Automatic Identification System

AIS is an automatic vessel tracking system that can be used to prevent illegal fishing, provide transparency at sea, and enhance traceability of seafood.

What is AIS?

- Automatic Identification System (AIS) is a vessel tracking system that transmits a vessel's location, behavior, and identity. This includes the name, unique vessel identifier, callsign, size, flag state, and type of the vessel, along with its speed, direction, and geographical position.
- AIS was developed to increase maritime safety, reduce vessel collisions, and enhance awareness of vessel locations at sea. It functions as the "eyes of the boat," enabling vessels to "see" each other's location and activity – of critical importance at night and in hazardous conditions.
- With tens of thousands of ships operating daily in the U.S.'s waters, AIS technology is a vital tool in maintaining maritime domain awareness. AIS sends identity information as well as position and transit information, telling the Coast Guard who is in U.S. waters, where they've been, and which other ships they may have met up with.

Why is AIS critical?

- Commercial fishing has the highest fatality rate of any occupation, and its workers are over 30 times more likely to die on the job than the average. Using AIS is one way to improve safety in an incredibly dangerous profession.
- AIS is also invaluable for transparency and monitoring, as it allows fisheries managers and authorities to detect suspicious and illegal behavior. NGOs such as Global Fishing Watch use AIS data collected from satellites to map fishing activities across the world's oceans, so fisheries managers and others can use this publicly available information to track compliance with regulations and make informed decisions regarding fisheries.
- At an Oceana roundtable event focused on Illegal, Unreported and Unregulated (IUU) fishing, former Secretary of the Navy Ray Mabus said, "When [IUU boats] 'go dark,' they become a maritime danger to anyone in the area, and that includes our Navy — first because of the risk of collisions at sea, but also because you can't tell what they're up to. It could be IUU, but it could also be piracy, or human trafficking, or weapons smuggling, or almost anything."
- The transparency of knowing where vessels are, and what they are doing, brings illegal behavior to light and discourages environmentally, economically, and socially harmful fishing practices. This can include anything from foreign vessels illegally entering the United States' Exclusive Economic Zone and stealing fish, to fishing fleets pillaging endangered species in marine protected areas.

How does AIS work?
- The AIS device consists of a very high frequency (VHF) radio to broadcast the vessel's location and identity and a GPS receiver to detect incoming signals. These signals can be picked up by neighboring vessels, land-based receivers, and satellites.
- AIS transponders come in three classes, A, B, and B+, which determine how frequently the vessel transmits a signal and how strong that signal is. Class A transponders are the most robust, Class B devices broadcast a weaker signal at a fixed interval, and Class B+ emit a medium strength signal.

What are the legal requirements?
- The United Nations Convention on the Law of the Sea requires Class A AIS on all large cargo vessels (over 500 tons) and all passenger vessels regardless of size.
- The United States requires all fishing vessels over 65 feet to transmit AIS while operating in U.S. navigable waters, defined by The Coast Guard as the territorial seas of the U.S., which extend 12 nautical miles from shore.

What are the limitations?
- The effectiveness of AIS for safety and transparency is stunted by loose legal requirements; only U.S. vessels over 65 feet are required to carry AIS; 85% of fishing vessels are smaller than this.
- U.S. non-passenger vessels are only obligated to transmit AIS within "U.S. navigable waters," which are defined as waters within 12 nautical miles of shore.
- As a result, just 15% of the US commercial fishing vessels are required to broadcast AIS and only two-thirds of these vessels are visible on Global Fishing Watch.
- Vessel operators can tamper with their AIS to falsify their location or identity – a practice called "spoofing" – or turn off their AIS altogether. These behaviors can protect a vessel by concealing it from pirates or competitors but can also be used to mask illegal activity from the authorities and public.
- Class A transponders transmit position data every 2-5 seconds while Class B+ transmits every 5-30 seconds. Class B transponders are the weakest devices transmitting every 30 seconds. Many vessels equipped with AIS use the weaker Class B or B+ transponders, substantially reducing the safety and transparency benefits.
- Signal reception changes by geography. In the high seas, vessels are sparsely distributed so most signals are successfully transmitted and received. However, in areas of high vessel density, such as near port or in the South China Sea, the cloud of signals causes interference, and only a small fraction of messages reach their destination.
- Some fishermen fear losing their "secret" fishing spots. But most commercial fishing vessels are already using sophisticated technology to find and catch fish such as helicopters, satellite data, and fish-finding forecasts. Platforms like Global Fishing Watch use AIS to show where fishing activity has occurred in the past, but they do not predict where fish are currently located or where they might move to in the future.

What can be done to improve transparency at sea?

- The United States should require commercial fishing vessels over 49 ft (15 m) to carry and continually broadcast AIS. The European Union already requires AIS for their fishing vessels 15m and greater.
- Regional fisheries management organizations can require AIS usage by all commercial fishing vessels in their territory.
- Fishing vessel owners can be required to give notice when and for what reason they stop transmitting AIS.
- Governments should transition to requiring Class A transponders for stronger and more reliable signal strength.

How does AIS compare to VMS?

- Some fishing vessels are required to carry VMS (vessel monitoring system) technology, which is also used to track vessels via satellite. VMS was designed for fisheries monitoring and provides myriad benefits: consistent detection by satellites, protection from spoofing, and more reliable signal transmission.
- However, in the U.S., VMS is required only on certain types of fishing vessels. Only 2,000 U.S. vessels are equipped with VMS vs. 44,000 with AIS. VMS data are proprietary and only accessible by the government to which the vessel is registered.
- The VMS device costs approximately $4,000 and can incur thousands more in fees throughout the vessel's lifetime. AIS devices cost between $700 - $2,600 and have no associated fees.
- While VMS is an essential monitoring tool, the high temporal resolution of AIS (which transmits signals every few seconds versus VMS's as little as once per hour) along with its lower cost, near real-time reporting, public availability, and mandatory carriage render it invaluable.
- AIS and VMS are two distinct systems that work best together.

By utilizing both VMS and AIS systems, the benefits are combined. With the high resolution (more signals per day) of AIS, in conjunction with the full coverage of VMS, monitoring is substantially improved.

	Automatic Identification System (AIS)	*Vessel Monitoring System (VMS)*
Publicly available data?	✓	✗
Potential pings per hour	**1,800**	**1**
Signals increase with vessel speed?	✓	✗
Required on all vessels greater than 65ft?	✓	✗
Number of vessels carrying (x1000)	🚢 (×38)	🚢🚢
Tamper-proof?	✗	✓
Typical cost	$	$ $ $