

# **Marine Electronics Update**

Chesapeake Area  
Professional Captains Association

May 18<sup>th</sup> 2009

Tim Hasson  
[www.TechYacht.com](http://www.TechYacht.com)

# Float Plan

- Developments in the Sat-Com world
- Loran-C/eLoran
- GPS Happenings
- AIS Class B

# Inmarsat

- 4<sup>th</sup> Generation (I4) Satellites
- Completed February 2009
- Broadband Global Area Network (BGAN)



# Inmarsat Fleet Broadband



- New Family of Maritime Terminals
- Simultaneous Voice and Data
- Data Speeds approaching 450 kbps

# Inmarsat Fleet Broadband

## ***FB-500***

- Voice
- Fax
- SMS
- 432 kbps
- 24"
- \$16,000

## ***FB-250***

- Voice
- Fax
- SMS
- 284 kbps
- 12.5"
- \$11,000

## ***New! FB-150***

- Voice
- No Fax
- SMS
- 150 kbps
- 11"
- \$6,000

# Inmarsat Fleet Broadband

Equipment: Thrane & Thrane, JRC, Furuno

Airtime: \$1.50/Minute nominal

Data: \$10/Megabyte

*This presentation is 3.352 Megabytes, so  
it's worth \$33.52*

# Inmarsat ISatPhone

*Coming to the Americas June 2010*

- Handheld
- Dual Satellite/GSM Cellular
- Data: 2.4 kbps
- Same Coverage as FB
  
- Equipment: \$700
- Airtime: \$0.75/Minute



# Iridium

- Hard at work on their next-generation satellite constellation, "Next-Gen"
- New Handheld: 9555
- 9505A Officially Obsoleted 5/1
- \$1,695
- Airtime: ~\$1.50/Min





# Iridium



- OpenPort
- 3 Iridium Units in one
- Simultaneous Voice/Data
- Data: 9.6 – 128 kbps
- Equipment: \$4,700
- Depends on Calling Plan
  - Data priced per-Megabyte

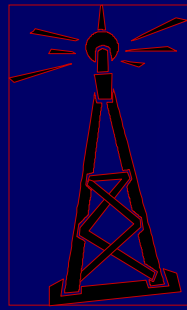
Questions/Comments

# Loran-C

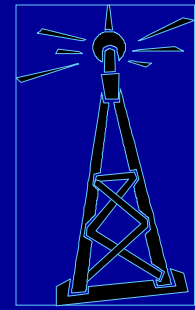


- Powerful Low Frequency (LF) Radio Stations
- Master Station
- 2-5 Secondary Stations
- "Chain" identified by GRI
- Receiver measures Time Differential Between Master and Secondaries to determine a line (TD Line)
- Point where these lines intersect plots position

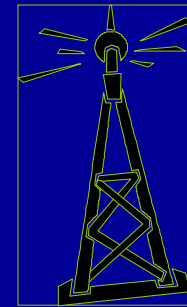
# Loran-C Concept



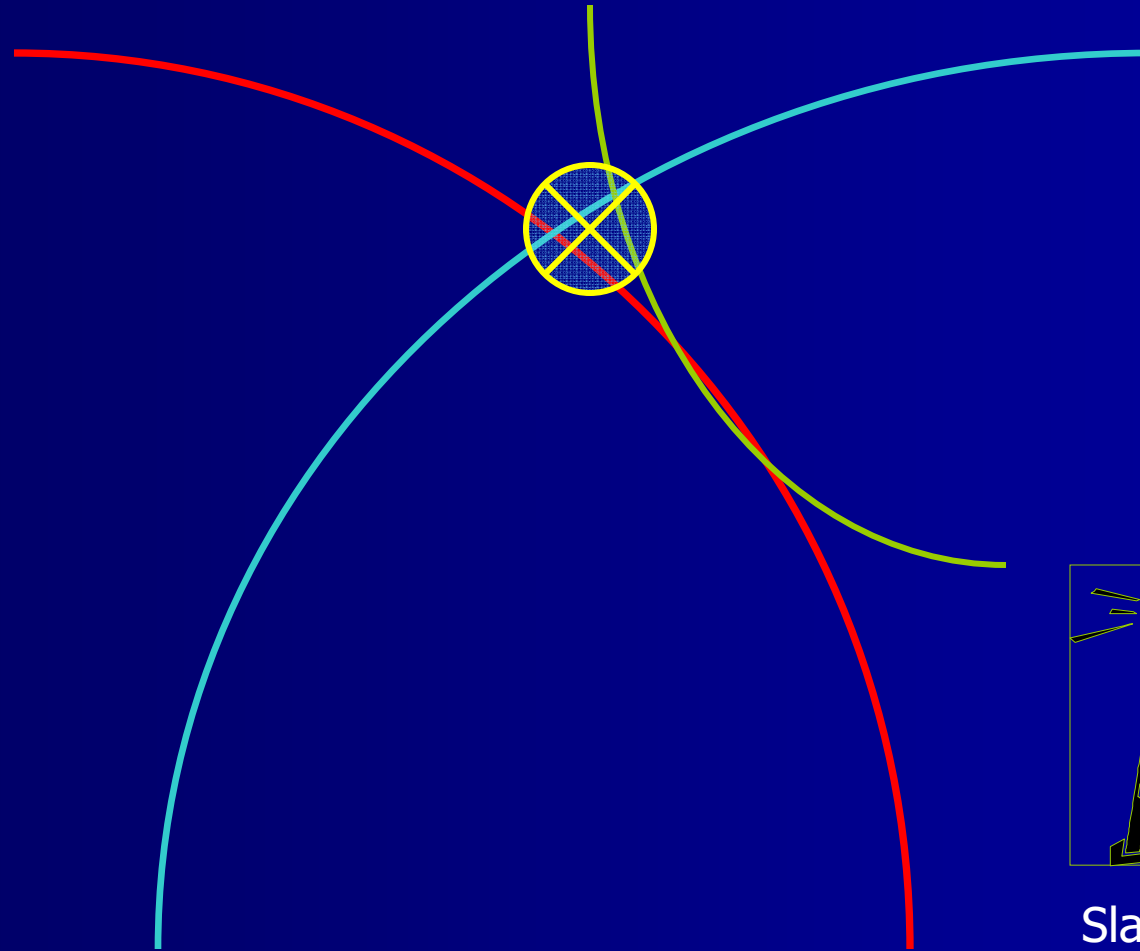
Master



Slave 1

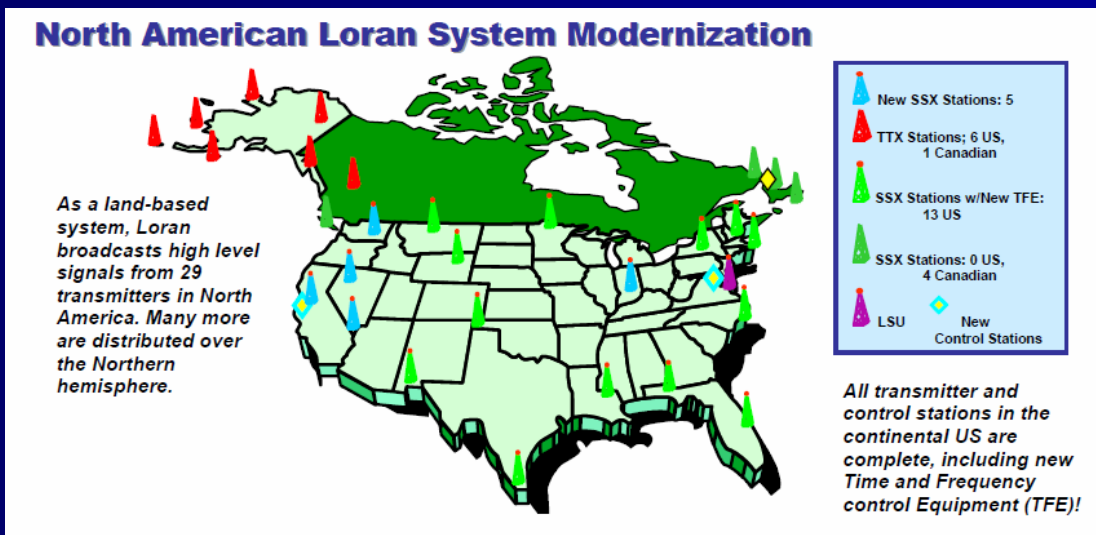


Slave 2



# eLoran

- Since 1997 US has invested over \$140 million in upgrades gearing towards newer technology called **eLoran**.
- UK/Western Europe have similar plan



# eLoran

- Backup to GPS
- Independent, Dissimilar System
- More Accurate than Loran-C: 26-65'
  - (Civil GPS is about 16')
- Harder to jam
- Heading Accuracy of less than 1° of Error
- Reliable Source for Precision Timing

# eLoran

- “Chainless”
- Receiver listens to all stations in range
  - Could be 8-10 Stations instead of 3-5
- Extra “Pulse”
  - Signal Corrections
  - Error Correction
  - Timing Data

## eLoran Equipment

- Si-Tex
- Crossrate
- Locus
- Others...
- Usually combination GPS/eLoran
- Starting at around \$700





# Federal 2010 Budget

## *Terminations, Reductions and Savings*

Loran-C is a federally-provided radionavigation system for civil marine use in U.S. coastal areas. *The Nation no longer needs this system because the federally-supported civilian Global Positioning System (GPS) has replaced it with superior capabilities.* As a result, Loran-C, including recent limited technological enhancements, serves only the remaining small group of long-time users. It no longer serves any governmental function and it is not capable as a backup for GPS.

Several Federal agencies, including the Departments of Defense, Transportation, and Homeland Security, already have backup systems for their critical GPS applications and the termination of Loran-C does not foreclose future development of a national back-up system. It merely stops the outflow of taxpayer dollars to sustain *a system that does not now and will not, in its current state, serve as a backup to GPS.*

# Independent Assessment Team (IAT) Report Issued May 2009

**May, 2009** - The recently released Independent Assessment Team (IAT) report, chaired by Dr. Bradford Parkinson, the father of GPS, and other industry leaders, concludes "... the IAT unanimously recommends that the U.S. Government complete the eLoran upgrade and commit to eLoran as the national backup to GPS for 20 years." The IAT reached this conclusion by evaluating the need for a GPS backup then evaluating all available or potential alternatives...

...They concluded upgrading to eLoran with improved accuracy and coverage is less expensive than decommissioning the Loran system and the new eLoran system will cost less to operate than the current Loran system.

# eLoran Status

## Stakeholders:

- Mariners
- Aviation (somewhat)
- Telecom's
- eLoran Equipment Manufacturers

## Status:

- Appears to have support in Senate
- Stay Tuned!

## Questions/Comments

*OK, at the risk of sounding like Chicken Little...*

# **Global Positioning System (GPS) *Service May Degrade in 2010***

GAO Report April 30<sup>th</sup>, 2009:

*Global Positioning System: Significant Challenges in Sustaining and Upgrading Widely Used Capabilities*

"It is uncertain whether the Air Force will be able to acquire new satellites in time to maintain current GPS service without interruption. If not, some military operations and some civilian users could be adversely affected"

# **Global Positioning System (GPS)**

## ***Service May Degrade in 2010***

GAO Report April 30<sup>th</sup>, 2009:

... "If the Air Force does not meet its schedule goals for development of GPS IIIA satellites, there will be an increased likelihood that in 2010, as old satellites begin to fail, the overall GPS constellation will fall below the number of satellites required to provide the level of GPS service that the U.S. government commits to."

# **Global Positioning System (GPS) *Service May Degrade in 2010***

## **Report Recommendations:**

"The Secretary of Defense should appoint a single authority to oversee the development of the GPS system, including DOD space, ground control and user equipment assets, to ensure that the program is well executed and resourced and that potential disruptions are minimized."

*[www.gao.gov/products/GAO-09-325](http://www.gao.gov/products/GAO-09-325)*

# Entering Period of Increased Solar Activity

- Expected to peak 2012



- Solar Activity can damage/disrupt satellite systems like GPS
- NOAA Hosting Conference to discuss potential (starts tomorrow)



# **Global Positioning System (GPS) *Service May Degrade in 2010***

*What was that about eLoran again?*

Questions/Comments

## AIS Class B



- Finally approved by FCC 9/15/2008
- Equipment now available from Furuno, Raymarine, ACR/Nauticast, Simrad, Comar – Everybody!
- Affordable: \$700 - \$1,300
- Gaining widespread acceptance, particularly on recreational craft that do not have radar

# AIS Class B vs Class A

## Class A

- Compulsory
- Static Data: 6 Mins
- Dynamic: 2 – 10 secs
- 12.5 Watts
- Protocol: SOTDMA

## Class B

- Voluntary
- Static Data: 6 Mins
- Dynamic: Max 30 secs
- 2 Watts
- Protocol: CSTDMA

*Class B Static Data must be programmed by the Vendor or a qualified technician – the End User is not permitted to do this.*

## **AIS Class B "Issues"**

- The "Congestion" Issue
- The "Visibility" Issue
- The "User Limitations" Issue

## AIS Class B “Congestion”

*Will all these new users interfere or cause garbled AIS messaging?*

- Probably Not

- Lower-power transmitter (2W vs 12.5w)
- Lower Antennas
- CSTDMA Protocol
  - Carrier-Sense Time-Division Multiple Access
  - Class A *always* trumps Class B

## AIS Class B “Visibility”

*What Technical Limitations affect how Class A users see Class B Targets?*

- USCG Marine Safety Alert 10/30/2008
  - Some older Class A equipment may not show Class B Static information
  - May appear as a target with range/bearing but no identifying information
  - Should be addressed in time with software/equipment upgrades

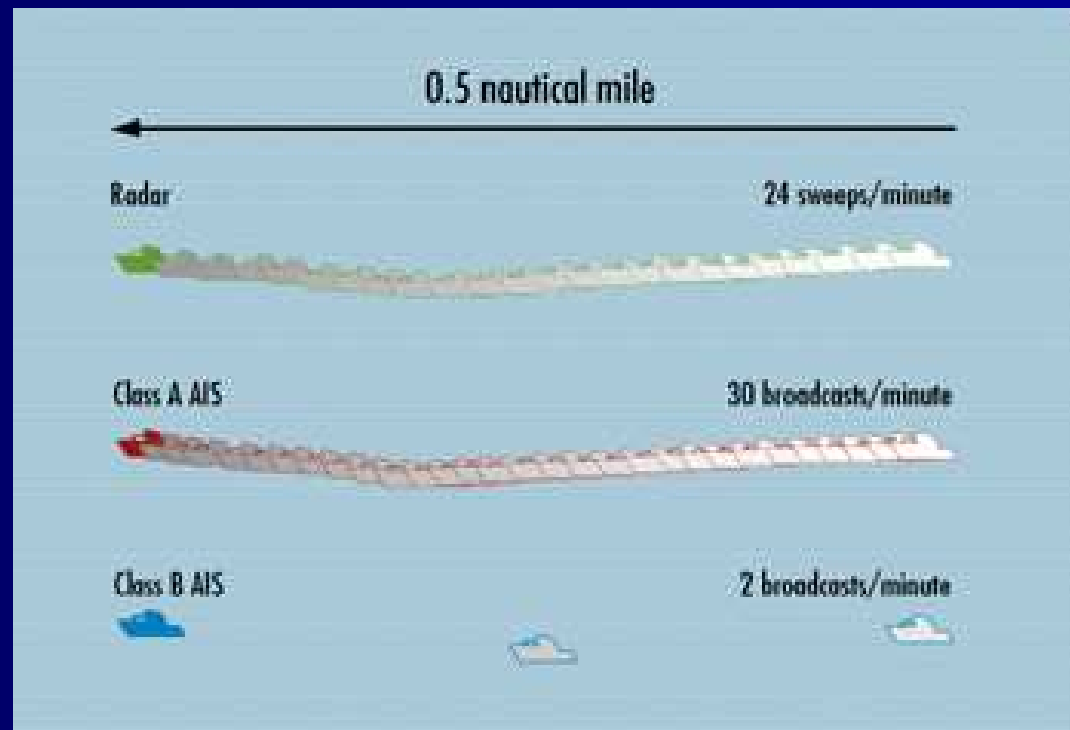
## AIS Class B “Visibility”

*What Technical Limitations affect how Class A users see Class B Targets?*

- Class B Dynamic Reporting Delay
  - Position/Course reported a *maximum* every 30 sec
  - As of July 2008, SOLAS Radars will have to offer an AIS overlay feature
  - Due to 30-second interval, ARPA targets and AIS targets are not likely to “match up”



# AIS Class B "Visibility"



AIS Class A vs Class B  
(Assumes vessels traveling @ 30 knots)

## AIS Class B User Limitations

*Class B Users may over-estimate the capabilities of AIS as a collision-avoidance tool!*

- False Confidence: *"we have a beacon, so they'll see us"*
  - Even if "they" do, they can't get out of your way
- Safety Perspective: Many Class B users probably hold different notions than SOLAS navigators on things like:
  - What is a safe CPA/TCPA
  - When do decisions in poor visibility come into force
- Technology Creates an Opportunity to Educate

# Is the Latest ... ... Always the Greatest?



# Thank You!

Tim Hasson

[www.TechYacht.com](http://www.TechYacht.com)

+1.610.287.0703