Global AIS: Enhancing Maritime Safety and Security through Satellite AIS Detection

Presented at the International Maritime Organization
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Presentation Objectives

Global AIS through Satellite AIS Detection

• Provide an overview of Satellite AIS (S-AIS) capability and deployment status
  “The Capability is here – now!”

• Highlight some of the potential applications of this new Global AIS capability
  “Provides a wide range of new and enhanced applications to global maritime agencies”
exactEarth

• Business focus:
  – High performance global AIS detection service
  – Serving global maritime authorities

• Canadian Company with Strong International Backing
  – Owned by COM DEV and Hisdesat – leading satellite solution providers
    • World leaders in satellite technology and systems, >$3B deployed in orbit
  – Working with international agencies for last five years on satellite AIS

• International Team of expert partners in place
  – Have built an exceptional solution for global AIS
  – $100M satellite system deployment now entering service
Taking AIS to the next level

• AIS today – globally deployed, locally used
  – ~65,000+ transponders, many years of successful operation
  – >$1B invested in global AIS deployment to date

• Current Applications – ‘Line of Sight’:
  – Collision avoidance, Coastal VTS/monitoring
  – Current applications limited by line of sight reception

• Satellite AIS detection ‘takes AIS global’
  – Receives Class A AIS regardless of location
  – Does NOT require any change to the ship’s equipment
  – Enables a range of new capabilities for AIS
exactAIS System Overview

A highly secure system
- Data is encrypted at all phases of transmission from satellite reception to user delivery
- Data center is in a secure facility
- System security will be constantly monitored
- Licensed by Cdn gov’t under RSSSA – provides oversight of data distribution to authorised users

A very simple system
- Satellites receive existing vessel AIS transmissions
- Does not require special AIS transmissions or any new ship-borne equipment
- AIS signals routed by satellites to earth stations and then to Data Processing Center (DPC) where AIS messages are stored
- From DPC filtered data sets are streamed directly to government customers

Satellites

Earth stations

DPC

Customers
Global Satellite AIS System Deployment

- @$300M of S-AIS System Deployment underway
  - exactEarth
  - Orbcomm
  - Norway
  - Others
- Strong growth in deployed satellites
  - Now: 6 satellites
  - 2015: >30 satellites
- Provides full global coverage with rapid update rate for Class A AIS transponders
  - Now: 8-10 reports per day
  - 2015: 30–60 reports per day
Current Performance – Measured Global Data

Image above shows a single position report from 60,000+ Unique MMSIs Currently Tracked By the exactEarth global satellite AIS system
Measured Global AIS Data

Note: Only one position report per vessel shown, multiple reports eliminated for clarity
Global AIS Capability Summary

• Global Data reception using one system “Global AIS”
  – Coastal AIS + Satellite AIS = Global AIS
  – No change to ship-borne equipment
  – Compatible with existing AIS data systems

• Provides a rich and unique data set
  – Detects/tracks all Class A AIS transponders globally
  – Dynamic Data including velocity and track
  – Static and voyage related information
  – Unique SatAIS Monitoring Capability (position validation and anti-spoofing)

• Capability is available now
  – Initial service has commenced, 6 satellites currently in orbit
  – >$300M of satellite deployment committed, 30 sats expected by 2015
  – Data can be collected and distributed securely to authorised users
Global AIS Applications

AIS Today

- Collision Avoidance
- Coastal VTS/Monitoring

Global AIS Tomorrow

**Enhanced VTS/VTM**
- Global Coverage/Global Tracking
- Ship Reporting/Ship Routing
- Arctic VTM
- Remote coasts-coastal AIS extension

**Environmental Protection**
- Monitoring Environmental Sensitive areas.
- Vessel Monitoring
- Identify Polluters
- Fisheries Monitoring

**Safety and Security**
- Rapid ID of vessels in vicinity
- AIS SARTS/EPIRBs
- AIS ATONS
- Position validation
- Anti-piracy monitoring

A Wide Range of Potential Applications
Environmental Protection Applications

Monitor Environmental Areas

- The Gully MPA

Identifying Polluters

Vessel Monitoring

- Vessel carbon footprint calculations
- Tracking of polluting, hazardous and obnoxious cargo
- Geofencing and alerting of approaches to environmentally sensitive areas
- Identification of candidate offenders through historical tracking
Arctic Vessel Monitoring Applications

Vessels identified in the Arctic - July 29, 2010

Canadian Coast Guard vessel tracks August, 2010

Complete Arctic Coverage for Vessel Monitoring

S-AIS allows for identification and route tracking/projection through the entire Arctic region
Vessel Traffic Monitoring Applications

Example of unusual behavior:

• Laden tanker slow steamed for several hours. Stopped for a number of hours, then proceeded at differing speeds on a dog leg prior to resuming course.
• Engine Failure or Maintenance???

S-AIS enables recognition of unusual behaviour

Velocity differences instantly recognizable to the trained eye

A new monitoring and analysis tool for coastal states
S-AIS monitors ATON’s in order to advise authorities when they are not working, in turn informing the shipping community.
Global AIS Search and Rescue Applications

• Wide Area vessel domain awareness
  • S-AIS contributes to a rapid, targeted response to distress notifications

• AIS SARTs/EPIRBs
  • Allows both satellite and surface vessel reception
  • Trials 2010 Caribbean and Hawaii – USCG & NLB showed:
    • Detection of AIS SARTS and AIS EPIRBS
    • Message 27 also received by exactEarth
Global AIS – Anti-Piracy Applications

• Global AIS is one tool in the war against piracy

• Key potential applications
  • Wide area vessel traffic monitoring
  • Traffic Analysis to identify high-risk targets
  • Post-piracy vessel tracking
  • Convoy management

Vessels avoiding pirated areas

Tracking Pirated Vessels
Benefits of Global AIS to SOLAS and MARPOL

- Monitoring compliance to existing regulations. (MARPOL, SOLAS)
- Tracking of ships with history of non compliance to regulations
- Enabler for automated reporting processes
- Facilitates Extension of systems coverage
- Provides for proactive Planning of VTS and VTM interaction & intervention
- Reactive –
  - Back tracking path of vessels to determine potential culprits
- Proactive – Planning and intervention
  - Recognition of unusual or reckless behaviour
    - Uncharacteristic velocity
    - Unsafe speed in bad weather – Potential loss of cargo
- Mitigating of Spoofing (vessels attempting to avoid detection of wrong doing)
- Enables more effective use of monitoring and surveillance assets
Complementing Existing Applications

- Global AIS provides dynamic information complementing existing functions of:
  - VMS – for AIS equipped Fishing vessels
  - LRIT – providing check on whether ship transmitting in accordance to regulations
  - NOA – automatic registration of Notice Of Arrival
  - SAR – increases likelihood of receiving last position

- Validation of declared information such as:
  - Engine / propulsion failure or stoppages
  - Detection of vessels hove to offshore
  - Inconsistency with estimated position

- VTS
  - Assists planning for slot allocation of vessels
  - Provides extension of AIS into remote coastal and offshore areas
AIS – A System for the Future

• AIS is a well proven global maritime system
  – Conceived by the IMO, >$1B invested to date, fully operational
  – AIS infrastructure is dedicated to civil maritime applications – not shared
  – Used by more vessels than any other mandated maritime tracking technology
    • Well in excess of 100,000 vessels fitted by 2013 (EU & US Fishing & Inland Navigation)

• Global AIS can be leveraged for significant future potential
  – Can play key role in e-Navigation evolution and consolidation of ship reporting
  – Addition of new frequencies and message types could allow future expansion of the global AIS system to allow the tracking of millions of vessels worldwide

• The IMO has a key role to play
  – Recognition by the IMO of S-AIS as part of the Global AIS system will pave the way towards realising these significant benefits to the global maritime community
Thank You!

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