MT Tracker use case

MobiSpaces Webinar

January 31st 2023
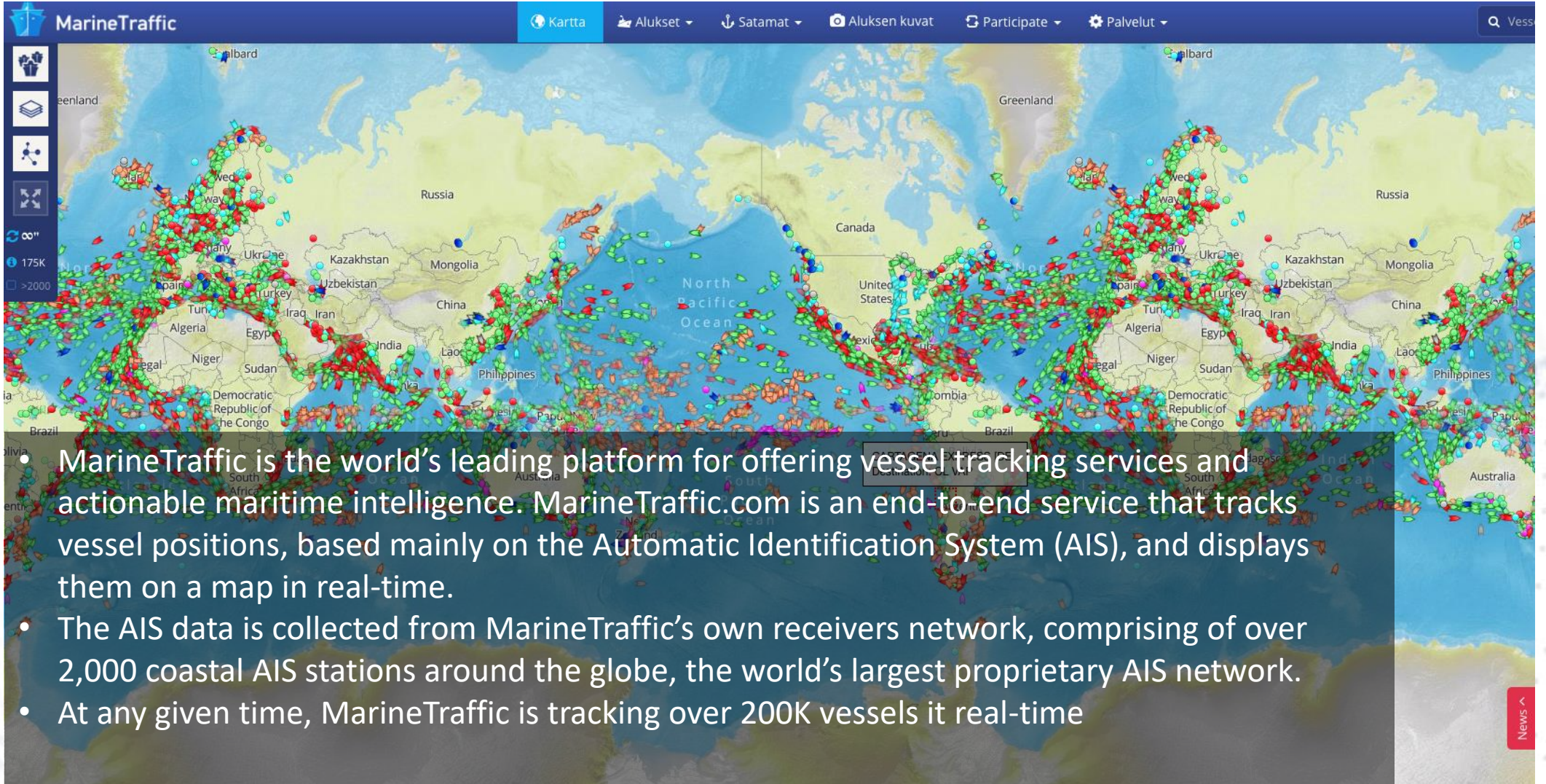
MT Tracker
Konstantina Bereta, MarineTraffic

MarineTraffic

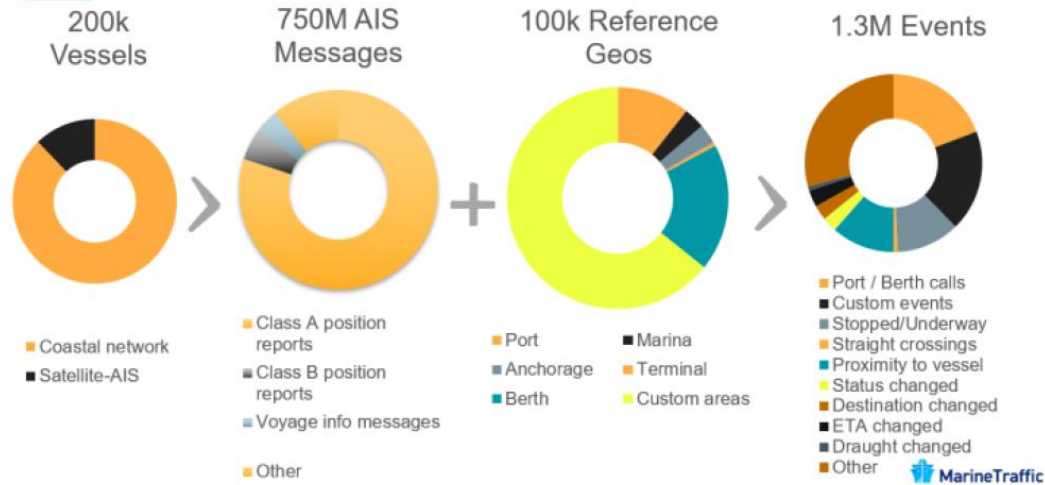- MarineTraffic is the world's leading platform for offering vessel tracking services and actionable maritime intelligence. MarineTraffic.com is an end-to-end service that tracks vessel positions, based mainly on the Automatic Identification System (AIS), and displays them on a map in real-time.
- The AIS data is collected from MarineTraffic's own receivers network, comprising of over 2,000 coastal AIS stations around the globe, the world's largest proprietary AIS network.
- At any given time, MarineTraffic is tracking over 200K vessels it real-time

A day at MarineTraffic

70GB Streams of AIS data need to be processed
every day for **1 million** users

Automatic Identification System (AIS)

- Collaborative, self-reporting system that allows marine vessels to broadcast their information to nearby vessels and on-ground base stations.

- It is based on VHF and it is used for vessel traffic monitoring and maritime event detection

- However:

  - Not mandatory for all vessels

  - Some vessels may switch-off their AIS transponder intentionally (**dark vessels**)

Objectives

⇌ Develop a robust and accurate vessel tracker (MT Tracker) to resolve measurement-to-object association ambiguities, especially in cluttered multi-object scenarios.

⇌ Develop techniques for multi-sensor (AIS, RF) multi-object tracking in order to enrich information coming from different sources (e.g., vessels that cannot be tracked via AIS).

⇌ Combine the results at a regional level providing macro analytics on aggregated data from the edge devices, reducing costly data transfered to centralized infrastructures.

DATA

AIS

Class A Transceivers

Class A AIS transceivers transmit and receive AIS signals. AIS transceivers are currently mandatory on all commercial vessels exceeding 300 tons that travel internationally (SOLAS vessels).

The following information can be transmitted by a Class A AIS system:

- Static data. Includes information such as vessel name, vessel type, MMSI number, call sign, IMO number, length, beam and GPS antenna location.

- Voyage related data. Includes information such as draft, cargo, destination, ETA and other relevant information.

- Dynamic data. Includes information such as time (UTC), ship's position, COG, SOG, heading, rate of turn and navigational status.

- Dynamic reports. Ship's speed and status.

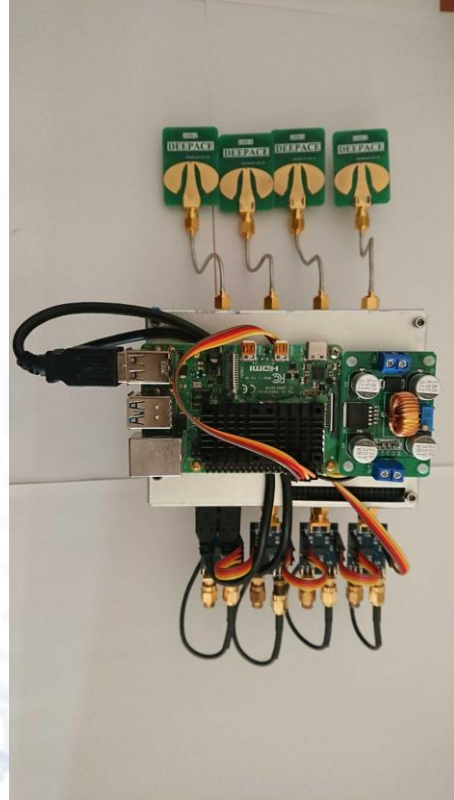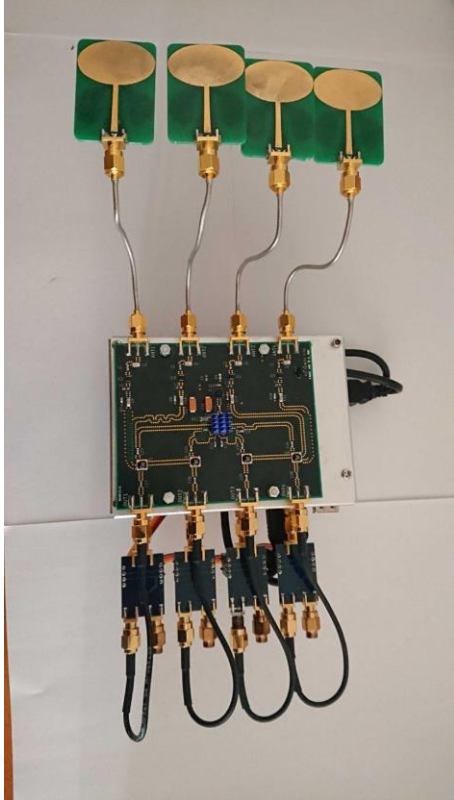- Messages. Alarms and safety messages.

Class B Transceivers

Class B AIS transceivers transmit and receive AIS signals, but use a reduced set of data compared to Class A (see *Data Summary*). A Class B AIS transceiver can be fitted on any vessel not fitted with a Class A transceiver, but is not mandatory aboard any vessel.

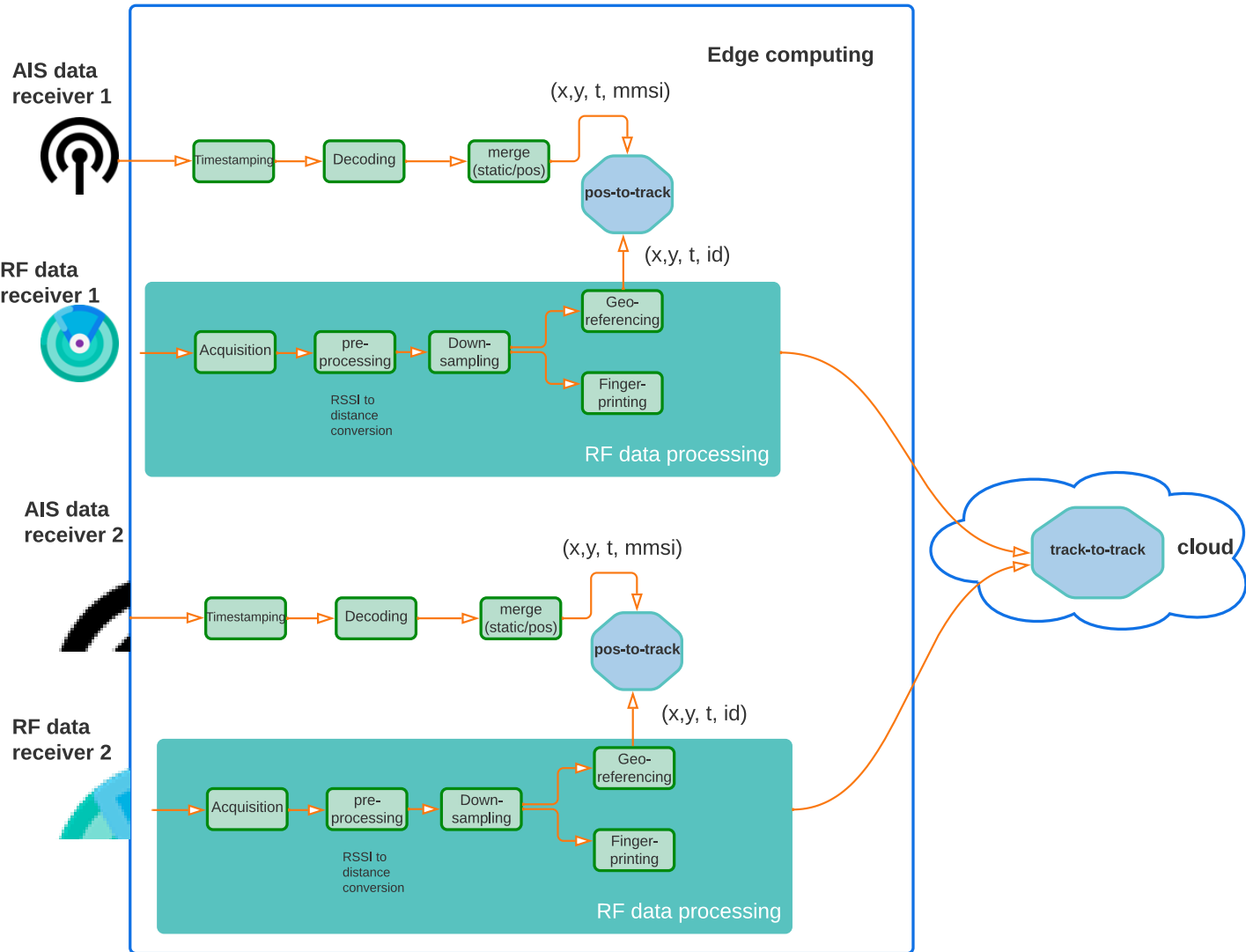| Data	Class A (receive)	Class B (send)	Class B (receive)
Call sign	Yes	Yes	Yes
IMO number	Yes	No	No
Length and beam	Yes	Yes	Yes
Antenna location	Yes	Yes	Yes
Draft	Yes	No	No
Cargo Information	Yes	Yes	Yes
Destination	Yes	No	No
ETA	Yes	No	No
Time	Yes	Yes	Yes
Ship's position	Yes	Yes	Yes
COG	Yes	Yes	Yes
SOG	Yes	Yes	Yes
Gyro heading	Yes	Yes*	Yes
Rate of turn	Yes	No	No
Navigational status	Yes	No	No
Safety message	Yes	No	Yes

RF DATA

RADAR Tx Direction Of Arrival detection

Rev 1

- Detect nearby RADAR transmissions in the X-Band and S-Band (bearing + distance from receiver)
- Correlate detected incidents with AIS in real-time to reveal "dark vessels" in the area
- Edge computing (perform multi-sensor multi-object data fusion on edge)
- Fingerprinting the RADAR transmissions (associate the RF signal unique characteristics with a specific vessel without the use of AIS)

Architecture

MT Tracker KPIs

KPIs	Target
Data to object association accuracy	> 85%
Data to track association accuracy	>80%
Data to server flow reduction	>30%

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