



AIS Class E – Supporting the Recreational Boating Community over Wireless Internet

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Outline

- Why do we need a new AIS Protocol?
- Smart Chart AIS Reference Implementation
- AIS E – Architecture
 - AIS Class E – What’s in a name
 - Registration Management – Web Portal,
 - Client Management – Application Portal, and
 - Real-Time Services
- Next Steps



Why do we need a new AIS Protocol?

- AIS for Recreational Boaters benefits all
- The MMSI scheme was designed in the 1970's for integration with telex exchanges
 - US number available are <999,999
 - Over 17 million Recreational Boaters
- AIS Class A was originally designed as a collision avoidance system
 - Tailored for High Seas Vessels
 - VHF TDMA Bandwidth is approaching saturation
- The existing AIS A & B system would fail if used by the general recreational boating public



Smart Chart AIS

A Test-Bed for AIS Class E

The So What – A DHS Sponsored SBIR Project

- The ability to track small vessels in an asymmetric threat environment is critical to maritime security, but not easily accomplished due to the sheer volume of craft and the range of environments which they operate within. The introduction of smart-phones with location, orientation, camera, and Internet capabilities enables cooperative vessel tracking at levels previously unachievable.

Technology / Product

- Smart Chart AIS smart phone software provides NOAA charts and additional services free of charge to recreational boaters. This software will also enable these users to benefit from Automatic Identification System (AIS) like services normally restricted to larger vessels.
- Smart Chart AIS is a prototype for AIS Class E

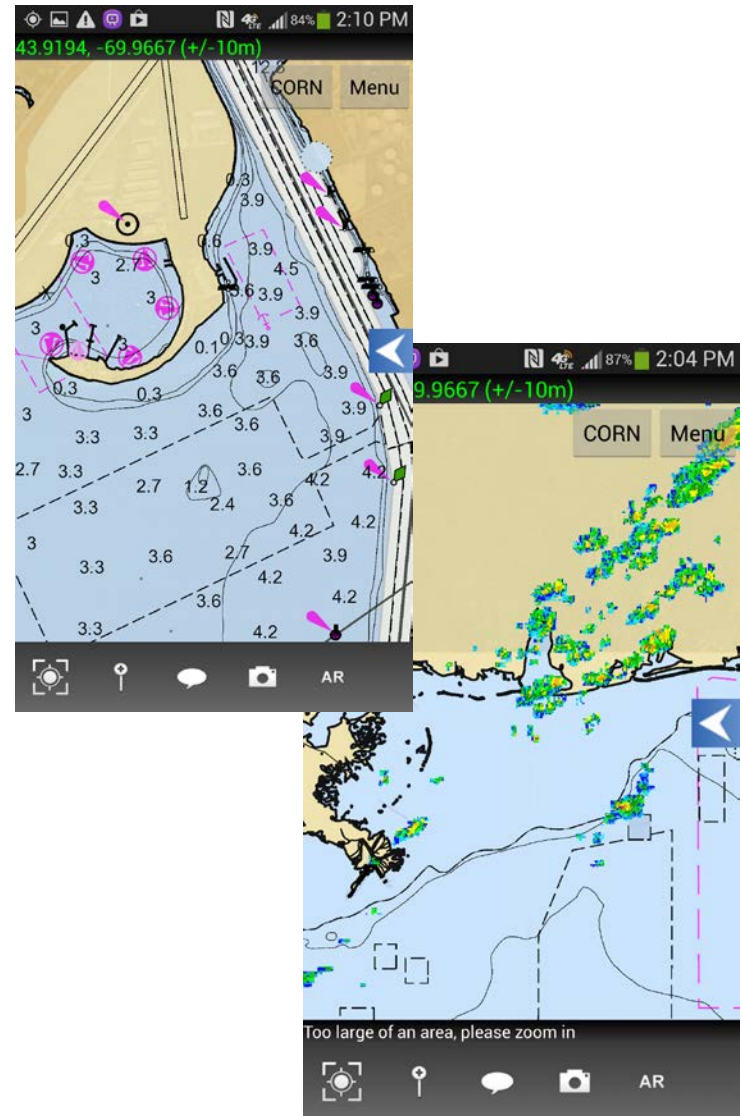


Boaters Want To Know: **Where They Are** and **What's Around Them**

- *Smart Chart AIS combines:*
 - *Electronic Charts*
 - *Automatic Identification System (AIS) over cellular networks*
 - *Augmented Reality*
 - *Social Networking*
- *Smart Chart AIS runs on Smart Phones and Tablets*
- *FREE to end users!*
 - *Android Released, iPhone in Beta*

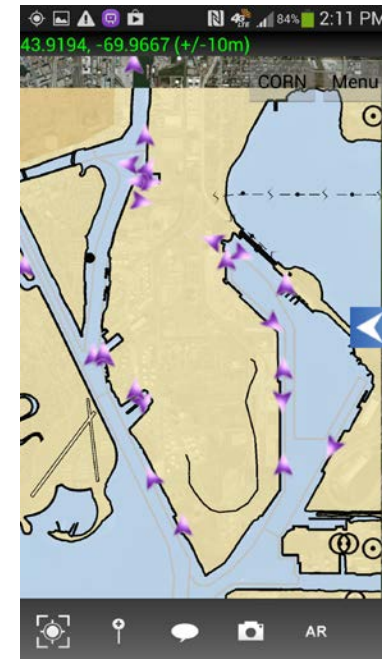
Charts and Overlays

- Electronic Charts are provided by NOAA's Direct ENC Servers
- Core Chart Capability is ArcGIS based
 - Also supports satellite, streets, etc.
 - Any ArcGIS based content can be added as an overlay, e.g. NEXRAD weather



AIS Class E (Developmental)

- Operates over Cellular Networks
 - Provides both User and Vessel Identification
 - Also supports viewing AIS Class A & B Traffic sourced from AISHub.net







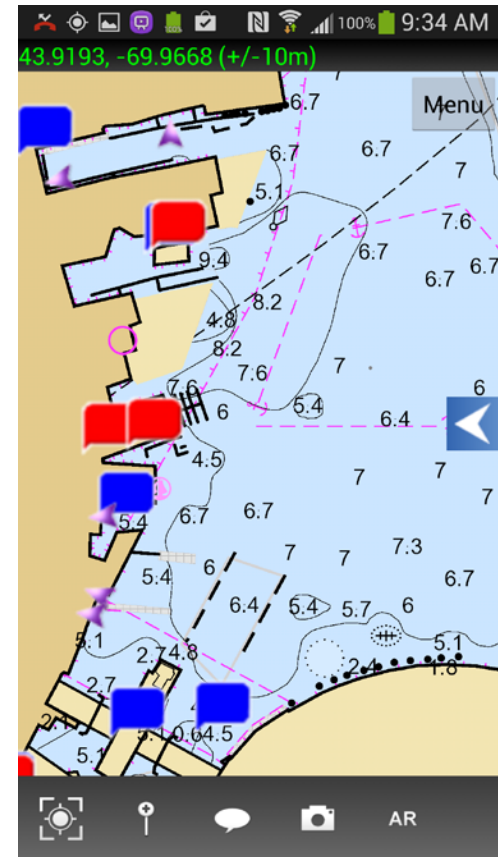
ActiveCaptain

- ActiveCaptain provides a wealth of cruising information.

It requires a free ActiveCaptain user account, which can be obtained at ActiveCaptain.com.

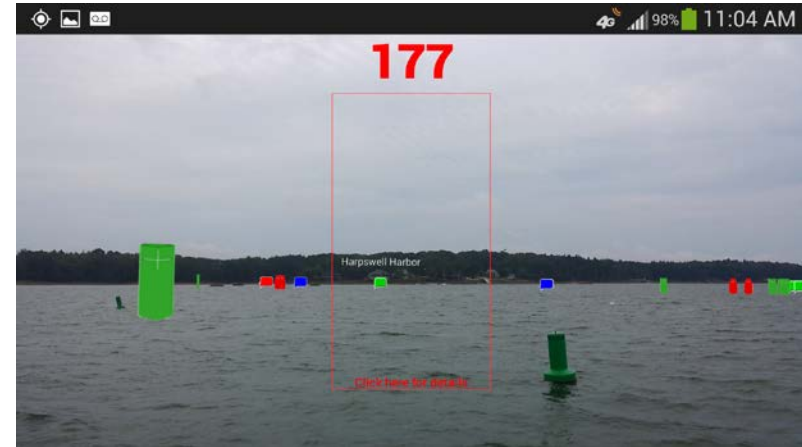
The ActiveCaptain menu enables toggling of optional Markers:

-  - Marinas
-  - Anchorages
-  - Local Knowledge
-  - Hazards



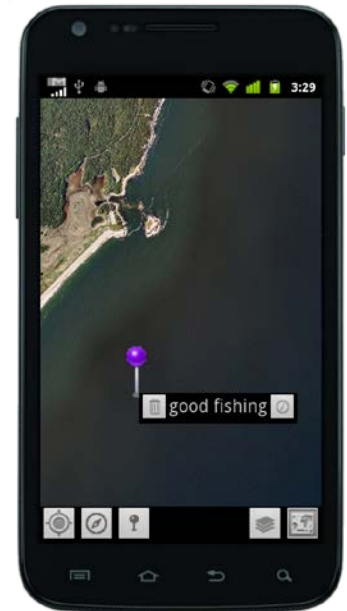
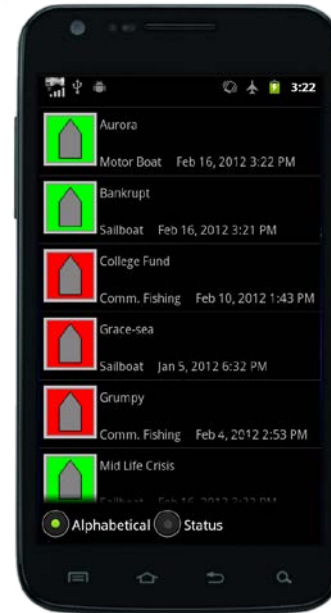
Augmented Reality Views

- See Routes, Navigation Aids, Other AIS Traffic through the smart-phone forward looking camera and display
- Great for no/low visibility situations
- Tap on the screen to get additional information

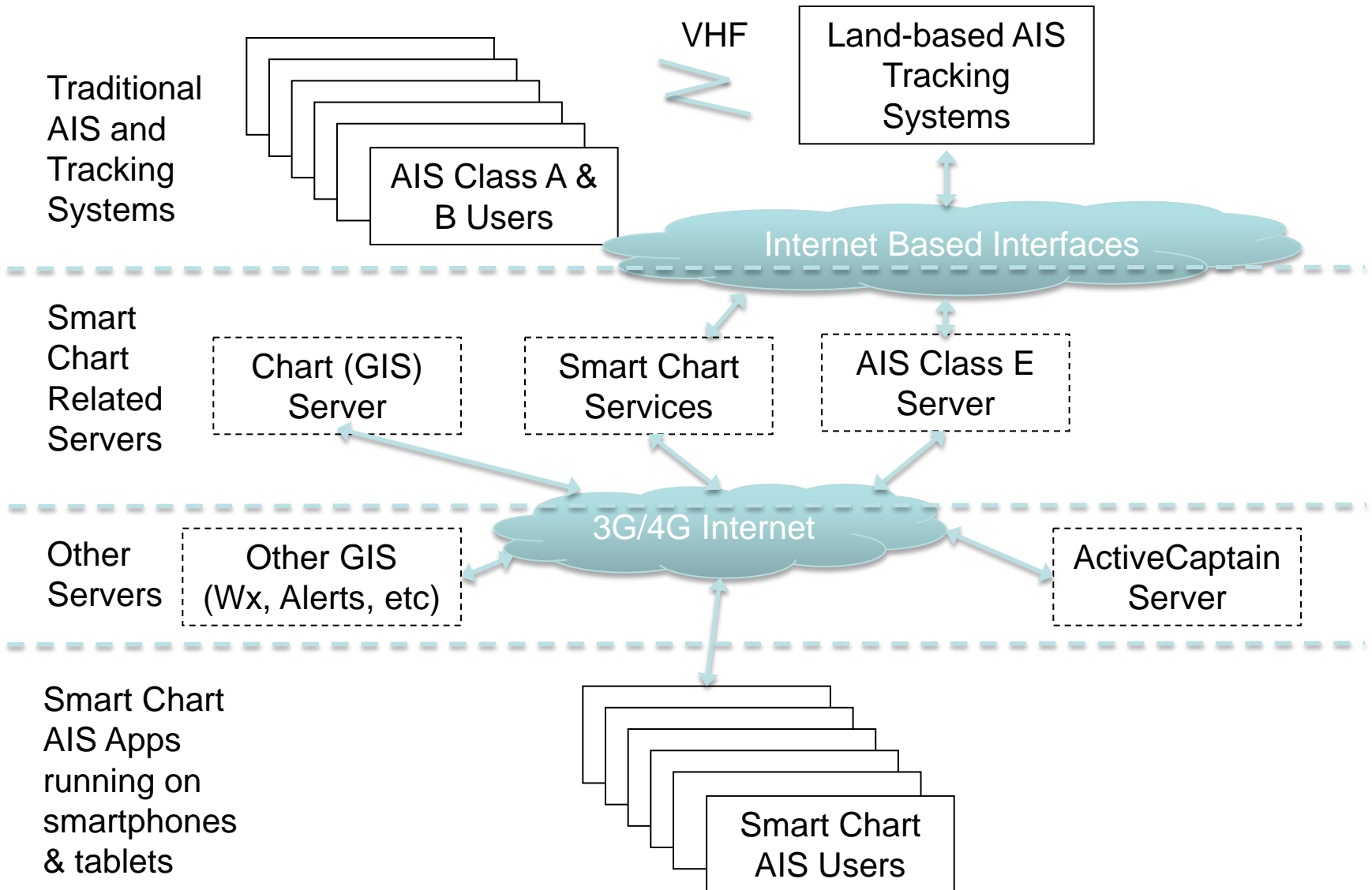


Social Networking on the Water!

- Chat boat to boat, or in chat rooms with like minded boaters
- Share pictures
- Share waypoints, zones, and other locations
- Easily find your friends
- Easily find your boat after a night on the town!



Smart Chart AIS / AIS Class E Architecture





Available Now for Free!

play.google.com

(iPhone coming soon!)

The screenshot shows the Google Play Store interface for the 'Smart Chart AIS' app. The app is by Technology Systems Inc., released on August 26, 2013, under the 'Transportation' category. The app icon is a green arrow pointing right on a blue water background. The page includes an 'Install' button, an 'Add to Wishlist' button, and a warning that the user has no devices. The app has a 5-star rating from 3 users.

Below the app page is a row of six mobile app preview images:

- 1. A satellite map view showing a harbor area with red and blue markers.
- 2. A detailed information screen for 'Liberty Landing Marina' with fields for Name, address, phone, facility type, and VHF channel.
- 3. A login screen for 'ActiveCaptain' with fields for email and password, and buttons for 'Update database' and 'Reset database'.
- 4. A nautical chart view showing a harbor with a red marker and a 'CROWN MARINA' label.
- 5. A data entry screen for 'CROWN MARINA' with fields for IMO, Callign, Location, True Heading, Timestamp, ETA, Destination, Draught, Beam, and Length.
- 6. A 'Select Map Layer' menu with options for 'NEXRAD Radar' and 'ENC'.



AIS Class E – What's in a name?

- Everyone knows what AIS is...
 - Instant Comprehension
- E is for “Enhanced”
- “AIS Class E” does not claim to be AIS Class A or B, or to fulfill any of the FCC, USCG, or IMO (International Maritime Organization) regulations pertaining to those devices and their users.
- However, it is in industry’s and government’s interest that future wireless “AIS-like” capabilities be standardized, and eventually also be regulated or mandated in certain circumstances.



Vision and Objectives

- The long-term goal is to establish standards that will support tracking of small vessels over wireless networks. To be successful the end capability must be:
 - Platform / Operating System (OS) agnostic
 - Open to industry and end users
 - Reliable, Predictable
 - Enforceable (e.g. be managed by a governing body, not ad hoc)

Standards: Other Examples

- DNS (Domain Name Services)
 - Managed by Internet Corporation for Assigned Names and Numbers (ICANN), a non-profit organization
 - Specifically, it is a **SERVICE** which is provided, and that the SERVICE relies on certain **STANDARDS** as an element of implementation.
 - Ultimately, an AIS Class E SERVICE must be maintained, and users of the SERVICE will be required to observe certain technical STANDARDS.



Standards: Other Examples

- AIS Class A & B
 - Mandated by IMO, Standard is Managed by IEC
 - Does not require an operational SERVICE
 - Does require MMSI Number Issuance Service
 - USCG
 - Boat US
 - Etc.
- AIS integrated bridge messages are standardized within NMEA
 - Not vessel-to-vessel, but system-to-system



AIS Class E (Developmental)

- Built using a Client-Server Model
- Server functions are broken down into 3 areas:
 - Registration Management – Web Portal,
 - Client Management – Application Portal, and
 - Real-Time Services
- Definitions:
 - USERS: Individuals – The Person
 - VESSELS: The Boat – What's Being Tracked
 - SYSTEMS: Hardware – The Device



Registration Management – Web Portal

- The AIS Class E Server Web Portal enables USERS to register.
 - Registration of a USER requires a unique Username and email, Password, Full Name (first and last), email address, and contact phone number.
- USERS can register Vessels (VESSELS) at the Web Portal.
 - Vessel Registration requires Vessel Name, and optional information including Owner (Default is the USER), Contact Info, Home Port, Vessel Dimensions, Type, MMSI number (if registered).
- USERS are automatically granted permission to associate their vessels with AIS Class E Systems (SYSTEMS) they provide credentials to (Username and Password).



Registration Management – Web Portal

- USERS can also share their vessels with other USERS via a simple “Share Vessel” function.
 - Thus, when a returning USER logs in he will see a list of the VESSELS he is permitted to associate SYSTEMs with.
- For VESSELS he has registered, he can edit VESSEL Info.
 - He can also see a list of other USERS he has shared the vessel with, and can delete USER share privileges if desired.
 - Finally, he can see all SYSTEMs that have been associated to the VESSEL.



Client Management – Application Portal

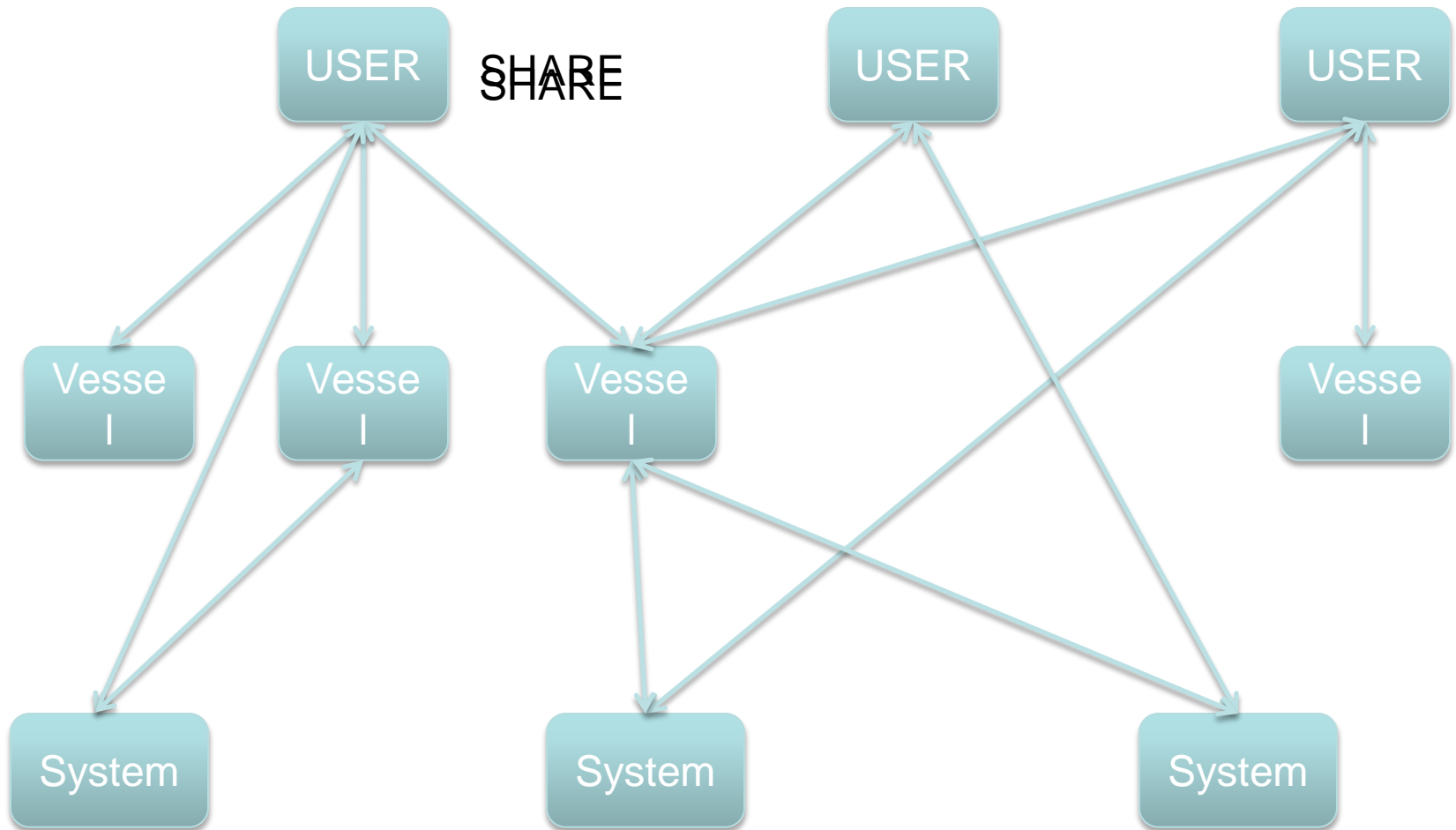
- The Application Portal is a Server function that enables SYSTEMs (clients) to associate with VESSELS.
- Application Developers are required to provide a valid Username and Password for a SYSTEM (client) to log in to the AIS Class E Server.
 - For a fixed SYSTEM requiring a single configuration (e.g. a permanent chart plotter installation) an Application Developer provided configuration module will ask for Username and Password, log in to the AIS Class E Server, which will then return a list of VESSELS that USER is permitted to associate with SYSTEMs. The USER then selects the correct VESSEL from a menu, provides a user defined description (e.g. Garmin 2000), and then the system is configured.
 - The process is identical for a Mobile SYSTEM, except that the USER is required to select the proper VESSEL each time the application is invoked.



Real-Time Services

- Once a SYSTEM is logged in with an identified USER and VESSEL, the application reports VESSEL telemetry to the AIS Class E Server, and requests surrounding VESSEL telemetry, which the server returns.
- Additional Vessel Descriptive Content is provided on request

USER – VESSEL – SYSTEM Interactions Overview





End User Perspective

- Establish a User ID
- Establish or Access a Vessel ID
- Log into an AIS Class E enabled device and select the vessel you are on.
- Once this has been done the vessel's telemetry will automatically be shared with others, and your device will see other AIS Class E vessels and be able to access further information about them.



Developer's Perspective

- Register to receive an API Key from TSI
- Create the GET Login capability within your app
- Create the POST Vessel Telemetry capability
- Create the GET Vessel Telemetry capability
- Create the GET Vessel Info capability
- Create the GET UserInfo capability



Next Steps

- AIS Class E Server is being set up as a stand-alone service
- AIS Class E Developer's Agreement is available on a limited basis
 - Provides a frame-work for Developers to integrate AIS Class E Capability into their apps
 - Requires Users to register at AIS Class E Server
- AIS Class E Service will transition to a .org type operation
 - The AIS Class E approach is covered under US Patent 7,805,146, issued September 28, 2010, entitled Cell Phone PDA/GPS Communication Network with AIS. TSI has an agreement with the patent holder under which this work has been developed.
- The AIS Class E Standard will be introduced to NMEA, IEEE, RTCM or another similar organization for Peer Review, with the long term goal of AIS Class E becoming a formal standard recognized by the IEC.

Summary

- AIS functionality can benefit the recreational boating community, port security, Coast Guards, and others
- Existing AIS Class A & B cannot inherently meet that need
- The AIS Class E concept has been developed under DHS SBIR funded project known as “Smart Chart AIS”
- The overall concept has been demonstrated as feasible
- AIS Class E is now transitioning into the public domain, under agreement with the US patent holder
- Adoption by industry and as a formal standard is proposed

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