Enhancing the Reliability of AIS through Vessel Identity Verification

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Homeland Security

Maritime Domain Awareness

Maritime Domain Awareness (**MDA**) is the effective understanding of anything associated with the maritime domain that could impact the security, safety, economy, or environment of the United States.[1]

Sensor-based position reporting systems are the preeminent means for building a real-time MDA picture of vessel positions, which include:

Automatic Identification System (**AIS**) – collision avoidance
Long-Range Identification and Tracking (**LRIT**) – vessel tracking
Vessel Monitoring System (**VMS**) – commercial fishing vessel regulatory enforcement (US)

Global Maritime Distress and Safety System (**GMDSS**) technologies which may transmit position information in times of distress include:

Digital Selective Call (**DSC**) Radio
Emergency position-indicating radio beacon (**EPIRB**)

[1] National Strategy for Maritime Security: National Maritime Domain Awareness Plan, December 2013

AIS Use Cases

Collision Avoidance: The original intent of the AIS system, AIS can assist in warning of collisions with other vessels utilizing AIS

Search and Rescue: AIS may provide the most current position information when a distress call is made from DSC radio or an EPIRB

Accident Investigation: A historical record of a vessel's movements may be produced with time, speed, course and heading information

Vessel Traffic Service (VTS): Traffic management functions are enhanced by AIS in real time, as well as for planning purposes through historical analysis of traffic patterns (density plots, heat maps, etc.) to improve efficiency or better inform policy decisions which may affect traffic patterns.

Maritime Security: Enhances vessel identification of vessels within or near a nation's Exclusive Economic Zone (EEZ).

Fleet Tracking: Allows vessel operators, shipping companies or parties interested in the movement of cargoes to plan for their delivery, promoting economic interests

Safety Impact of Data Quality

Sinking of the F/V Lady Mary, March 24th, 2009[2]:

- EPIRB was activated, but the beacon's unique 15-character identification code was improperly registered by one digit in NOAA's beacon registration database - one of the digits which should have been recorded as a "C" was transcribed from the handwritten form as an "O."

- Because the EPIRB ID did not match a known vessel, the alert was not passed to a Response Coordination Center for another 87 minutes when location information was obtained.

- One survivor was rescued in this incident; four crewmembers were recovered deceased, and two deckhands remain missing and are presumed dead.

[2] USCG Investigation Report of the Sinking of the F/V Lady Mary, MISLE Activity Number 3439089, Aug 23, 2013; retrieved from http://www.nj.com/news/index.ssf/2013/08/coast_guard_deadly_lady_mary_sinking_in_2009_the_result_of_open_hatch_and_unstable_boat.html

Safety Impact of Data Quality

Similar to the manufacturer ID number of an EPIRB, the Maritime Mobile Service Identity (**MMSI**) number uniquely identifies the transmissions made via AIS and DSC radio

The MMSI number is typically issued as part of a ship station's radio license, typically in conjunction with the international radio call sign (**IRCS**).

For many flag state administrations, radio licensure and ship documentation are handled by separate agencies – this leads to disconnects between a transmitted identity and a documented vessel's physical characteristics and ownership details when official ship numbers are not mandatory on the radio license or not verified against the ship registry

While **a single maritime vessel should have only one MMSI number actively licensed** / authorized for use in all ship radio transmissions:

- Many vessels have multiple active radio licenses obtained over time by different licensees, or by the same licensee without cancelling previously issued licenses
- Many vessels are not licensed by the current owner/operator, and transmit with outdated or unregistered identifiers (MMSI and IRCS)

AIS Challenges to Effective MDA

Of the population of vessels transmitting AIS:

- Which targets are actually maritime vessels?
- Which are land-based (improperly broadcasting with Class A/B AIS)?
- Which are broadcasting:
  - the wrong identity?
  - another vessel's identity?
  - An identifier from a credential issued to another party for the same vessel?
  - Identifiers issued on an expired license?
  - Radio identifiers issued by a different flag than their registry?
- How many vessels' movements cannot be tracked in real time or audited historically by using duplicative MMSI numbers (multiple vessels simultaneously broadcasting same MMSI)?

Even as 100% identification is not possible (typically 50-100 vessels/day out of 10,000-13,000 within the U.S. NAIS System range, or ~1% unverified), allows vessels to be divided into **known** and **unknown** sets, enabling focus on unknown vessels

Vessel Identity

- Vessels are identified by various means:
  - Communications/Sensor Systems (AIS, LRIT, DSC radio):
    - Radio license credentials (MMSI and Call Sign), plus IMO and Name for AIS
  - Non-sensor based Reporting Mechanisms (USACE VOR, LPMS, SANS NOA, AMVER)
    - Official Number, IMO number (General VIN)
  - Radio Licensure
    - Requires Name and Ship Number
    - Provides MMSI and Call Sign
  - Documentation processes
    - USCG Certificate of Documentation / State Registration
    - Requires manufacturer hull number
    - Provides Official Number / State Registration Number

Vessel Identity – data caveats

• Only **manufacturer hull number** details are “permanent” in vessel identification – but not recorded as a part of most vessel data sources other than state/federal documentation (**titling**)

•Most vessel identifiers are established by a **legal/administrative** process which may **change** with different owners or registrations of the same boat (IMO number is the sole exception)

•Context must be understood for each numbering mechanism:

- A vessel may have multiple MMSIs, call signs, state registration numbers, official numbers (across multiple flags)
- Vessel Names are recognizable / memorable attributes which are often not unique, but useful for correlation

AIS Background / Current State

Approximately 50% of AIS Static Data transmissions have errors

Of those with errors:

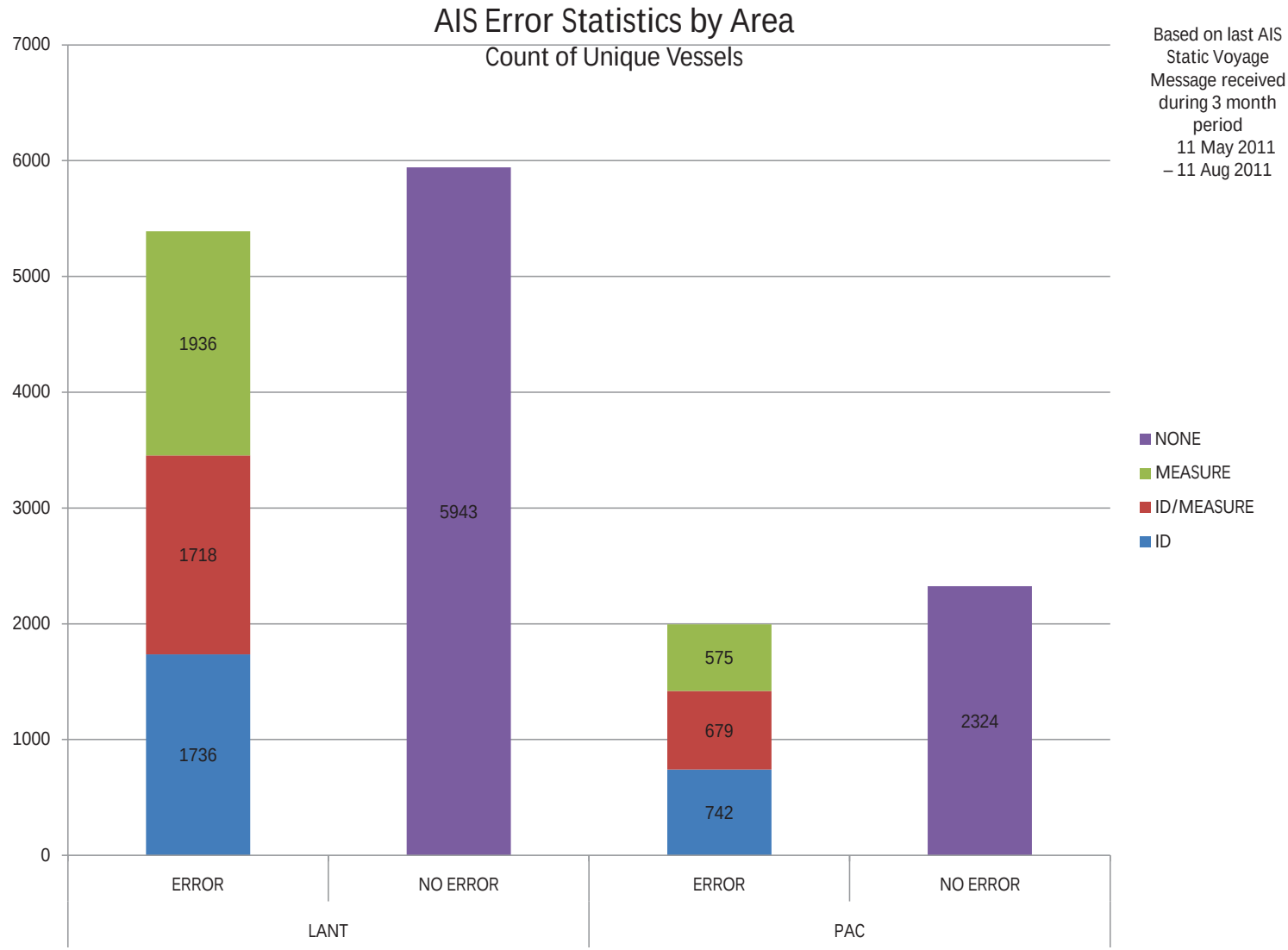
- 1/3 have ID errors
- 1/3 have Measurement errors
- 1/3 have **both** ID and Measurement errors

Overall, 1/3 of ALL vessels have at least one incorrect identifier of MMSI number, IMO number, Call Sign and or Ship Name – Maritime Security / Intel

Another 1/3 of ALL vessels have at least one error in measurements or some other non-identifying static data element – Maritime Safety

While correct vessel measurements are crucial to improving collision avoidance, a vessel must be properly identified in order to know who to contact to correct their measurements

AIS Error Types by USCG Area



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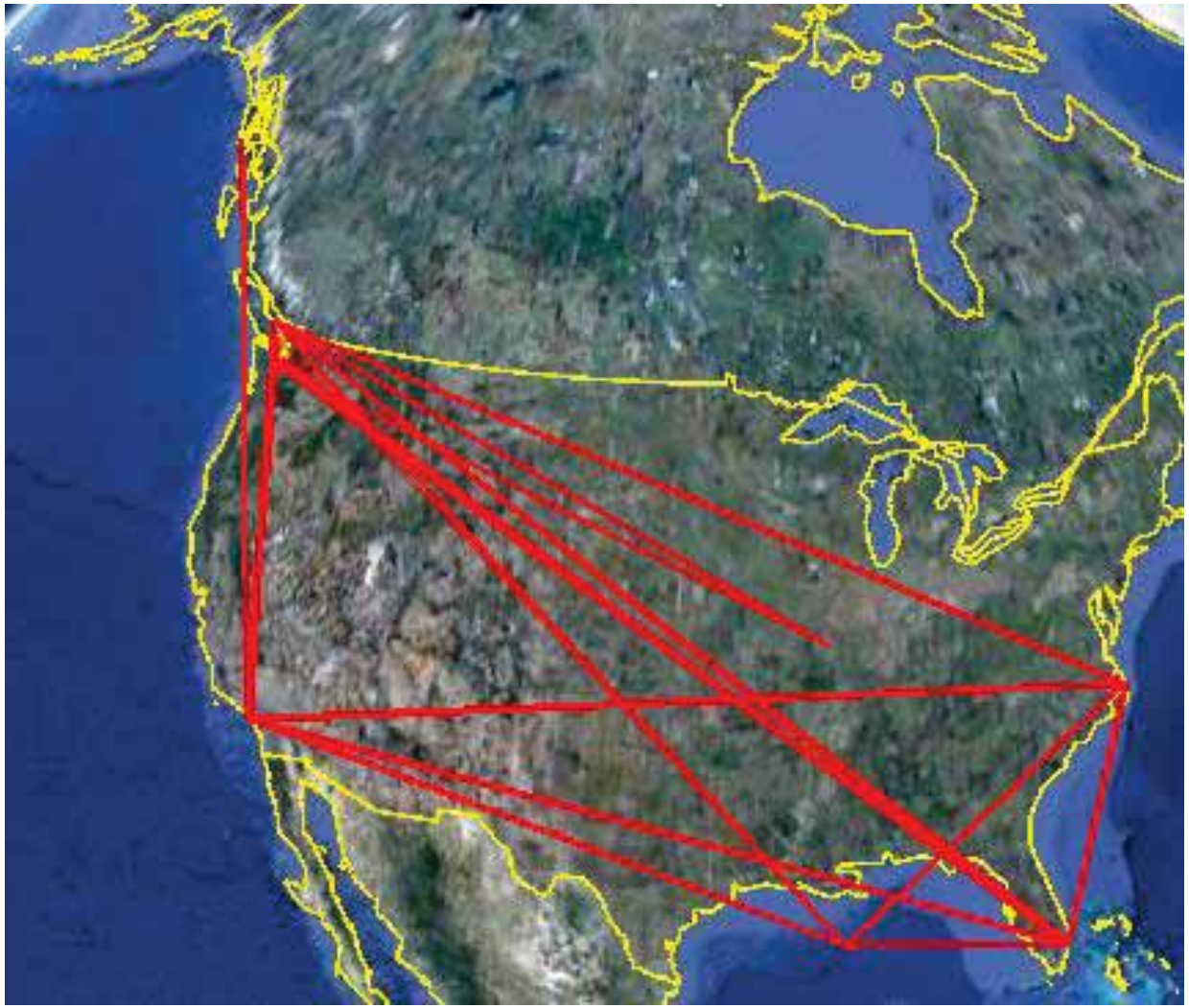
AIS Error – MMSI Duplication

- Largest problem for systems consuming unvalidated AIS data
  - Safety problem when multiple ships use same MMSI in same local region
  - For historical data analysis, often difficult to track history of a vessel which uses a duplicative MMSI
- Limited domain of duplicative MMSIs
  - Only approx. 150 MMSIs over the past 3 years
  - #1 problem: Nauticast X-Pack-US default MMSI 1193046
    - Why? Keeps coming back until operators repair or replace their transponder
    - Typical MMSIs: 111111111, 123456789, 987654321, 1, 5, etc.
  - If another data element is correctly configured its identity can be verified, but often spatial analysis (ports/facilities visited, nearest neighbor vessels) must be used to get "eyes on the target"
- Common case involves Yacht Tenders / Lifeboats / Workboats aboard a parent craft (mothership) programmed with the same MMSI

AIS Error – MMSI Duplication

Vessel Track of MMSI 111111111

(30 days, 22 Feb - 24 Mar 2011)



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Vessel Naming Conventions

• Vessel Names are available for federally-documented vessels, but not typically for state (or provincially)-registered vessels

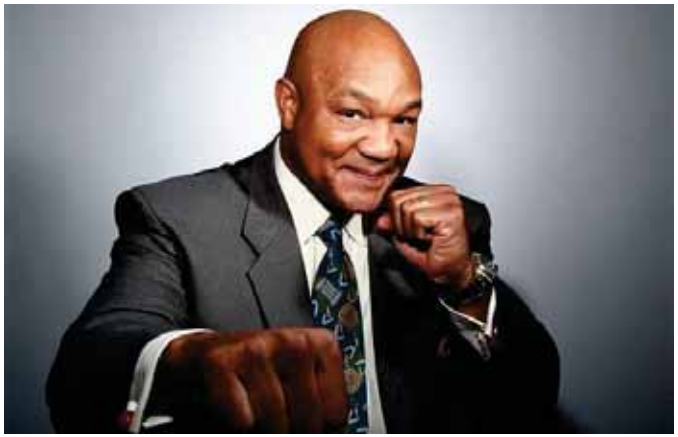
•Reported names often differ between sources:

- Prefixes (M/V, S/V, M/T, F/V, M/Y, L/B, etc.)
- Suffixes (numbered fleets: Arabic vs Roman Numerals)
- Punctuation
- Truncation (AIS=max 20 characters for Name)
- Abbreviations (Capt, Mr, Ft, military ranks, etc)
- Misspellings

- Some Flag States (such as Canada) mandate unique names during documentation, many do not (such as U.S.)

Vessel Name Uniqueness

- Vessel Names are not unique identifiers, but are a critical attribute when a distinct identifier (such as MMSI, IMO, etc.) is suspected to be incorrect (typo/transposed/inserted/deleted digits)



Vessel Attributes

- Accurate Identity is used to access the attributes of a vessel:
- Physical characteristics
  - Tonnages / Dimensions / Draft / Power / Yard / Build Year
- Authorities
  - Flag State / Class Society
- Geographic Location
  - Home port
- Ownership
  - Operator / Owner / Agent / Manager
- Categorization
  - Multiple Vessel Type / Service schemes

Vessel Attributes (cont'd)

- Vessel Attributes are particularly useful when performing:
- Search / Data Discovery:
  - "Tankers newer than 2005 and over 200 meters"
  - "Domestic towing vessels over 65 horsepower"
    - *Completeness* of attributes is essential for effective data discovery

- Vessel Validation:
  - Guards against vessel duplication using a different name and other identifiers
  - Regular revalidation ensures changes in vessel particulars are captured over time, increasing user confidence in the accuracy of results

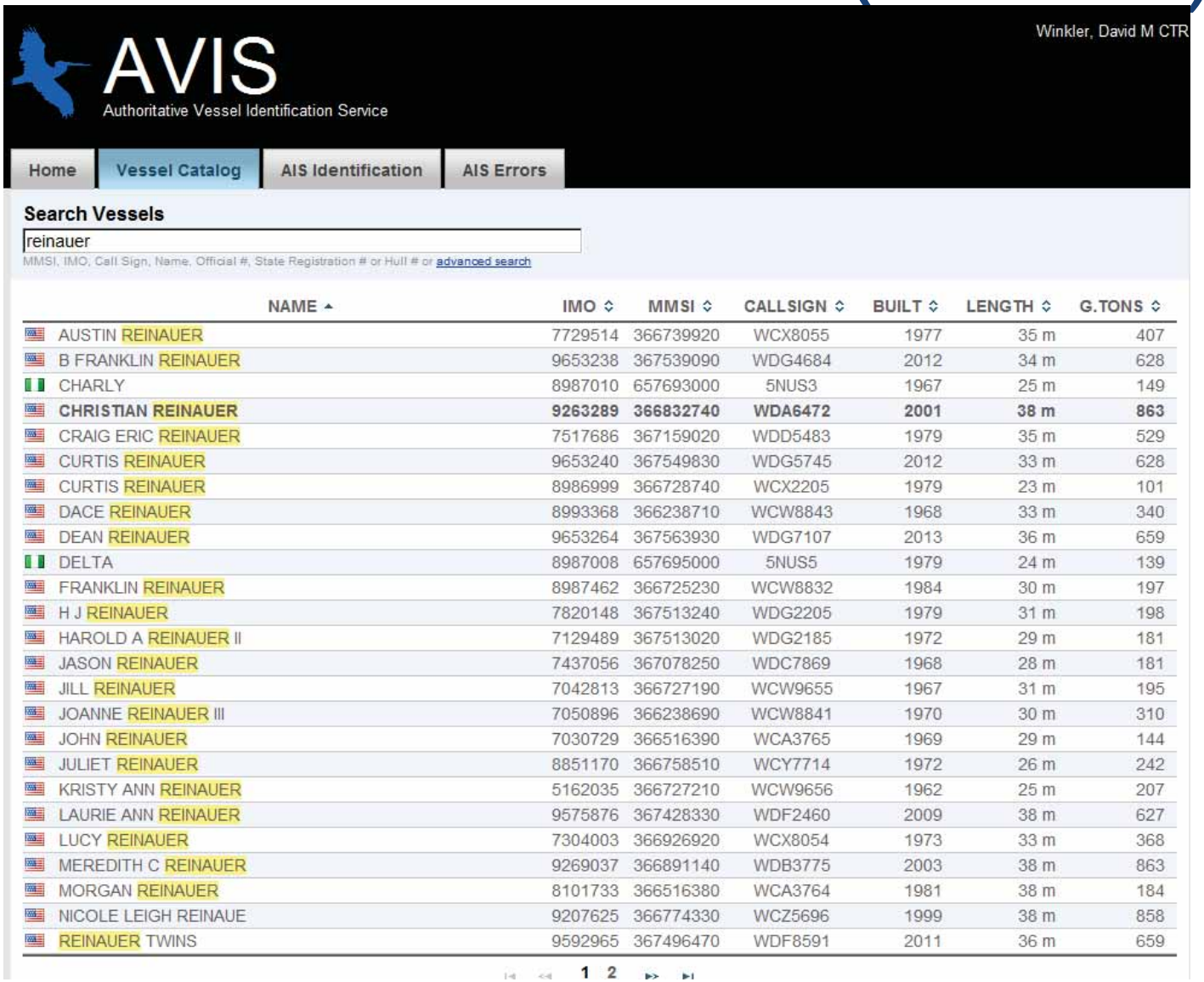
AVIS

• The USCG's Authoritative Vessel Identification Service (AVIS) provides a data and data services architecture for managing and sharing validated vessel identification data in a uniform manner through RESTful web services.

• Correlation to data sources such as the USCG's MISLE / VDS / VIS systems, radio licenses, classification society records, sensor systems, etc. provides authoritative data

•Validation (and regular revalidation) of data supports DHS/USCG policy for an Authoritative and Trusted Data Methodology (ATDM), adding human accountability to the fusion of multiple data sources and resolving conflicts between them

Vessel Attributes (cont'd)



AVIS
Authoritative Vessel Identification Service

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Search Vessels

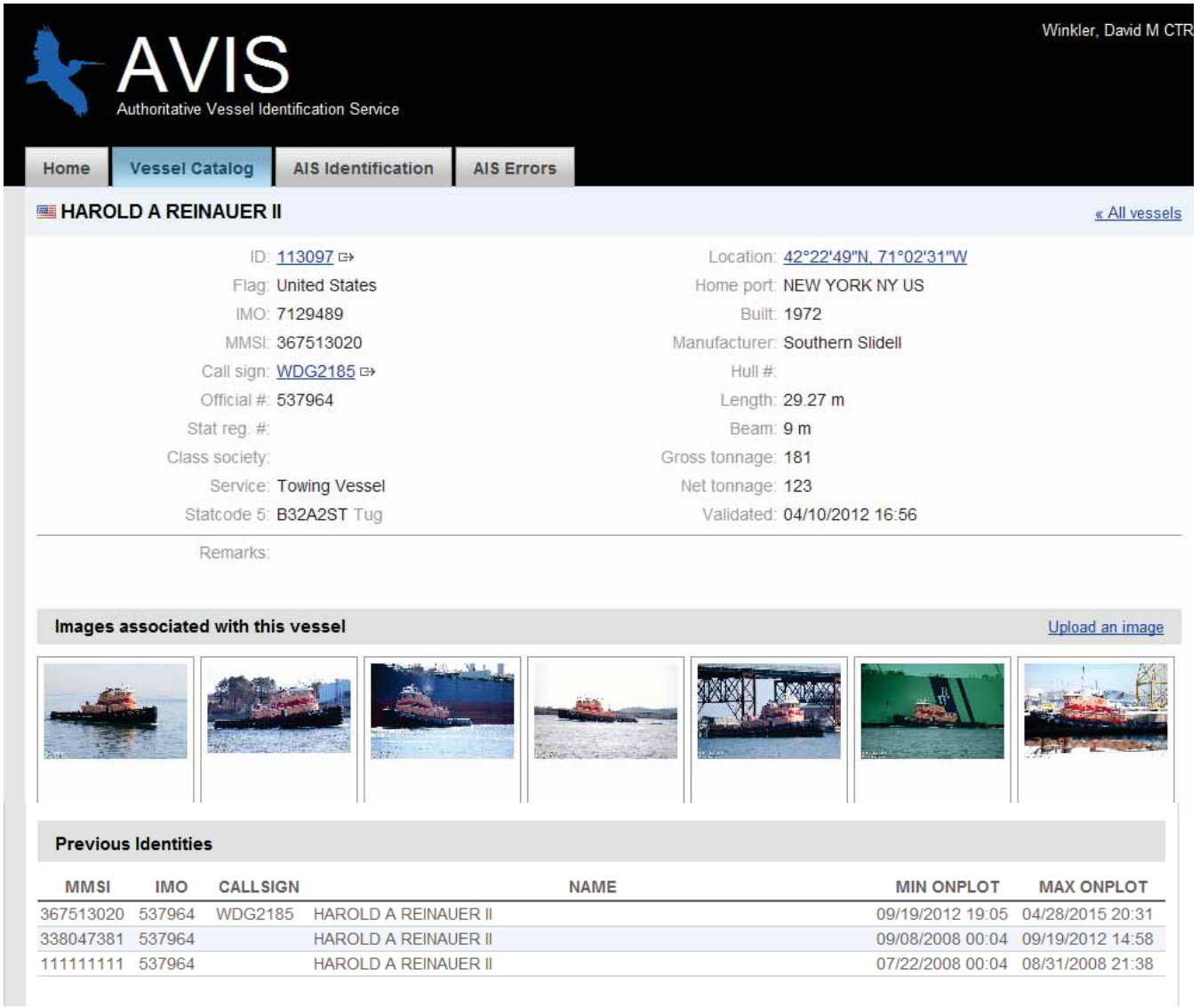
reinauer

MMSI, IMO, Call Sign, Name, Official #, State Registration # or Hull # or advanced search

NAME	IMO	MMSI	CALLSIGN	BUILT	LENGTH	G.TONS
AUSTIN REINAUER	7729514	366739920	WCX8055	1977	35 m	407
B FRANKLIN REINAUER	9653238	367539090	WDG4684	2012	34 m	628
CHARLY	8987010	657693000	5NUS3	1967	25 m	149
CHRISTIAN REINAUER	**9263289**	**366832740**	**WDA6472**	**2001**	**38 m**	**863**
CRAIG ERIC REINAUER	7517686	367159020	WDD5483	1979	35 m	529
CURTIS REINAUER	9653240	367549830	WDG5745	2012	33 m	628
CURTIS REINAUER	8986999	366728740	WCX2205	1979	23 m	101
DACE REINAUER	8993368	366238710	WCW8843	1968	33 m	340
DEAN REINAUER	9653264	367563930	WDG7107	2013	36 m	659
DELTA	8987008	657695000	5NUS5	1979	24 m	139
FRANKLIN REINAUER	8987462	366725230	WCW8832	1984	30 m	197
H J REINAUER	7820148	367513240	WDG2205	1979	31 m	198
HAROLD A REINAUER II	7129489	367513020	WDG2185	1972	29 m	181
JASON REINAUER	7437056	367078250	WDC7869	1968	28 m	181
JILL REINAUER	7042813	366727190	WCW9655	1967	31 m	195
JOANNE REINAUER III	7050896	366238690	WCW8841	1970	30 m	310
JOHN REINAUER	7030729	366516390	WCA3765	1969	29 m	144
JULIET REINAUER	8851170	366758510	WCY7714	1972	26 m	242
KRISTY ANN REINAUER	5162035	366727210	WCW9656	1962	25 m	207
LAURIE ANN REINAUER	9575876	367428330	WDF2460	2009	38 m	627
LUCY REINAUER	7304003	366926920	WCX8054	1973	33 m	368
MEREDITH C REINAUER	9269037	366891140	WDB3775	2003	38 m	863
MORGAN REINAUER	8101733	366516380	WCA3764	1981	38 m	184
NICOLE LEIGH REINAUE	9207625	366774330	WCZ5696	1999	38 m	858
REINAUER TWINS	9592965	367496470	WDF8591	2011	36 m	659

1 2

Vessel Attributes (cont'd)



AVIS
Authoritative Vessel Identification Service

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HAROLD A REINAUER II « All vessels

ID:	113097	Location:	42°22'49"N, 71°02'31"W
Flag:	United States	Home port:	NEW YORK NY US
IMO:	7129489	Built:	1972
MMSI:	367513020	Manufacturer:	Southern Slidell
Call sign:	WDG2185	Hull #:	
Official #:	537964	Length:	29.27 m
Stat reg. #:		Beam:	9 m
Class society:		Gross tonnage:	181
Service:	Towing Vessel	Net tonnage:	123
Statcode 5:	B32A2ST Tug	Validated:	04/10/2012 16:56

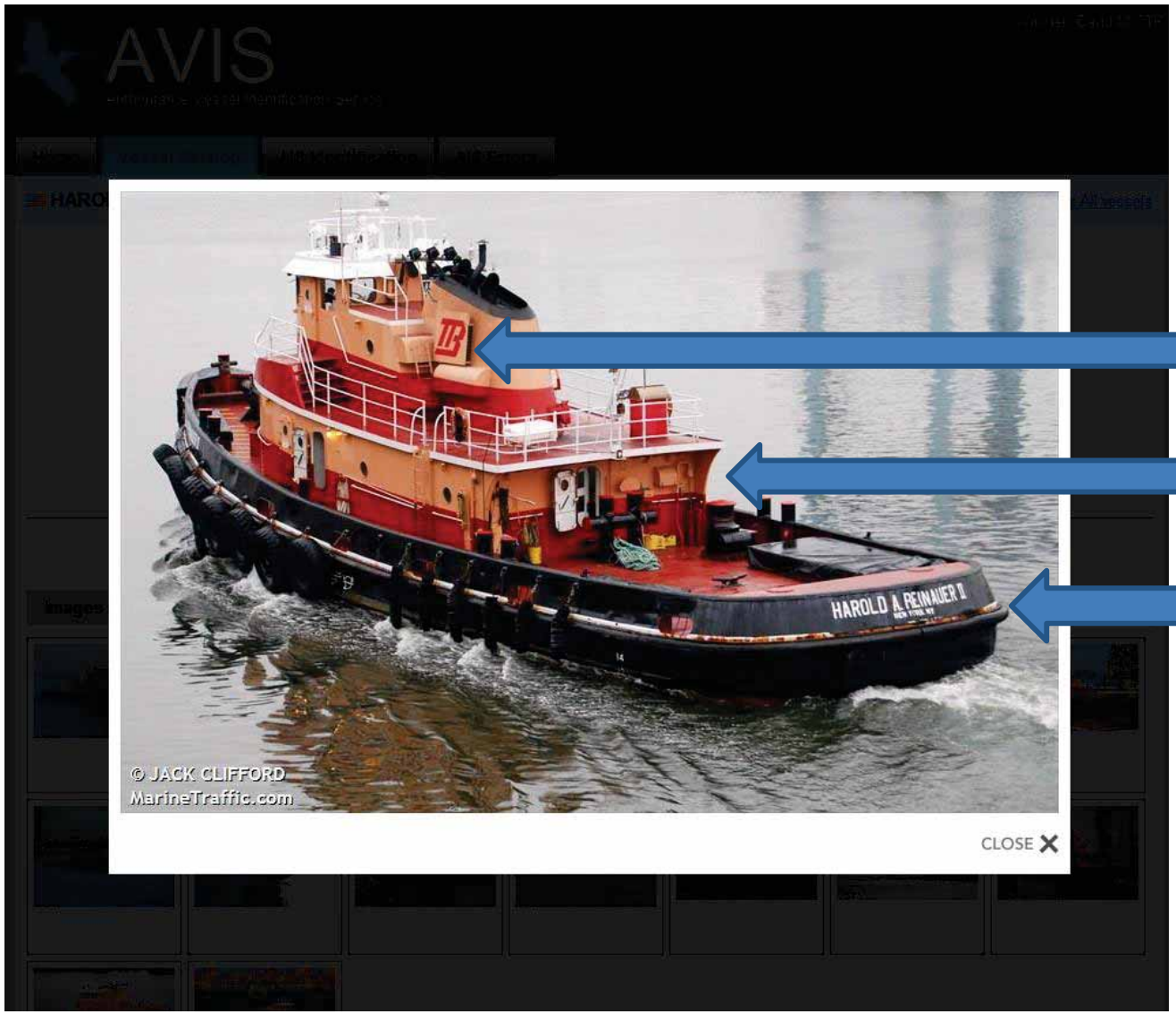
Remarks:

Images associated with this vessel Upload an image

Previous Identities

MMSI	IMO	CALLSIGN	NAME	MIN ONPLOT	MAX ONPLOT
367513020	537964	WDG2185	HAROLD A REINAUER II	09/19/2012 19:05	04/28/2015 20:31
338047381	537964		HAROLD A REINAUER II	09/08/2008 00:04	09/19/2012 14:58
111111111	537964		HAROLD A REINAUER II	07/22/2008 00:04	08/31/2008 21:38

Incorporate Open-Source Intel



Boston Towing Logo

Type = Harbor Tug

Vessel Name and Hailing Port

Correlation to external sources

FCC Federal Communications Commission

FCC Home | Search | Updates | E-Filing | Initiatives | For Consumers | Find Peop

Universal Licensing System

FCC > WTB > ULS > Online Systems > License Search FCC Site Ma

ULS License

Ship Compulsory Equipped License - WDG2185 - Boston Towing & Transportation

New Search | Printable Page | Reference Copy

MAIN | ADMIN

Call Sign	WDG2185	Radio Service	SB - Ship Compulsory Equipped
Status	Active	Auth Type	Regular
Dates			
Grant	12/21/2011	Expiration	12/21/2021
Effective	12/21/2011	Cancellation	

Licensee Information			
FRN	0005086780	Type	Corporation
Licensee Name			
Boston Towing & Transportation 404 Border St. Boston, MA 02128 ATTN Laura Raymond			

Ship Data					
License Type	Regular		Ships in Fleet		
Official Ship #	537964		General Class	Fishing	
Ship Name	HAROLD A. REINAUER		Specific Class	Tug	
Gross Tonnage	181 tons		Working Series		
Length	27 meters		MMSI	367513020	
Selective Call Digital		Selective Call INMARSAT		Accounting Authority Code	
Does ship make international voyages?				Yes	
Does ship communicate with foreign coast stations?				No	

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Vessel Catalog Example

An effective vessel catalog will maintain only those basic data elements which form the basis for a Common Recognition Context for a vessel

- Each data element should be maintained / verified for completeness / correctness / uniqueness

```
<Vessel>
    <Identification>
        <Vessel_ID>1179</Vessel_ID>
        <MMSI>367440780</MMSI>
        <IMO>8968715</IMO>
        <Call_Sign>WDF3513</Call_Sign>
        <Name>FAST SPIRIT</Name>
        <Official_No>1092094</Official_No>
        <State_Reg_No/>
    </Identification>
    <Authority>
        <Vessel_Flag>US</Vessel_Flag>
        <Class_Soc>ABS</Class_Soc>
    </Authority>
    <Category>
        <Vessel_Service>Passenger (Inspected)
        </Vessel_Service>
        <Statcode5>B21A2OC</Statcode5>
        <Statcode5_Desc>Crew/Supply Vessel
        </Statcode5_Desc>
    </Category>
    <Manufacture>
        <Build_Year>2000</Build_Year>
        <Mfgr_Name>Breaux Brothers</Mfgr_Name>
        <Mfgr_Hull_No>542-001</Mfgr_Hull_No>
    </Manufacture>
    <HomePort Home_Port_Code="1000943">
        <Home_Port_City>GALLIANO</Home_Port_City>
        <Home_Port_State>LA</Home_Port_State>
        <Home_Port_Country>US</Home_Port_Country>
    </HomePort>
    <Measurement>
        <Length>50.29</Length>
        <Beam>9.75</Beam>
        <Draft>2.45</Draft>
        <Horsepower>19520</Horsepower>
        <GT>378</GT>
        <NT>113</NT>
    </Measurement>
    <Auditing>
        <Remarks/>
        <Created_Dttm>2010-02-17T09:06Z</Created_Dttm>
        <Validated_Dttm>2011-02-01T00:00Z</Validated_Dttm>
        <Validated_By>WINKLER,DAVID M</Validated_By>
    </Auditing>
</Vessel>
```

Vessel Correlation

Unique tracking over time - what should be used as the fixed variable when identifying vessels?

No single legal identifier (Official Number, IMO Number, State Registration Number, Call Sign, MMSI, etc.) meets the criteria that it is available / issued to every vessel for the purpose of unique tracking

For U.S., the USCG's Maritime Information for Safety and Law Enforcement (MISLE) and Vessel Documentation System (VDS) serves as the nation's vessel registry

Vessel Correlation (cont'd)

The MISLE / VDS systems represent any vessel with a unique VESSEL_ID sequence number

This VESSEL_ID number used within the USCG's System of Record is transparent - publicly available through the USCG's CG-MIX Port State Information Exchange (PSIX) search pages and web services.

AVIS data services augment the body of vessel data provided by MISLE to provide unique identifiers for vessels which are (yet) not recorded in MISLE (such as the 9% of AIS-transmitting vessels in and around the U.S. detected by NAIS, or worldwide signal collected from satellite AIS or LRIT sources)

Correlation of vessels to a permanent, immutable number allows for consistent tracking of vessels over time even as other legally assigned numbers change

Data sharing between IT systems and different organizations is vastly improved as multiple systems, including but not limited to AIS, rely upon the same fixed variable for vessel identification

Vessel Correlation Example

AIS_UID	MMSI	IMO_NUMBER	CALL_SIGN	NAME	RECORDS	MIN_ONPLOT_DT	MAX_ONPLOT_DT	MISLE_VESSEL_ID
367051230||||||||0WDC6095||||LTSAMUELSCOURSEN	367051230	0	WDC6095	LT SAMUEL S COURSEN				609844
367051230||||||||1WDB3537||||||||||||COURSEN	367051230	1	WDB3537	COURSEN	130,827	2007-11-08 22:40:16.000	2008-07-26 23:57:19.000	609844
367051230||||||||1WDC6095||||||||||||COURSEN	367051230	1	WDC6095	COURSEN	370,739	2007-11-08 22:43:00.000	2009-05-10 13:12:24.000	609844
||1193046303174162WDC6095||||||||||||COURSEN	1193046	303174162	WDC6095	COURSEN	15	2008-08-13 12:31:11.000	2008-08-13 12:52:30.000	609844
|36705123||||||||1WDC6095||||||||||||COURSEN	36705123	1	WDC6095	COURSEN	7	2008-08-13 12:54:58.000	2008-08-13 12:55:06.000	609844
||1193046303174162WDB3537||||||SAMUELSCOURSEN	1193046	303174162	WDB3537	SAMUEL S COURSEN	57	2009-06-02 14:22:01.000	2009-12-28 18:52:58.000	609844
367051230||||||||1WDB3537||||||SAMUELSCOURSEN	367051230	1	WDB3537	SAMUEL S COURSEN	873,748	2009-06-02 14:31:00.000	2011-03-19 22:01:21.296	609844
||1193046303174162WDB3537|||||||SAMUELSCURSEN	1193046	303174162	WDB3537	SAMUEL S CURSEN	11	2009-06-02 14:47:26.000	2009-10-28 13:33:21.000	609844
367051230||||||||1WDB3537|||||||SAMUELSCURSEN	367051230	1	WDB3537	SAMUEL S CURSEN	38,391	2009-06-02 15:00:57.000	2009-12-28 15:06:00.000	609844
||||||||1|36701230WDB3537||||||SAMUELSCOURSEN	1	36701230	WDB3537	SAMUEL S COURSEN	684	2009-09-04 11:20:10.000	2009-09-05 13:05:19.000	609844
367051230||||||||1|D11233||||||||||NAUTICAST	367051230	1	D11233	NAUTICAST	114	2009-10-07 11:00:40.000	2011-03-19 22:21:36.430	609844
367051239||||||||1WDB3537||||||SAMUELSCOURSEN	367051239	1	WDB3537	SAMUEL S COURSEN	22	2009-10-09 11:29:20.000	2009-10-09 11:32:09.000	609844
367051230||||||||1WSB3537||||||SAMUELSCOURSEN	367051230	1	WSB3537	SAMUEL S COURSEN	60,665	2009-12-28 19:16:16.000	2010-03-27 22:28:46.176	609844
367051230||||||||1WDC6095||||||SAMUELSCOURSEN	367051230	1	WDC6095	SAMUEL S COURSEN	1,086	2011-03-19 21:11:59.186	2011-03-20 16:25:08.123	609844
367051230||||||||0||||||||||||||||||||	367051230	0			4,498	2011-04-12 15:39:47.156	2011-08-09 14:32:15.810	609844
367051230||||||||0WDC6095||||||SAMUELSCOURSEN	367051230	0	WDC6095	SAMUEL S COURSEN	122,045	2011-04-12 15:42:16.730	2011-09-22 23:58:25.403	609844

Vessel Data Validation

In order to measure whether a vessel is properly identified, a standard must exist which can be used to compare the AIS data against

"Official" data sources exist within authoritative systems of record, but that does not guarantee they are **correct**, **complete**, **current** or **unique**!

- Consider for which data elements a system of record serves as the **data steward**
  - FCC is the steward of the Call Sign and MMSI, but not the ship name
  - USCG is the steward of a *documented* vessel's name, but not call sign
  - Lloyds is the steward (for the IMO) of the IMO #, but not the owner

A proper standard should incorporate the authoritative and verified data elements from each authoritative information source in order for comparisons with raw AIS data to yield proper decisions as to whether a vessel is properly identified

Vessel Catalog – Data Sources

U.S. Radio licenses

- FCC / Boat U.S. / SeaTow / Shine Micro / U.S. Power Squadrons

International radio registrations

- ITU MARS Database

Official Vessel Registration

- U.S. Certificate of Documentation (VDS -> MISLE -> CG-MIX PSIX)
- U.S. State boat registrations (USCG VIS)
- International Flag State registries

Lloyds Register / IHS

- Equasis

Classification Society records

- IACS member societies' data is regarded as legal record by many flag states

Notice of Arrivals, Fishing Treaty Organization databases, sensor systems, open source intelligence, etc

U.S. Government Vessel Data Sources

Department of Homeland Security (DHS)

U.S. Coast Guard (USCG)

MISLE	Maritime Information for Safety and Law Enforcement
VDS	Vessel Documentation System
VIS	Vessel Information System (U.S. State Vessel Registration Data)
CG-MIX PSIX	Coast Guard Maritime Information eXchange / Port State Information eXchange
SANS	Ship Arrival and Notification System
NAIS	Nationwide Automatic Identification System
LRIT	Long Range Information Tracking
eGIS	Enterprise GIS
R21	Rescue 21
AMVER	Automated Mutual-assistance VEssel Rescue System
AOPS	Abstract of Operations System
AUXDATA	Auxiliarist Data System
MMLD	Merchant Mariner Licensing Database
COFR	Certificate of Financial Responsibility
FLS	Fleet Logistics System
MASCOT	Marine Safety Center
MAGNET	Maritime Awareness Global Network
CGBI	Coast Guard Business Intelligence
PAWSS	Ports and Waterways Safety System
CWSS	COP Web Services System
WK	WatchKeeper
NBIC	National Ballast Water Information Clearinghouse (with Smithsonian Institute)
Watchkeeper	Interagency Operations Center (IOC) WatchKeeper

U.S. Government Vessel Data Sources

Department of Homeland Security (DHS)

U.S. Customs and Border Protection (CBP)

ACE	Automated Commercial Environment
ITDS	International Trade Data System
ABI	Automated Broker Interface
AES	Automated Export System
AMS	Automated Manifest Systems
MMM	Multi-Modal Manifest

Science & Technology Directorate (S & T)

CSS	Coastal Surveillance System

Department of Defense (DoD)

U.S. Army Corps of Engineers (USACE)

TOWS	The Oracle Waterways System
LPMS	Lock Performance Management System
LOMA	Lock Operations Management Application

U.S. Navy (USN)

SILO	Single Integrated LookOut
AMRS	Automated Merchant Reporting System

U.S. Transportation Command (TRANSCOM)

IRRIS	Intelligent Road/Rail Information Server
IGC	Integrated Data Environment (IDE)/Global Transportation Network (GTN) Convergence

U.S. Government Vessel Data Sources

Department of Defense (DoD)

National Geospatial-Intelligence Agency (NGA)

MODU	Mobile Offshore Drilling Units

Department of the Treasury

Internal Revenue Service (IRS)

ExSTARS	Excise Summary Terminal Activity Reporting System

Office of Foreign Asset Control (OFAC)

SDN	Specially Designated Nationals and Blocked Persons list

Department of Commerce (DOC)

National Oceanic and Atmospheric Administration (NOAA)

BRDB	Beacon Registration Database (406MHz EPIRB)
IUU	Illegal, Unreported, and Unregulated (IUU) Fishing
VMS	Vessel Monitoring System (Fishing Vessels)
Permits	NOAA Fisheries regional permit offices (decentralized systems)

Federal Communications Commission (FCC)

ULS	Universal Licensing System

National Telecommunications and Information Administration (NTIA)

MMSI	U.S. Federal Vessel Maritime Mobile Service Identity assignment database

U.S. Census Bureau

ATAC	Automated Tracking and Control System (Shipboard Enumeration Operations)

U.S. Government Vessel Data Sources

Department of Transportation (DOT)

Maritime Administration (MARAD)

MARVIEW	MARVIEW
Jones Act	List of U.S. Jones Act Vessels (Office of Cargo Preference)

Research and Innovative Technology Administration (RITA)

MSSIS	Maritime Safety and Security Information System

Bureau of Transportation Statistics (BTS)

NCFO	National Census of Ferry Operators

U.S. Environmental Protection Agency (EPA)

VGP	Vessel General Permit

Department of the Interior (DOI)

Bureau of Safety and Environmental Enforcement (BSEE)

TIMS	Technical Information Management System (corporate DB, shared with BOEM)

Department of Agriculture (USDA)

Animal and Plant Health Inspection Service (APHIS)

PPQ	Plant Protection and Quarantine

Agricultural Marketing Service (AMS)

ATDA	Agricultural Transportation Data Analysis

Grain Inspection, Packers and Stockyards Administration (GIPSA)

WBSCM	Web-Based Supply Chain Management

U.S. Government Vessel Data Sources

National Transportation Safety Board (NTSB)

Office of Marine Safety (OMS)

DMS	Docket Management System

Department of Labor (DOL)

Occupational Safety & Health Administration (OSHA)

IMIS	Integrated Management Information System

National Science Foundation (NSF)

Division of Ocean Sciences (OCE)

UNOLS	University-National Oceanographic Laboratory System

AIS Enforcement

While AIS signal is visible, publicly available information, only flag states have the authority to enforce correct AIS configuration

The **cost** of misconfigured AIS **is far greater than the cost of enforcement**, but:

- costs are not well defined – not easy to quantify ($$$)
- spread across multiple organizations
    - Multiple government agencies, commercial and academic entities rely upon AIS information for security, safety, economic and environmental analysis

For the U.S., 33 CFR 164.46(b) and 46 USC 70114 allows for commercial vessels with an improperly configured AIS to be issued penalties of up to $25,000/day and $50,000 maximum as defined in 46 USC 70119

Estimates for 70% / 30% compliance / non-compliance with a 3-month enforcement program would:

- Correct >95% of all known AIS misprogramming in the U.S. within 3 months
- Collect approximately **$4,000,000** in fines after initial warnings ignored

AIS Enforcement - Example

AIS MMSI	AIS Call Sign	AIS IMO	AIS Name	AIS Last Observed	Correct MMSI	Correct Call Sign	Correct IMO	Correct Name	AIS Draft	A Distance from Bow	B Distance from Stern	C Distance from Port	D Distance from Starboard
1	WDE9276	9032824	INTL'RAIDER	9/10/2012	367415510	WDE9276	9032824	INT'L RAIDER	3	12	31	4	6
367077440	WDF5644	918409300	INT'L BRAVE	9/1/2012	367465640	WDF5644	9184093	INT'L BRAVE	3.4	14	30	8	3
367036120	WDD6853	663407	INT'L TRADITION	9/10/2012	367178460	WDD6853	0	INT'L TRADITION	3	12	31	6	4
367046690	WDC5807	149	JIMBO	9/9/2012	367165510	WDD5902	0	JIMBO	3	0	0	0	0
367450560	WDF4330	602952	CAPT BRIAN	9/8/2012	367508080	WDF9716	8978136	CAPT BRIAN	3	10	20	6	3
367184050	WDD7263	0	CAVALIER	9/10/2012	367184050	WDD7263	0	CAVALIER	3	0	0	0	0
367485860	WDF7572	9030773	CLIPPER	9/10/2012	367485860	WDF7572	9030773	CLIPPER	3	10	70	9	1
367163390	WDD5771	641216	GULF SOUTH 1	9/10/2012	367163390	WDD5771	0	GULF SOUTH 1	0	8	26	6	2
367176070	WDD6676	635181	INTL CARRIER	9/9/2012	367176070	WDD6676	0	INT'L CARRIER	3	0	0	0	0
367475790	WDF6587	0	INTL CHARGER	9/10/2012	367475790	WDF6587	8978095	INT'L CHARGER	2.3	0	0	0	0
367464080	WDF5512	8978174	INT'L CHIEF	8/31/2012	367464080	WDF5512	8978174	INT'L CHIEF	2.5	0	0	0	0
367452910	WDF4526	9121716	INT'L COURAGE	9/10/2012	367452910	WDF4526	9121716	INT'L COURAGE	3.2	0	0	0	0
367197840	WDD8333	0	INT L DIAMOND	9/8/2012	367197840	WDD8333	0	INT'L DIAMOND	0	10	20	30	40
367158180	WDD5424	892626	INTERN,L DISCOVERER	9/10/2012	367158180	WDD5424	8926626	INT'L DISCOVERER	0	0	0	0	0
367147750	WDD4664	4	INT,L EXPLORER	9/10/2012	367147750	WDD4664	0	INT'L EXPLORER	3	8	26	8	2
367186230	WDD7424	105000000	INT'L FALCON	9/9/2012	367186230	WDD7424	0	INT'L FALCON	0	7	30	3	6
367483880	WDF7375	8978162	INT'L FLYER	9/7/2012	367483880	WDF7375	8978162	INT'L FLYER	5.5	0	0	0	0
367159140	WDD5493	100000009	INT'L FREEDOM	7/1/2012	367159140	WDD5493	7501065	INT'L FREEDOM	3.5	10	25	6	5
538001293	V7BK9	7703417	INTL FRONTIER	8/3/2012	538001293	V7BK9	8766703	INT'L FRONTIER	18	0	0	0	0
367468990	WDF5947	8978320	INT'L NAVIGATOR	9/10/2012	367468990	WDF5947	8978320	INT'L NAVIGATOR	2.5	6	2	6	26
367191040	WDD7768	591434000	INTL PATRIOT	9/9/2012	367191040	WDD7768	0	INT'L PATRIOT	3.5	12	22	4	5
367165490	WDD5901	641321	INTL PRIDE	7/26/2012	367165490	WDD5901	0	INT'L PRIDE	25.5	0	35	0	8
367464110	WDF5514	0	INT'L QUEEN	8/28/2012	367464110	WDF5514	8978215	INT'L QUEEN	2	10	22	5	4
367152990	WDD5051	608889	INTLRUNNER	9/8/2012	367152990	WDD5051	0	INT'L RUNNER	3	0	0	0	0
367312920	WDD9543	52	INTL SCOUT	9/10/2012	367312920	WDD9543	0	INT'L SCOUT	2.9	0	0	0	0

Interagency Cooperation

Federal Initiative for Navigation Data Exchange (FINDE)

- A federal working group focused on data sharing and standardization of vessel, port, commodity, owner/operator information
- Partners include CMTS (lead), USACE, USCG, CBP, IRS, NOAA, MARAD
- Achievements include interagency Information Sharing Agreements (ISAs) to share AIS information and reference data sets from the USCG to USACE and sharing of USACE's inland AIS transceiver network data with USCG

National Maritime Intelligence-Integration Office (NMIO)

- IC organization to promote "whole of government" approach to maritime information sharing

Federal-Industry Logistics Standardization (FILS)

- Focused on data standards and information sharing, both industry-industry and industry-government
- Increased automation of reporting to government intended to alleviate reporting requirements to multiple agencies – one-stop reporting is the goal
- Industry-led, government coordination through CMTS

Take-aways

- Understand the scope of AIS identification and measurement data error
- Current AIS carriage requirements and operating procedures are described at http://navcen.uscg.gov/?pageName=AISRequirementsRev
- USCG can share Nationwide AIS (NAIS) data feeds and corrective analysis with partner government agencies today – see http://navcen.uscg.gov/?pageName=NAISdisclaimer
- Participate in interagency working groups – engage in data sharing and standing up data services for improved efficiencies between agencies
- White paper and additional resources for the USCG Authoritative Vessel Identification Service (AVIS) may be made available on request
- If your agency manages maritime vessel information, standardize / verify against authoritative sources