20th IALA Conference 2023 Rio de Janeiro - Brazil

Modern Racons for Modern Radars

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Introduction

At some point in time, the type of racons installed today will no longer be usable.

Eventually, modern marine radars will replace the traditional magnetron radars in common use today.

A modern radar is one that uses a solid-state transmitter, modulated to give best performance.

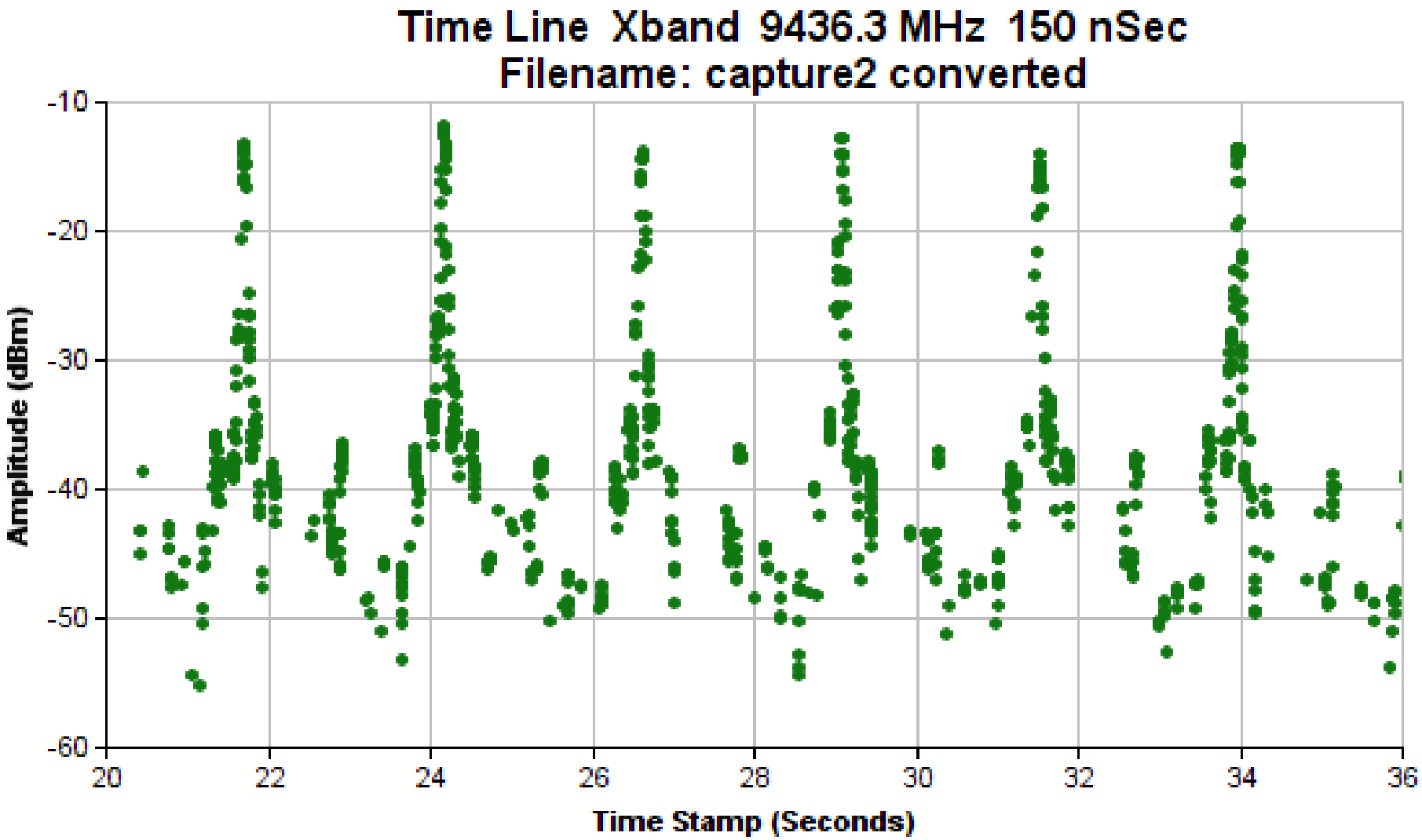
Traditional racons do not work well, if at all, with modern radars.

We need modern racons.

Technical Challenges

- Racon Side Lobe Suppression
  - Racons in Busy Harbours
  - Gets Worse with Solid-State Radars
  - The 9400 MHz Band

Please see IALA paper ENAV20-13.11 On Racons in Busy Harbors
Or contact Paul F Mueller for a copy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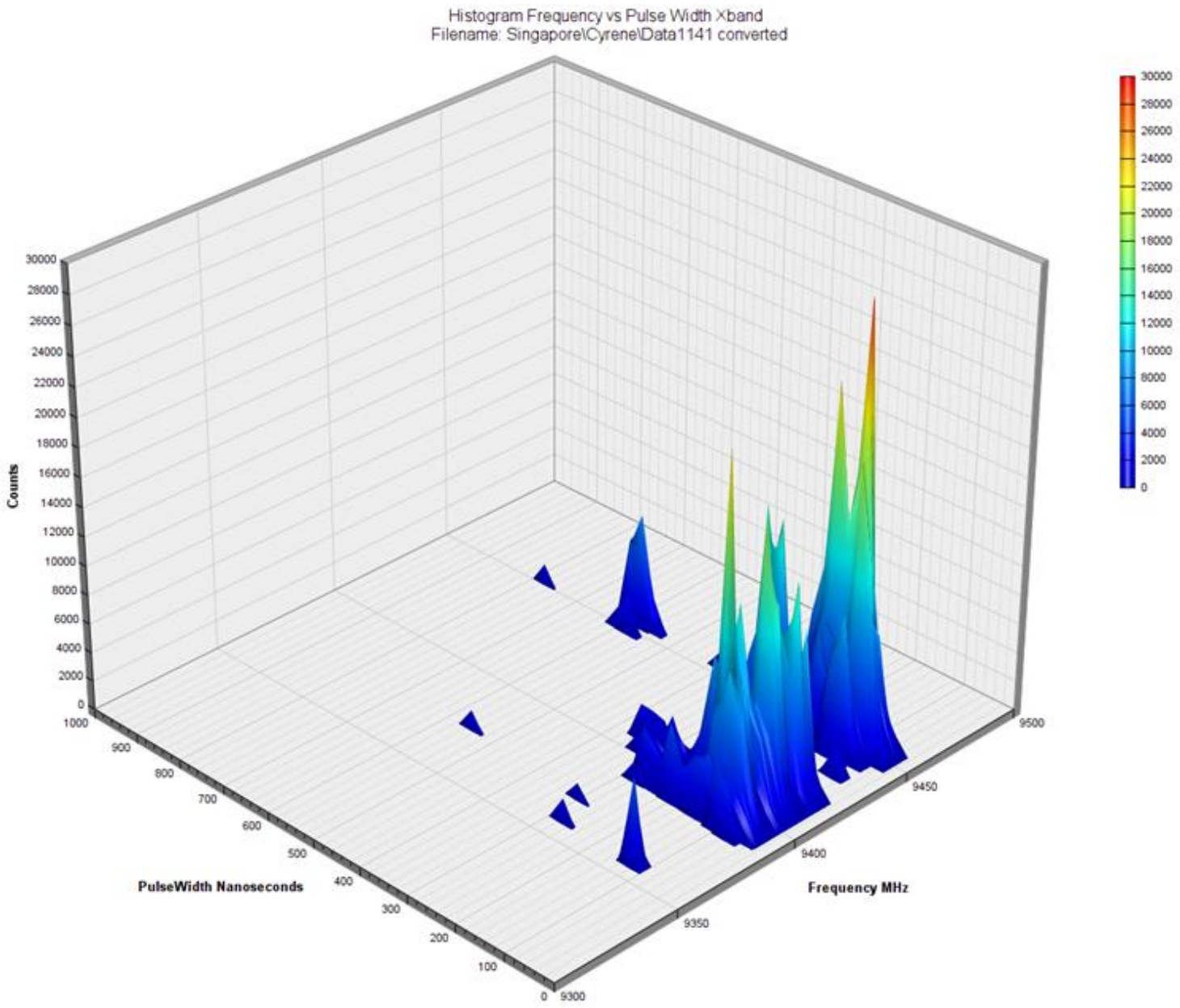
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18000
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14000
12000
10000
8000
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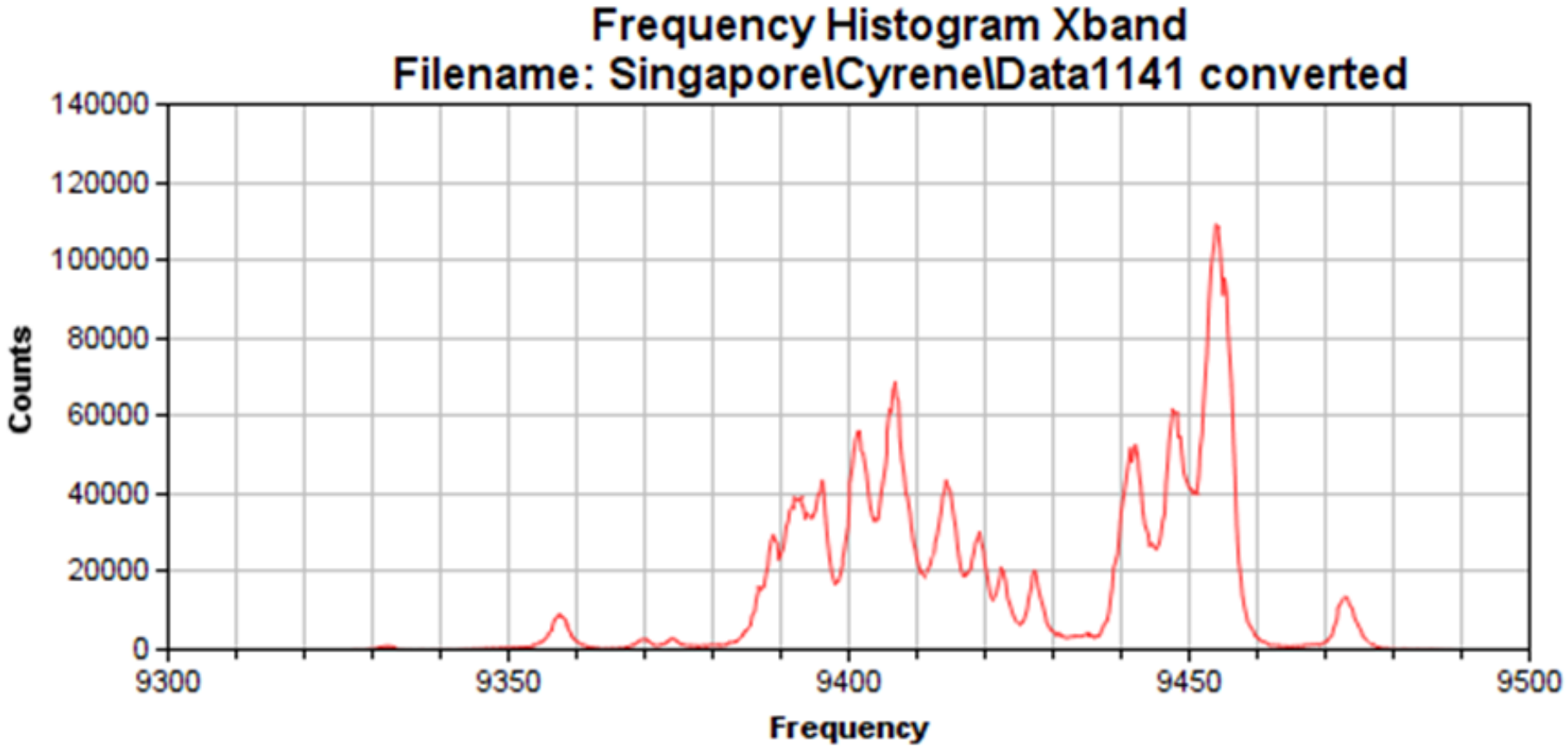
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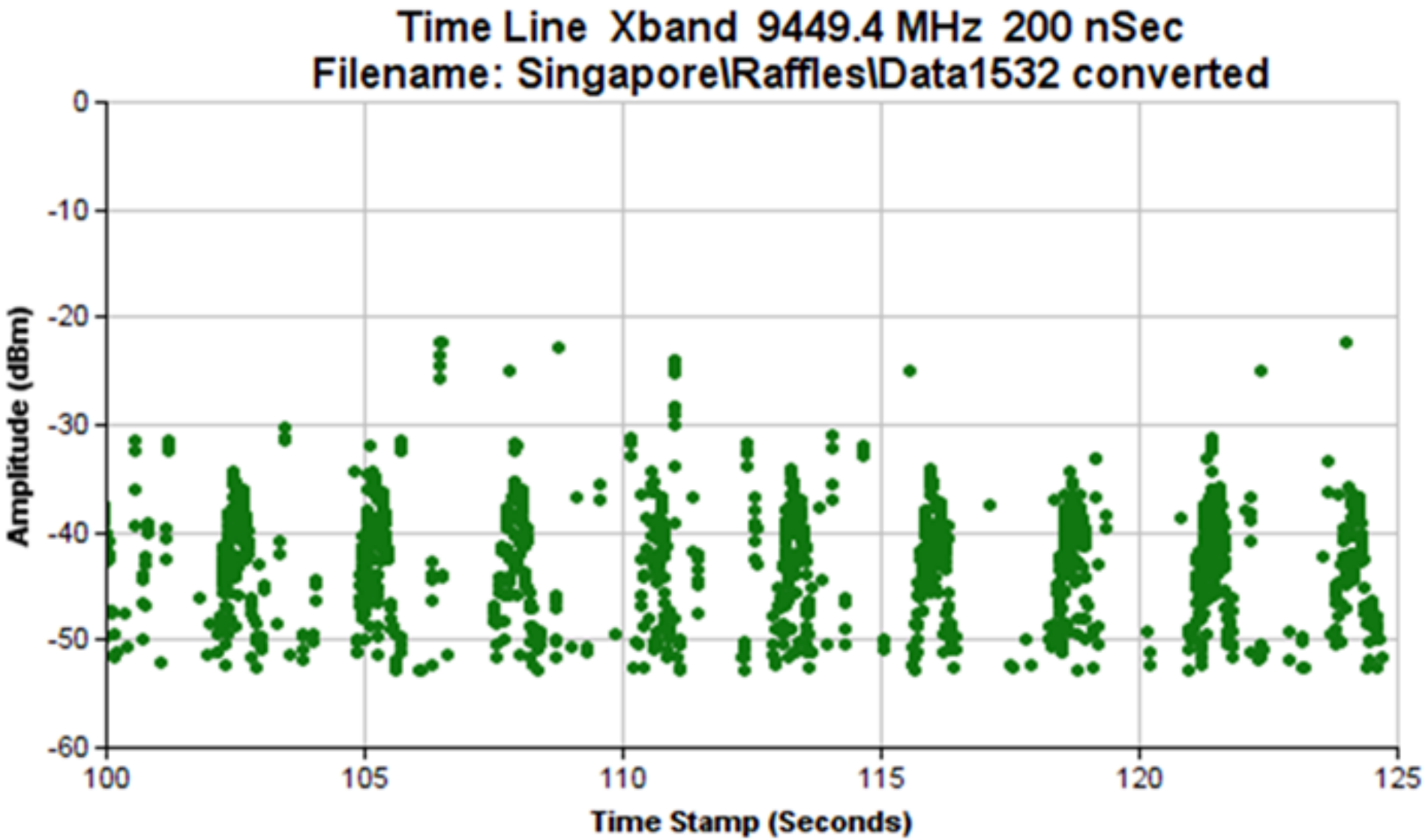
Frequency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105
110
115
120
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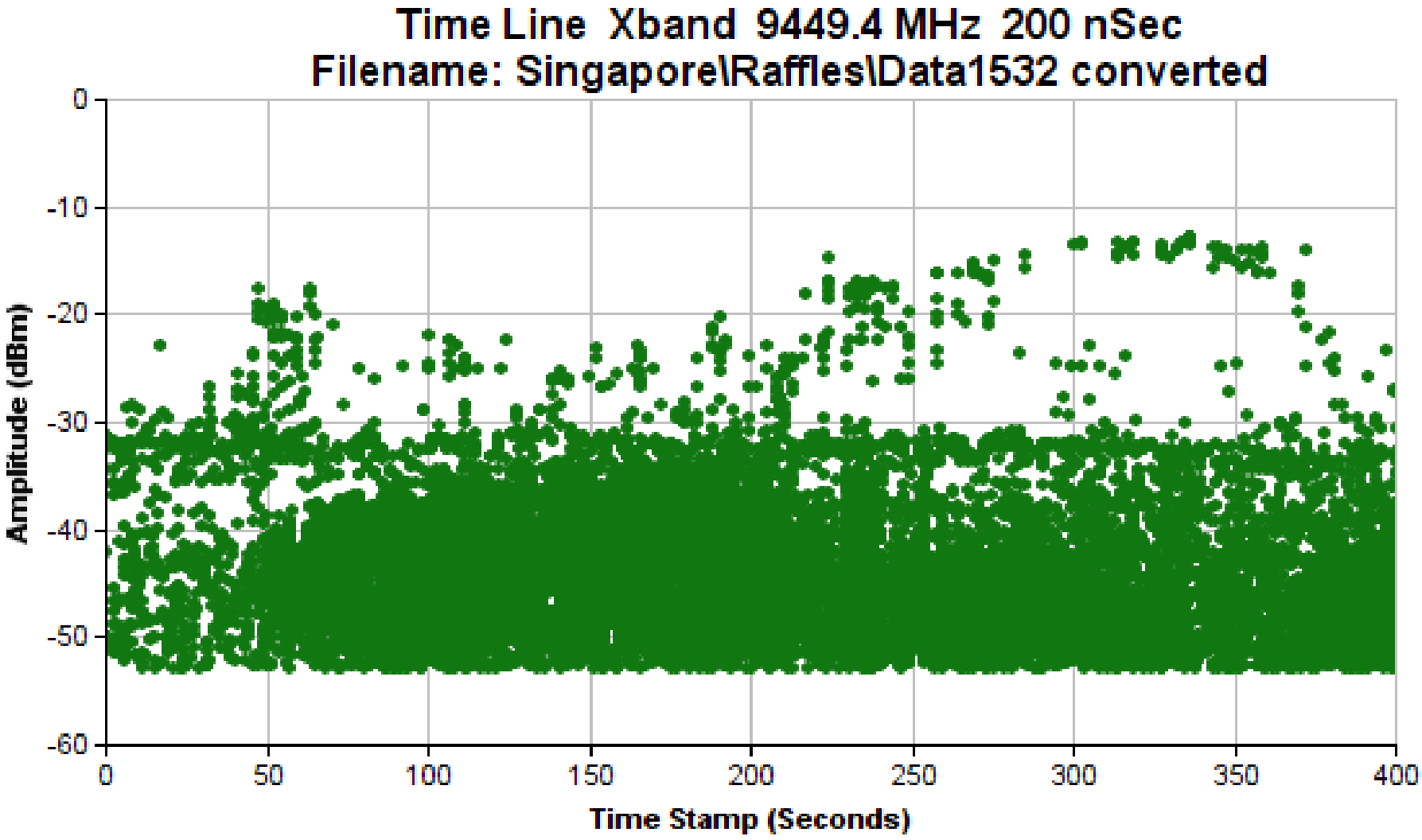
Time Stamp (Seconds)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-50
-60
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50
100
150
200
250
300
350
400
Time Stamp (Seconds)

Technical Challenges

- Range Limitations Using Solid-State Radars
  - Solid-state radars transmit at lower power than traditional magnetron radars
  - Detection at racons is highly dependent on racon receiver sensitivity
- Radar Modulation
  - What modulation will radar manufacturers use?
  - Can racon manufacturers keep up?
- The Way Forward: Standardisation
  - Currently, there are no standards

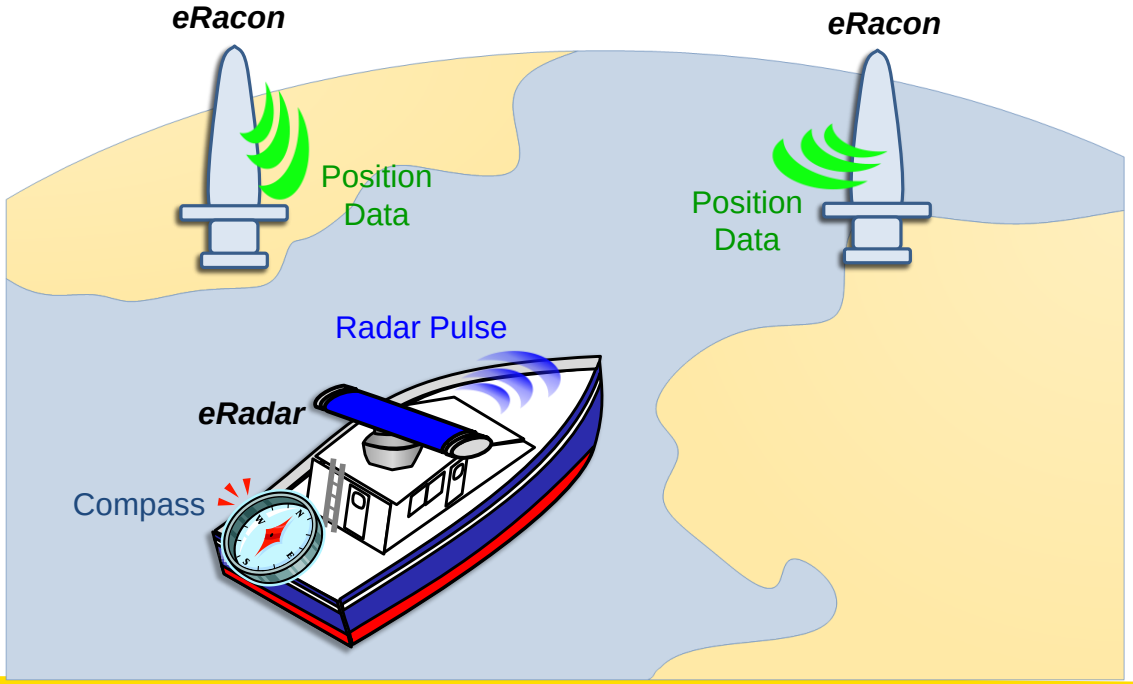
Regulatory Issues

- Resilient PNT
  - Prominently featured in IMO eNavigation Strategy Implementation Plan
  - Radar has always been a resilient PNT solution
- IMO Carriage Requirements
  - Modern radars will fail to qualify if they do not work with racons
- Radar and Racon Standards
  - No existing interoperability standards between radars and racons
- Where to Start?
  - Recent IALA workshop was a good start and drew many attendees from outside IALA – perhaps another workshop?

Automatic Radar Absolute Positioning Systems

- Enhanced Radar Positioning System (ERPS)
- Map Matching
- Regulatory Issues – Resilient PNT
- Adoption

Please see IALA G-1147 for more on ERPS



Conclusions

The vessel's radar is a significant navigation aid, its evolution path to solid-state technology brings potential benefits through reduced power and the ability to provide data encoding to support resilient PNT, but there's a need to standardize the approach, to aid system interoperability and performance, and to support efficient management of the spectrum.

Automatic position determination is very attractive and seems to be easily added to radars and racons.

The authors wish to acknowledge Liu Chunhai for his review of this paper and acknowledge the many others who have contributed ideas and suggestions over the years.

The authors also wish to acknowledge the contributions of the Danish Maritime Administration, the General Lighthouse Authorities of United Kingdom and Ireland, the Maritime and Port Authority of Singapore, Furuno Electric and Tideland Signal to the extensive work done to develop ERPS.

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