

You Are Not Where You Think You Are: GNSS Threats

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What are we talking about today?

- What is GNSS
- How can it be attacks
- Risks to Maritime
- Mitigation



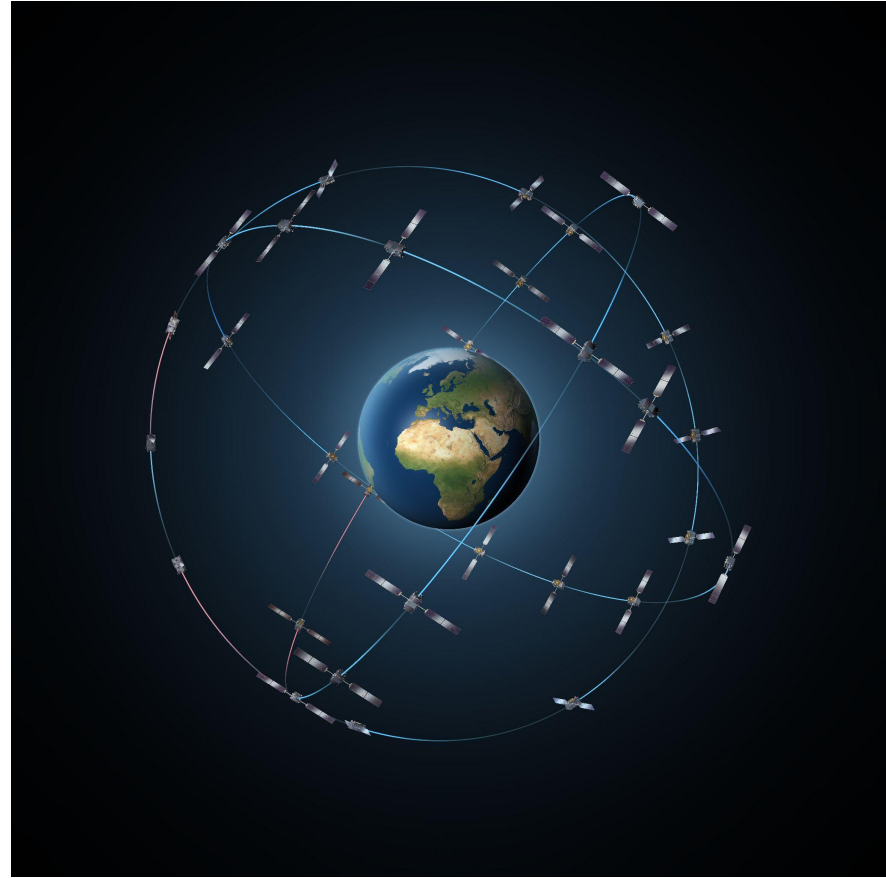
What GNSS Systems Are There?

- BeiDou - China
- Galileo - Europe
- GLONASS - Russia
- GPS - Global Positioning System - USA
- NavIC - India - Regional
- QZSS - Japan - Regional



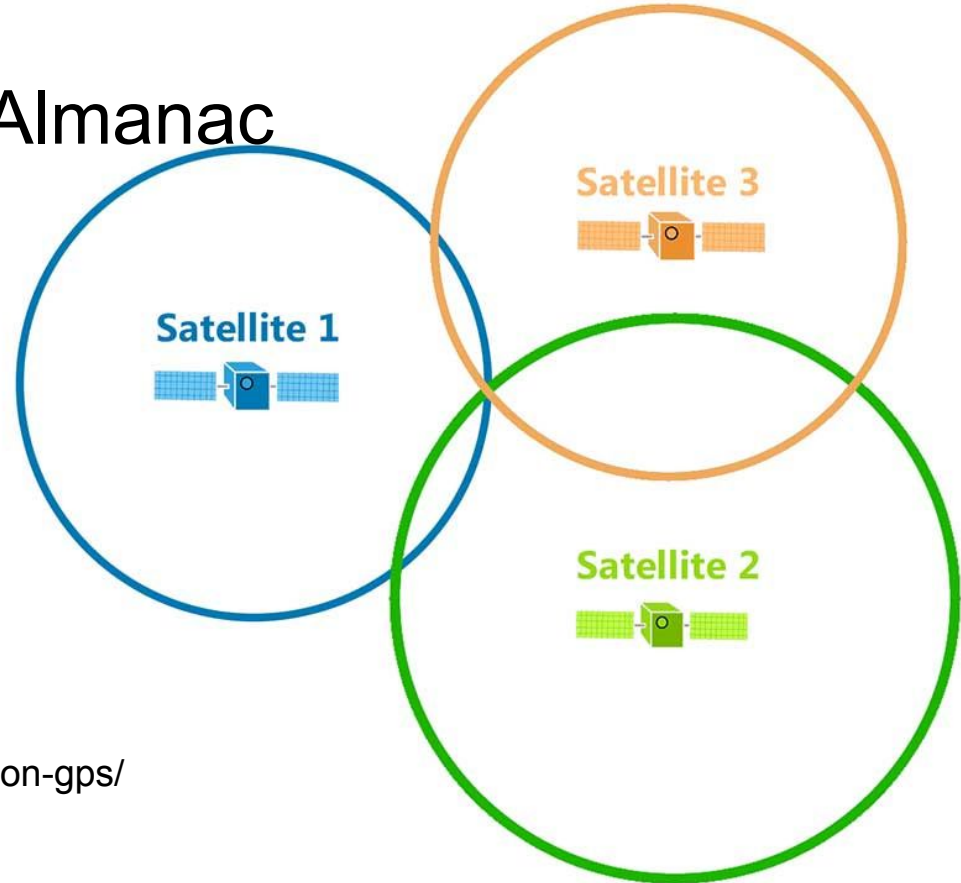
How GNSS Works?

- Constellation of Satellites



How GNSS Works?

- Broadcast Time & Almanac
- Math Happens
- Location



<https://gisgeography.com/trilateration-triangulation-gps/>



<https://karit.nz>

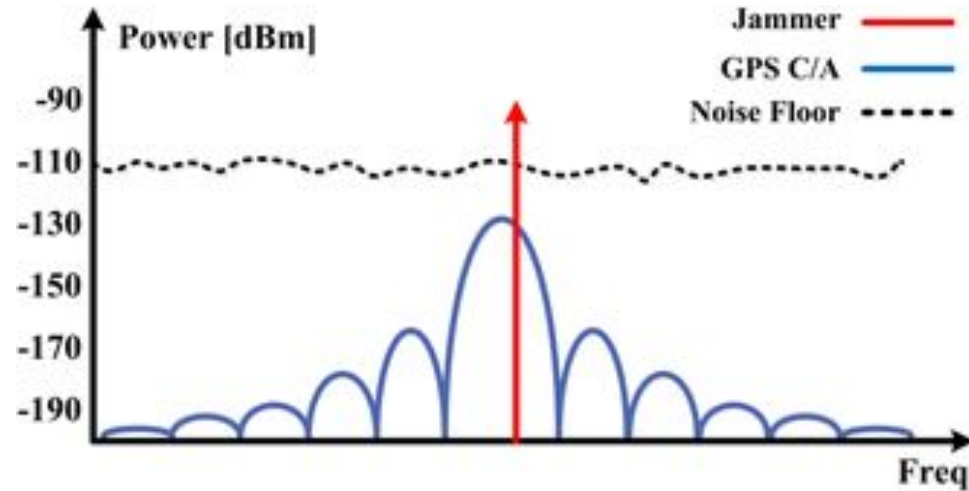
How GNSS Can Be Attacked?

- Jamming
- Replay
- Spoofing



Jamming

- Broadcast on the frequency
- Overpowers the signal get no location
- Easy to spot



Replay

- Delay and replay
- Constrained in location change
- Can replay encrypted signal



Spoofing

- Full opportunity to change location
- Can't spoof encrypted signal



How Easy?



What Are We Currently Seeing?

Strait of Hormuz







<https://karit.nz>

<https://www.flightradar24.com/data/gps-jamming>

Where

- North Korea - Sanction Bypass
- China - Sand Mining
- Black Sea - Military
- Persian Gulf - Military



Maritime Impacts

- Middle of Ocean
- Navigating Close to Land
- Reefs, Channels, etc
- No go zone, Borders
- Lure to piracy



What Protections Are There?

- GPS
 - Public - None
 - Military - Encryption
- Galileo
 - Commercial - Encryption Options



Maritime Mitigations

- Automation - Risk
- Human close to land - Eyeball
- A look at supplemental tools
- WBAS, Image, Radar, eLORAN, INS
- Navies reintroducing celestial navigation

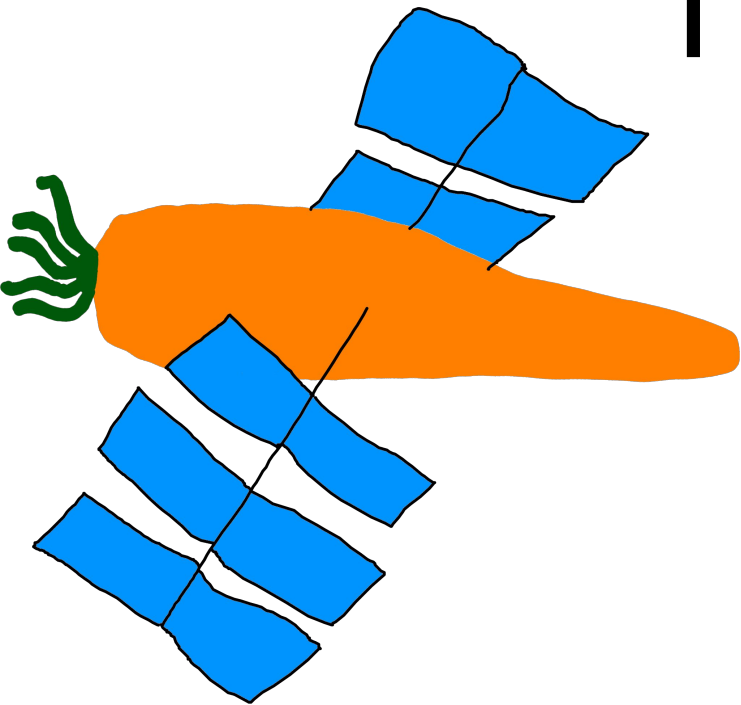


Takeaway

- Don't rely on one
- Make sure there are redundant methods.
- What are the failure modes?
- What should you do when there is a failure?



Thanks



<https://www.karit.nz/social>



<https://karit.nz>