The US involvement in Vietnam—all of its suffering and sacrifice—was likely due to faulty radar equipment that indicated phantom attack boats. It looks like something similar is brewing at present, but due to someone with malicious intent.

There were two Gulf of Tonkin incidents that sent the US into Vietnam, one on August 2, 1964, when Vietnamese boats fired on the USS Maddox, and another on August 4, when the USS Maddox and another ship believed that they were being attacked. That second attack almost certainly didn’t happen, and it was radar “ghosts” (along with some other issues) that caused them to think there were Vietnamese boats in the water.

Despite the fact that there were doubts about the second attack almost immediately, America still went to war. They would eventually lose the war, and some 58,000 soldiers would forfeit their lives or liberty in the process—and all because of some ships that probably weren’t really there.

Almost six decades later, there seems to be a similar threat. Who is manipulating the automatic identification system, or AIS, causing warships to appear to be in places they shouldn’t be?
**The system**

How do you prevent two boats from colliding at sea? Marine radar is one way, but AIS is another. Every ship transmits a radio broadcast that indicates where it is. These broadcasts can be picked up by ground-based stations or by satellites. They provide not only location information but also some identifying information about the vessel in question.

Large ships and those carrying passengers must have AIS on board, and they generally transmit throughout a voyage. Military vessels, however, usually only use AIS when they are near a port or in an area that has a good deal of ship traffic, and collisions are therefore a greater concern.

All of the AIS information that is received is fed into databases that show the positions of thousands of ships around the world.

**The first problem**

Data analysts working with the environmental non-profit organizations Global Fishing Watch and SkyTruth have noted anomalies in the AIS network for years, with boats apparently showing up in impossible places, such as Antarctica or in the desert in Utah, but they recently began to notice positions that appeared to be the work of people deliberately simulating real boat movements.

The first set of fake positions was relatively innocuous, involving what appeared to be a group of sailboats in the middle of the Atlantic Ocean. What drew the attention of the analysts was that the AIS database indicated that their location had been picked up by a ground-based station, which can generally only pick up signals within 60 miles. These boats were supposedly hundreds of miles offshore.

Bjorn Bergman, a project manager at SkyTruth who also does data analysis for Global Fishing Watch, eventually realized that the position of these boats was the same as those on a website for simulated boat racing. Someone was basically taking the boats from a computer game and making them show up on the databases that show real ships.

**A worse problem**

The revelation was an unpleasant one. The fact that these fake ships were being placed into the systems used to track real ships was a sign that they were vulnerable to tampering.

But Bergman soon learned about a more concerning issue when they were shown a news story about fake AIS tracks for Swedish Navy vessels. The navy had confirmed to the press that the ships in question were not where the AIS network had indicated they were, and also said that there were even more false AIS signals involving Swedish Navy vessels, including one that showed a ship nearing the Russian coast.

Bergman found some subtle ways in which those AIS signals differed from genuine signals, and he began to search the AIS databases for other signals that showed those same signs. To his consternation, he found a number of signals supposedly from military vessels that also seemed to have them.

To determine whether those signals were actually fake, he began to examine satellite images of those areas of the ocean, when available. He also attempted to match up specific AIS signals with specific military vessels, which generally don’t indicate their exact identity in their AIS signals. By tracing ships from ports where they were clearly photographed on the ground, he was able to figure out their identity numbers.

Bergman found that the ships in question did not appear to be where the AIS signals indicated they were. And some of the places the AIS signals showed them as being were worrying.

For example, at least 11 NATO or NATO-allied warships—including a US warship—were shown entering Russian
territorial waters near Kaliningrad and Murmansk, as well as waters claimed by Russia near Crimea. Conversely, two Russian ships were shown entering territorial waters of Ukraine and Poland. All of these tracks appear to have been faked.

Some of these fake tracks were entirely unrelated to the actual position of the ships. For example, the USNS Bruce C. Heezen, an American survey vessel, was shown by an AIS signal as entering the Baltic Sea on September 23, 2020. But a different AIS signal, one that appears to be real, showed the ship off the coast of Virginia on September 27, before it docked in Norfolk. Sailing from the Baltic Sea to Virginia would take considerably longer than four days for that ship.

But some other apparently fake tracks have been made very close to where the real ships are—and that could lead to an international incident. One example the researchers point to is the faking of the locations of the British destroyer HMS Defender and Dutch frigate HNLMS Evertsen in June of this year. Both ships were seen docked in Odessa, Ukraine, and an apparently faked AIS track showed them traveling from Odessa to a naval base in Sevastopol, Crimea, which the Russians occupy. A real AIS signal later showed them merely skirting through Crimean territorial waters—but the fake approach to Sevastopol could theoretically have been used as a pretext for some action against the ship, or even an attack on it.

To understand this issue better, we spoke with Bjorn Bergman.

**Bjorn Bergman, Project Manager for Skytruth and Data Analyst for Global Fishing Watch**

**How dangerous are these fake tracks?**

The false positions aren’t ones that would affect a ship’s navigation on the water. They’re going into different systems that aggregate vessel tracking positions around the world. They’re mostly used for analysis but are updated in real time, so if you had a subscription to one of these services, you’d see these fake positions. So it definitely could lead to misunderstandings.

More than that, you can see by the placement of these tracks that someone is deliberately trying to cause trouble. You see NATO and NATO-allied ships placed within Russian territorial waters, and we also saw two Russian ships placed in the territorial waters of Ukraine and Poland. It is very rare that these ships would actually engage in these incursions, and we have a particular pattern in the data [that connects them all], so it appears that they are false positions.

You also checked many of these against satellite images, right?

Yes. We were able to check 15 of the tracks against imagery from the European Space Agency.

Why can’t we tell how these fake positions showed up in the system?

These positions were all supposedly received by shore-based, terrestrial AIS receivers. Pretty much anyone can put up one of these antennas near the shore and get ship positions within about 50 miles. Then there are websites that aggregate all these positions and pass the data on to other users.

In some cases, we can see the specific AIS antenna that supposedly received the transmissions. But that is the extent of what we know about how the data entered the system.

So does that mean that someone is going around with a radio transmitter and broadcasting these
fake signals to the AIS receivers?
We don't know. I've heard it suggested that someone is planting some kind of low-power radio transmitter to input these fake locations. I'm a little skeptical of that because we know that these were received in several different European cities. Logistically, it would be difficult to plant all of these devices.

I think that someone has been able to gain access to one of these AIS aggregator sites and input the data electronically. But we're not sure.

Is there some sort of authority that will investigate?
It would only be the countries whose vessels are affected. We've shared some information with the navies of the US and the UK. There isn't a central authority that regulates AIS. It's a very open system.

The International Maritime Organization mandates the use of AIS for some ships, but I don't think they have any capacity for regulating this sort of thing.

Has there been any reaction to your report?
I think it's still early. There has been some discussion, but so far nothing concrete.

You're still looking at it?
Yes. There are still unanswered questions, and we're continuing to monitor the situation. The latest case was on July 15, involving a vessel in Russian waters near Norway.

There was some concern that the Russians were carrying this out, right? But you noted that it affected some Russian vessels, as well.

It has overwhelmingly affected vessels of NATO and NATO allies. We were able to confirm 15 of these cases with satellite imagery, but there are many more vessel tracks showing the patterns of false data. All but two of them are from NATO and NATO allies.

It is also very geographically concentrated, first in the Baltic and then in the last few months in the Black Sea. Whoever the perpetrators are, there is a focus on Russian waters. Considering the placement of the ships, it is definitely an attempt to stir up trouble in some way.