GPS jamming: The invisible battle in the Middle East

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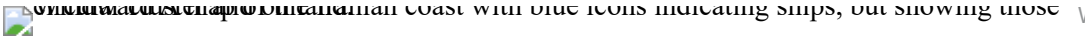


Windward

GPS jamming is making ships near the Iranian coast appear to be on land

Hundreds and hundreds of ships. But they're all in the wrong place. "Oh my goodness," says Michelle Wiese Bockmann, senior maritime intelligence analyst at Windward, a maritime AI company, as she checks the live positions broadcast by commercial vessels in waters off Iran, the United Arab Emirates and Qatar.

"I'm up to… 35 different clusters," she says, looking at a map of the Strait of Hormuz and surrounding areas.

The clusters she mentions are weird circles of icons layered over the map, with each icon representing a real ship.

But ships don't bunch together in tight, unnaturally perfect circles. And they also don't hover over land – which is where some of the clusters appear. No, their GPS coordinates have been disrupted, obfuscating their true location.

 AFP via Getty Images

Jamming in the Gulf has interfered with the system used by ships to avoid collision

Wars are not just fought with bullets and bombs. Electromagnetic waves also do battle. Invisible to the naked eye, GPS jamming can cause significant disruption, hampered communications – and potentially deadly accidents.

In recent years, GPS jamming has affected aircraft in Europe, **including a plane** used by the President of the European Commission. And it is **a daily feature** of the war in Ukraine. Now that conflict has erupted in the Middle East, electronic warfare is spilling over yet more territory.

The interference currently affecting ships in and around the Strait of Hormuz is far from the first time that Bockmann has observed GPS jamming impacting vessels' Automatic Identification Systems (AIS).

The same thing happened in this region last year **during the 12-day war** between Israel and Iran, and electronic interference has also **troubled vessel navigators** in the Baltic Sea. But, she says, "This is next-level."

"We can't over-estimate the huge danger this places to maritime navigation and safety," adds Bockmann. The National Hydrographic Office Pakistan **has also warned about interference** affecting shipping in the region.

Ships use AIS partly to avoid one another. It takes a long time for a 300m-long tanker carrying hundreds of thousands of tonnes of oil to turn or come to a stop – and vessels can travel potentially many kilometres before they fully adjust their course.

If you can't be sure about where nearby vessels are, the risk of a collision goes up, especially at night or in poor visibility.

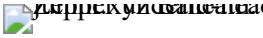
"That's the problem," says Alan Woodward at the University of Surrey. "Not you knowing where you're going – it's not knowing where everybody else is going."

There is no official confirmation as to who is behind the jamming but military analysts strongly suspect Iran of causing disruption to vessels. Iran has also threatened to attack any ship attempting to pass through the Strait of Hormuz.

Global Navigation Satellite System (GNSS) or GPS jamming tools used by Iran are likely to be domestically produced or made with equipment sourced from Russia or China, says Thomas Withington, associate fellow at the Royal United Services Institute, a think tank.

He also suggests that US forces in the region are using jamming systems to protect their bases, personnel and vessels from drones and GNSS-guided weapons.

When approached, the US Department of War told the BBC: "Due to operations security we are not going to comment on the status of specific capabilities in the region."



Sean Gorman has used various techniques to detect GPS jamming

Sean Gorman is co-founder of tech company Zephr.xyz, which has analysed the extent of jamming in countries including Ukraine. Data from aircraft can reveal when GPS jamming is happening but with the airspace over Iran now closed, Gorman has had to find other sources.

In recent days, he used radar data from a satellite to **detect jamming in Iran**. While the BBC has not independently verified this data, Gorman says that jamming devices leave a trace of the interference they cause in radar signals, allowing him to reveal occurrences of GPS-jamming around the country.

In 2024, he and colleagues used smartphones strapped to drones to study GPS jamming in Ukraine. The drones would fly around while the smartphones recorded GPS information – picking up interference that could then be plotted on a map. "We were looking at the [GNSS] measurements of all those phones," he explains. "You could triangulate to where the jammer was located."

"I was just amazed [at] the level of jamming and how powerful it is," says Gorman.

There are various technologies that offer to protect against GPS jamming. Mitigating the problem can include automatically detecting jamming or interference and switching to unaffected frequencies, for example.

Defence giant Raytheon UK makes a device called Landshield, which is about the size of an ice hockey puck in its smallest form. The company says this "anti-jam antenna system" can be installed on different kinds of vehicles – from cars to aircraft – and that it uses multiple channels to overcome jamming. "We're seeing quite an increase in demand and capacity for our anti-jamming products at the moment," says Alex Rose-Parfitt, engineering director of Raytheon UK.

Other companies have developed navigation tools that work around GPS's flaws. Advanced Navigation, an Australia-based firm, has come up with a system that can determine a vehicle's position based on readings from gyroscopes and

accelerometers – the same kind of devices that your smartphone uses to detect when it has been turned sideways, for instance.

As for working out one's geographic position, though, Chris Shaw, co-founder and chief executive of Advanced Navigation, says his firm's tech can use alternatives when GPS proves unavailable or unreliable.

This includes matching optical imagery of one's location to satellite imagery, or even through computer-based analysis of the position of stars overhead.

"The image processing is very advanced," says Shaw. "Doing something like… star-mapping is very inexpensive." Though, he adds, "It's just not very accurate." That is why multiple forms of location and position analysis might be necessary.

Advanced Navigation

Advanced Navigation is working on alternative tech to GPS

Without better protection, GPS will likely remain vulnerable in its current form. Crucially, the signals used by GPS-based systems are very weak and therefore easy to jam. It's worth noting that militaries have access to "M-Code" GPS, is a carefully authenticated and encrypted form of the technology that is far more resistant to jamming.

Ramsey Faragher, director of the Royal Institute for Navigation, says that GPS jamming in the waters off Iran raises the risk of a maritime accident. He predicts that the growing prevalence of jamming could lead to the introduction of more secure alternatives. Similar to the gradual move from wi-fi networks that were once

completely open and publicly accessible, to the password-protected networks of today.

"Soon, we will look back on this era where we are using open GNSS signals and think, 'God, we were mad, that was really not a smart move'," he says.

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