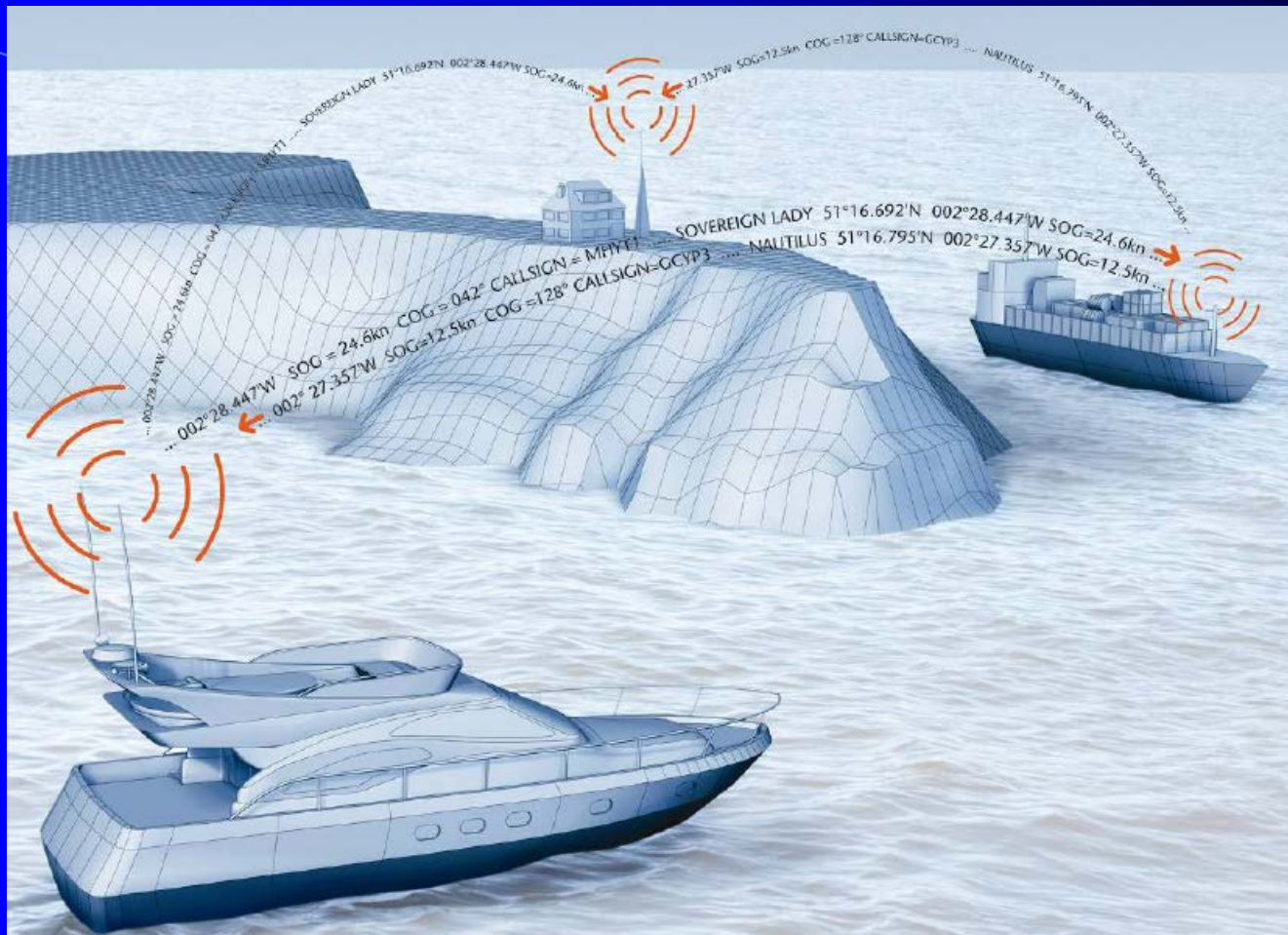


Tide & Meteorological Data over AIS

E.F.Read (Ohmex Ltd) & W.S.Heaps (ABP Ltd)



Background to AIS

- Most significant development since RADAR
- Positions and Timing from GPS network
- 12.5 Watt over 2 VHF channels
- 2250 ‘slots’ on each channel
- Compulsory for passenger & over 300 tonne
- Aids to Navigation services

Tide & Met data on AIS

- TideMet very relevant to navigation
- Hydro Surveyors – Tidal RTK check
- Broadcast over AIS no special radios
- Access to data other than speech/visual
- AIS v website presentations
- Data latency over internet websites
- Danger of using just predicted tides

AIS AtoN Message Types

- Type 21 General AtoN Report
 - Position, Name, Settings
- Type 8 Binary broadcast
 - Met/Tide, Lock, general
- Type 6 Binary Addressed
 - AtoN Status, Health

Structure of an AIS message

- I.M.O. Defined
 - NMEA text checksum format
 - 6 Bit ASCII data payload
- AIVDM – Broadcast message
- AIVDO – ‘Own’ message

```
!ANVDM,1,1,,A,33P7pL0003OpjNPLwPv<THQb00w0,0*7B
$ANMPR,992351200,8,1,0,2,1,04dfJe3wD3Qqb8000000001W3EO,C*7E
$ANMPR,992351200,8,1,0,2,2,0e00000000000620000000dt001,C*4D
!ANVDM,1,1,,A,33P88o@01dOr23HM3lqG25kb0000,0*65
!ANVDM,1,1,,A,13M@D7@2imwr3?NM3tMeh:kdOHOf,0*42
!ANVDM,1,1,,A,13OaBj501JOq8:2M14nMiJuj2HRD,0*6E
!ANVDM,1,1,,A,13P88o@4QeOr231M313FwU1005k0,0*4B
!ANVDM,1,1,,A,39NWRE@OisOqu<4M3OQeOJv200rh,0*2D
!ANVDO,1,1,,Y,E>jHCp06IgPb7W00000000000000tHMg>QUu@00000P020,4*1B
!ANVDO,1,1,,B,8>jHCp00Bjqb1?u@>7V`P00000006L=D02100000000000H8000002kh004,2*2F
!ANVDM,1,1,,A,4h2=aQiuQO>h1OpiMVLwBcA005k0,0*5F
```

TideMet Type 8 Content

- Tide
- Wind
- Temperature
- Barometer
- Current
- Humidity
- *derived ...*

PARAMETER	BITS	DESCRIPTION
Message ID	6	Identifier for Message 8; always 8
Repeat Indicator	2	Used by the repeater to indicate how many times a message has been repeated.
Source ID	30	MMSI number of source station
Spare	2	Not used. Should be set to zero.
IAI	16	DAC = 001; FI = 11
Latitude	24	Measuring position, 0 to +/- 90 degrees, 1/1000th minute
Longitude	25	Measuring position, 0 to +/- 180 degrees, 1/1000th minute
Date and time	16	Time of transmission, Day, hour, minute, (ddhhmm in UTC)
Average wind speed	7	Average of wind speed values for the last 10 minutes. 0-120 kts, 1 kt
Wind gust	7	Wind gust is the maximum wind speed value reading during the last 10 minutes, 0 - 120 kts, 1 kt
Wind direction	9	0 - 359 degrees, 1 degree
Wind gust direction	9	0 - 359 degrees, 1 degree
Air temperature	11	Dry bulb temperature - 60.0 to + 60.0 degrees Celsius 0.1 of a degree
Relative humidity	7	0 - 100 %, 1 %
Dew point	10	- 20.0 - + 50.0 degrees, 0.1 degree
Air pressure	9	800 - 1200 hPa, 1 hPa
Air pressure tendency	2	0 = steady, 1 = decreasing, 2 = increasing
Horizontal visibility	8	0.0 - 25.0 NM, 0.1 NM
Water level (incl. tide)	9	Deviation from local chart datum, - 10.0 to + 30.0 m 0.1 m
Water level trend	2	0 = steady, 1 = decreasing, 2 = increasing
Surface current speed	8	0.0 - 25.0 kts 0.1 kt
Surface current direction	9	0 - 359 degrees, 1 degree
Current speed, #2	8	Current measured at a chosen level below the sea surface, 0.0 - 25.0 kts, 0.1 kt
Current direction, #2	9	0 - 359 degrees, 1 degree
Current measuring level, #2	5	Measuring level in m below sea surface, 0 - 30 m 1 m
Current speed, #3	8	0.0 - 25.0 knots, 0.1 knot
Current direction, #3	9	0 - 359 degrees, 1 degree
Current measuring level, #3	5	Measuring level in m below sea surface, 0 - 30 m 1 m
Significant wave height	8	0.0 - 25.0 m, 0.1 m
Wave period	6	Period in seconds, 0 - 60 s, 1 s
Wave direction	9	0 - 359 degrees, 1 degree
Swell height	8	0.0 - 25.0 m, 0.1 m
Swell period	6	Period in seconds, 0 - 60 s, 1 s
Swell direction	9	0 - 359 degrees, 1 degree
Sea state	4	According to Beaufort scale (manual input?), 0 to 12, 1
Water temperature	10	-10.0 - + 50.0 degrees, 0.1 degree
Precipitation (type)	3	According to WMO
Salinity	9	0.0 - 50.0, 0.1.
Ice	2	Yes/No
Spare	6	Total Number of bits 352 Occupies 2 slots

Fig 1 - IMO Type 8 Tide and Met. message definition

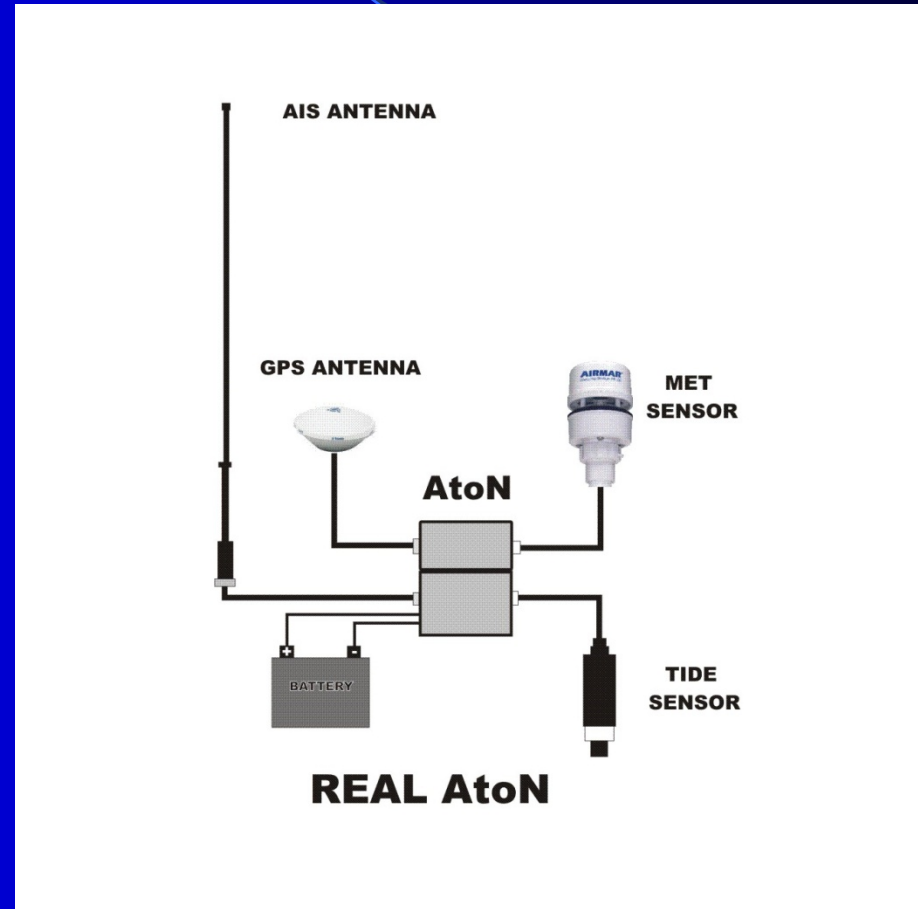
AIS AtoN Antenna Pod



- VHF Antenna
- GPS Antenna
- Meteorological POD
 - Wind Speed
 - Wind Direction
 - Barometer
 - Temperature
 - Relative Humidity

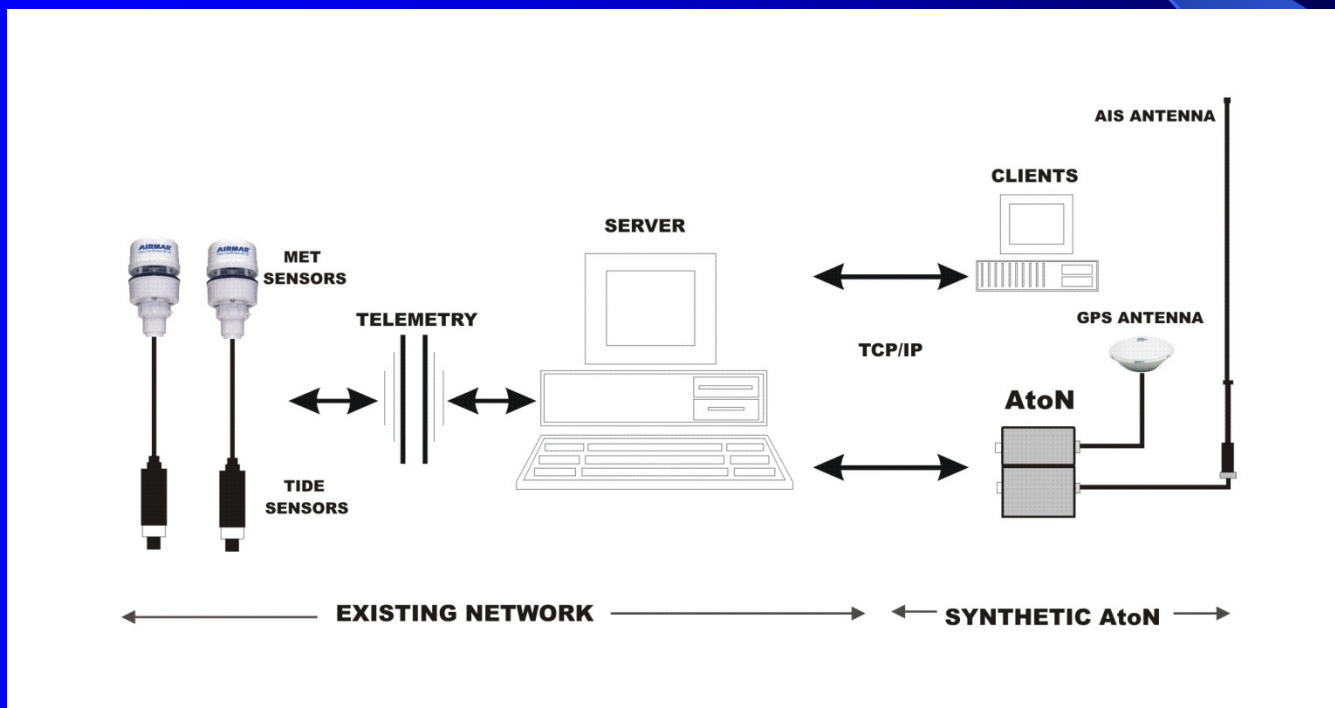
TideMet 'real' mode AtoN

- AtoN Device
- Met Sensor
- GPS Device
- Tide Sensor
- VHF Antenna
- Power

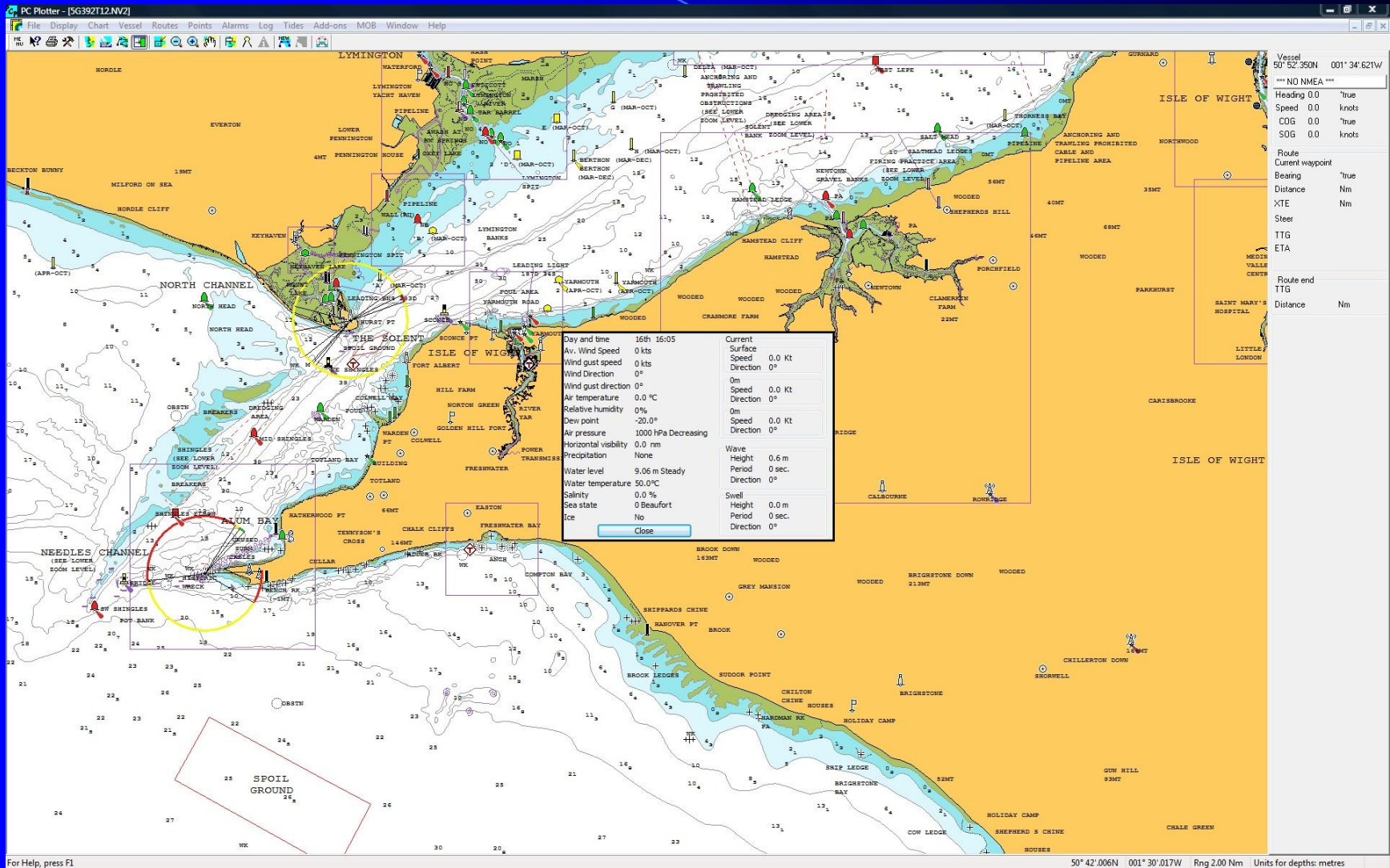


VTS 'Synthetic' mode AtoN

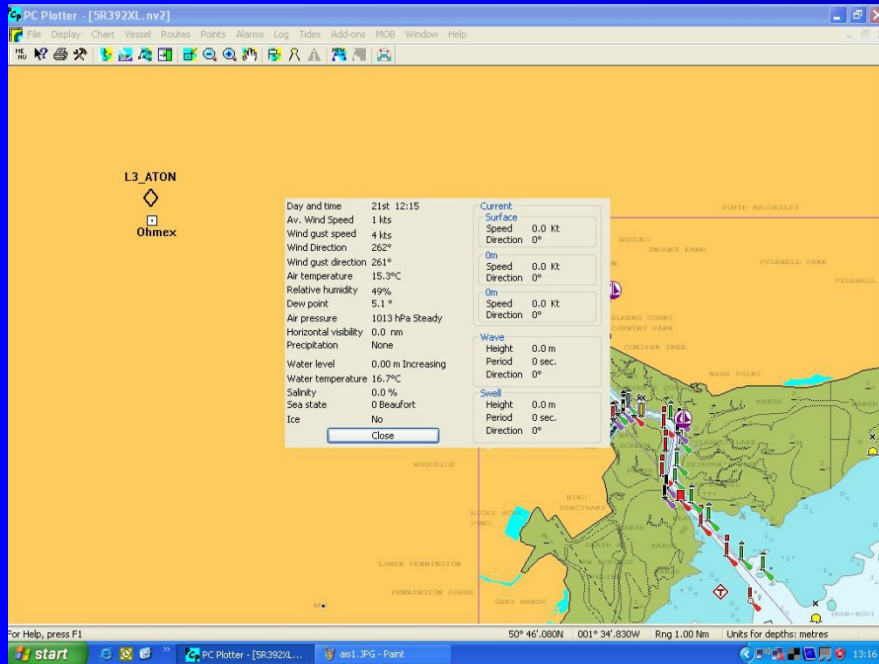
- Network server connection software
- Multiple 'Real' TideMet Gauges



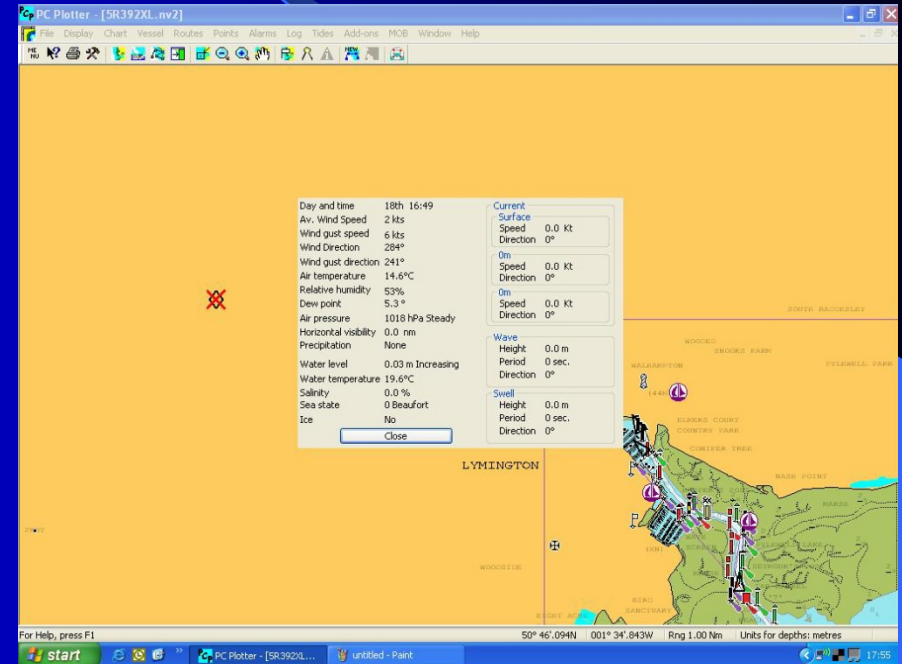
AtoN Receive software



AIS AtoN display software



Message 21 ID/Position



Show Timeout display

AIS AtoN Authorisation

- Radio Technical Specification
 - ITU Radio Regulations
 - EU Directives (99/5/EC)
- AIS Specification
 - IMO
 - IALA
 - IEC
- Broadcast Authority (UK – OFCOM)
 - Radio Spectrum
 - MMSI (ship or not a ship)
- Marine Authorities (UK – MCA)

AIS TideMet Users

- Ports & Harbours
 - Navigation, Pilots, SOLAS
- Inland Harbours
 - Forward Met, Tide, Traffic information
- Hydrographic
 - Offshore requirement, Tide corrections
- Dredging
 - Tide Corrections, Wave Height
- Civil Engineering
 - Wind Farms, Wave Energy platforms

Advanced TideMet Applications

- Search and Rescue (SAR)
 - models based on wind/current/tide
 - Type 9 message repeater
- Sewage discharge/disposal schemes
- Oil spill control/recovery modelling
- Flood surge control warnings
- Locks 25km forward information
- Bridges - 'air gap' clearance
- AISlive – National tide/met network

AIS requirements review

- Lack of software to decode messages
- Messages need to be computer friendly
 - Byte aligned
- Temporal review of message structures
- Content review of IMO messages
 - No international FI numbers
- More message bandwidth (AB+CD)
 - Amateur/Professional segregation
- More bandwidth discipline

Summary

William Heaps – ABP Ltd

AIS TideMet – A users perspective

AIS in the Port Environment

- Ted has given a thorough technical overview...
- I have been involved with AIS since early trials in the Solent
- The Port of Southampton was quick to see advantages.
- Have been long term users of AIS in VTS

What do we use AIS for?

- “Traditional” vessel identification and tracking. (Radar, web etc)
- Advanced warning of movements and verification
- Aboard Pilot launches (“traditional” again)
- More recently as integral part of PPU’s
- Data basing – historical information

The future

- You have already seen part of our vision of the future
- AIS could be very powerful
- Hardly scratched the surface of alternative uses
- Messaging – specific and broadcast.
- Alarms for specific vessels in specific regions
- TideMet – the technology exists – why invent something else? Ports have been waiting for the manufacturers.

AIS TideMet System

Questions ?

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