GNSS JAMMING & SPOOFING

Availability, Impact, Overcoming

By: Moshe Kaplan – GPS Dome CTO
GNSS Jamming & Spoofing

• Distribution of GPS jammers/spoofers and its impact on GNSS receivers.
• Impact of jammers and spoofers on system navigation & timing.
• Methods of overriding such threats –
• GPS Dome proposed solution
GPS Attacks - Jamming

A continuous jamming attack will deprive navigation of any GPS data.

Will eventually disable the ability to navigate.
GPS Attacks - Spoofing

A spoofing attack tricks the GPS with false position / time

Will endanger any navigation/timing system
Distribution of GPS jammers/spoofers and its impact on GNSS receivers

- Small size jammers
- “Professional” jammers
- High power jammers
- Spoofers
GPS vulnerabilities could open grid to hacks -- DHS report

Peter Behr and Blake Sobczak, E&E News reporters

October 30, 2015

A newly disclosed government report warns that the power grid may become more vulnerable to hacking attacks on the Global Positioning System as grid operators expand the use of advanced monitors that depend on GPS signals.
Why Would People Use Jammers?
Spoofing – News flash

New post on GPS World

Spoofing in the Black Sea: What really happened?
October 11, 2017 - By Michael Jones
Impact on Timing Systems

SyncServer #1
- OCXO
- UUT
- GPSdome #1
- 1PPS

SyncServer #2
- Rb

PERSONAL COMPUTER
- Ext.Ref.
- 10 MHz
- 1PPS
- 1PPS
- 1PPS

Primary Frequency
- Standard 5071A
- 1PPS

Counter/Timer #1
- Agilent 53132A
- Start
- Stop
- 1PPS

Counter/Timer #2
- Agilent 53132A
- Start
- Stop
- 1PPS
Impact on Timing Systems (Rb)
Override Spoofing

- Fly wheel algorithms to prohibit the system from immediate jumps in location and time – GNSS Receiver
- Supported by INS to limit these jumps (location) – GNSS Receiver
- Block spoofing signal (CRPA + Null Steering) - Antenna
Override Jamming

- Fly wheel algorithms to maintain time (OCXO, Rb, etc.) – GNSS Receiver
- Supported by INS to maintain reduced performance (location) – GNSS Receiver
- Block spoofing signal (CRPA + Null Steering) - Antenna
CRPA + Null Steering

- RF algorithm developed for defense applications
- Rejects disruptions by directing a null towards it
- Protects receiver and maintains lock to signal
GPS Dome Solution

• CRPA + Null Steering Antenna
• Based on 2 elements (Next generation – 4 elements)
• Fixed calibratable delay (50nS)
• Small SWaP

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