

# GNSS JAMMING & SPOOFING

Availability, Impact, Overcoming

By: Moshe Kaplan – GPS Dome CTO

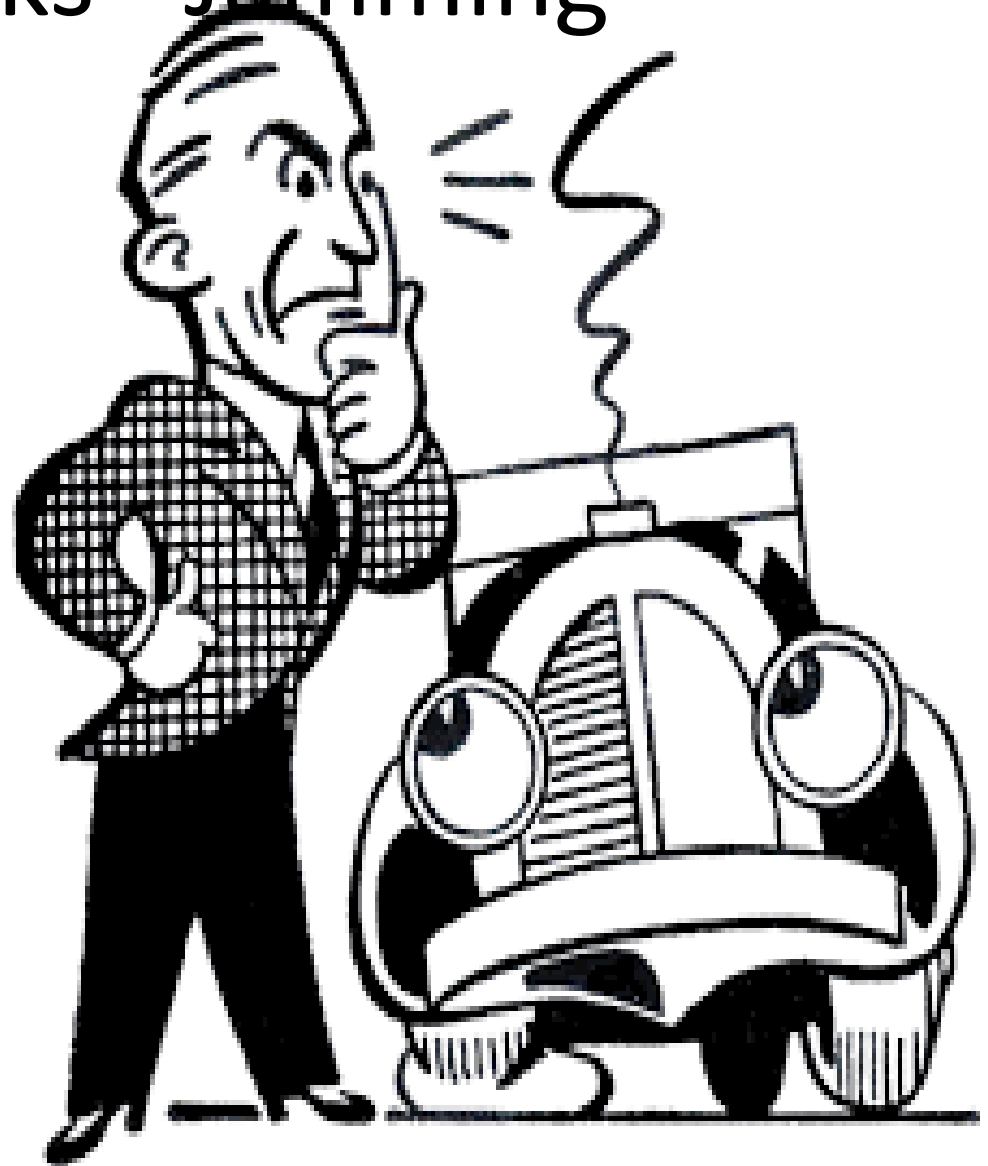
# GNSS Jamming & Spoofing

- 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

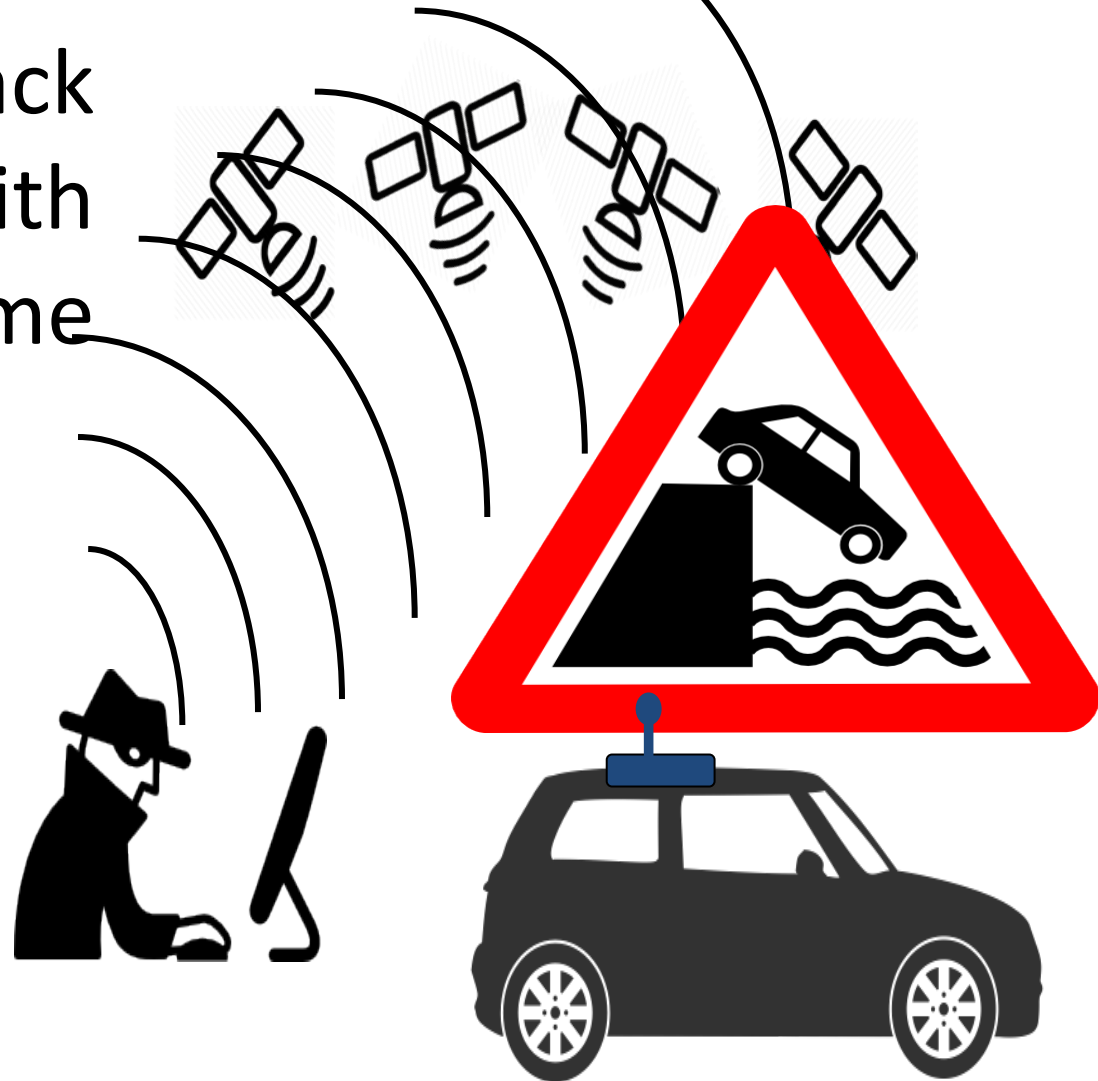
Will eventually disable the ability to navigate



# 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 Jammer



GPS jamming  
Out of sight

Satellite positioning-data are vital—but the signal is surprisingly easy to disrupt  
Jul 27th 2013



DHS: Drug Traffickers Are Spoofing Border Drones



The homeland security agency, and local law enforcement as well, are looking to harden its drones against attack, but that comes at a price.

NBC NEWS SECTIONS NIGHTLY NEWS MUSIC MEET THE PRESS DATELINE TODAY

Car thieves using GPS 'jammers'

'Jammers' overwhelm anti-theft devices on cars and lorries - and later versions could be used to disrupt air traffic

Criminal gangs have begun using GPS "jammers" imported from China to help them steal expensive cars and lorries carrying valuable loads - and there are fears that terrorists could use more powerful versions to disrupt air traffic, a conference in London will hear on Tuesday.

The "jammers" put out radio signals at the same frequency at the Global Positioning System satellites, overwhelming the timing signal that is used to



Mini Portable Cell Phone+ GPS jammer  
Description: Mini Portable Cell Phone+ GPS jammer

NEWS > U.S. NEWS WORLD INVESTIGATIONS CRIME & COURTS ASIAN AMERICA

GPS Under Attack as Crooks, Rogue Workers Wage Electronic War

Once the province of hostile nations, electronic warfare has arrived with little fanfare on U.S. highways and byways.  
Criminals, rogue employees and even otherwise law-abiding citizens are using illegal "jamming" devices to overpower GPS, cellphone and other electronic

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SECURITY  
GPS vulnerabilities could open grid to hacks -- DHS report

Peter Behr and Blake Sobczak, E&E News reporters  
Energywire: Friday, 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.



Start From: 1 Unit(s)  
Review: ★★★★★ 2 review

Getting lost near the Kremlin? Russia could be 'GPS spoofing'

by Clare Sebastian @clarecm  
December 2, 2015 4:34 AM ET

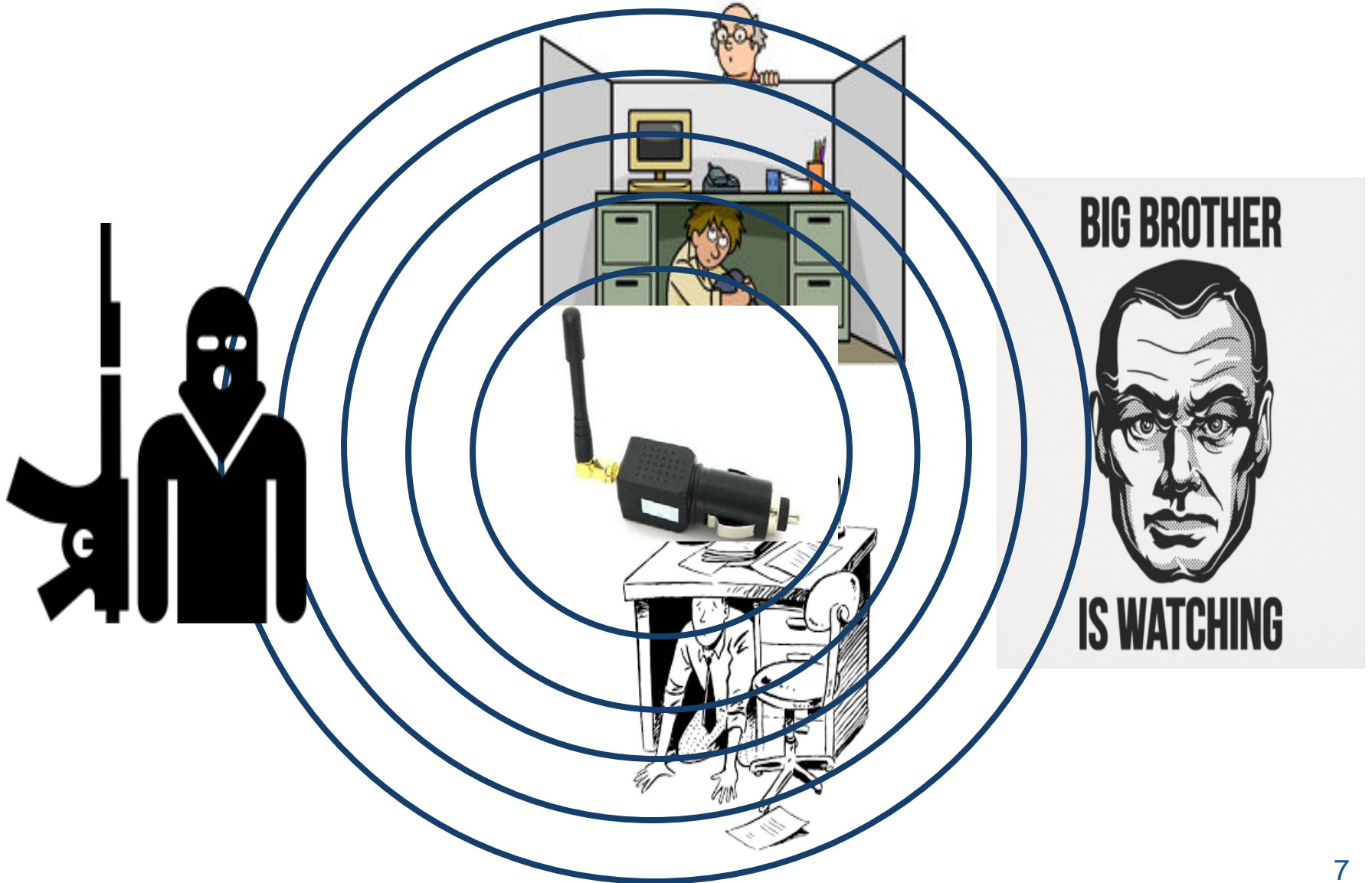


Social surge: What's trending  
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# Why Would People Use Jammers?



# Spoofing – News flash



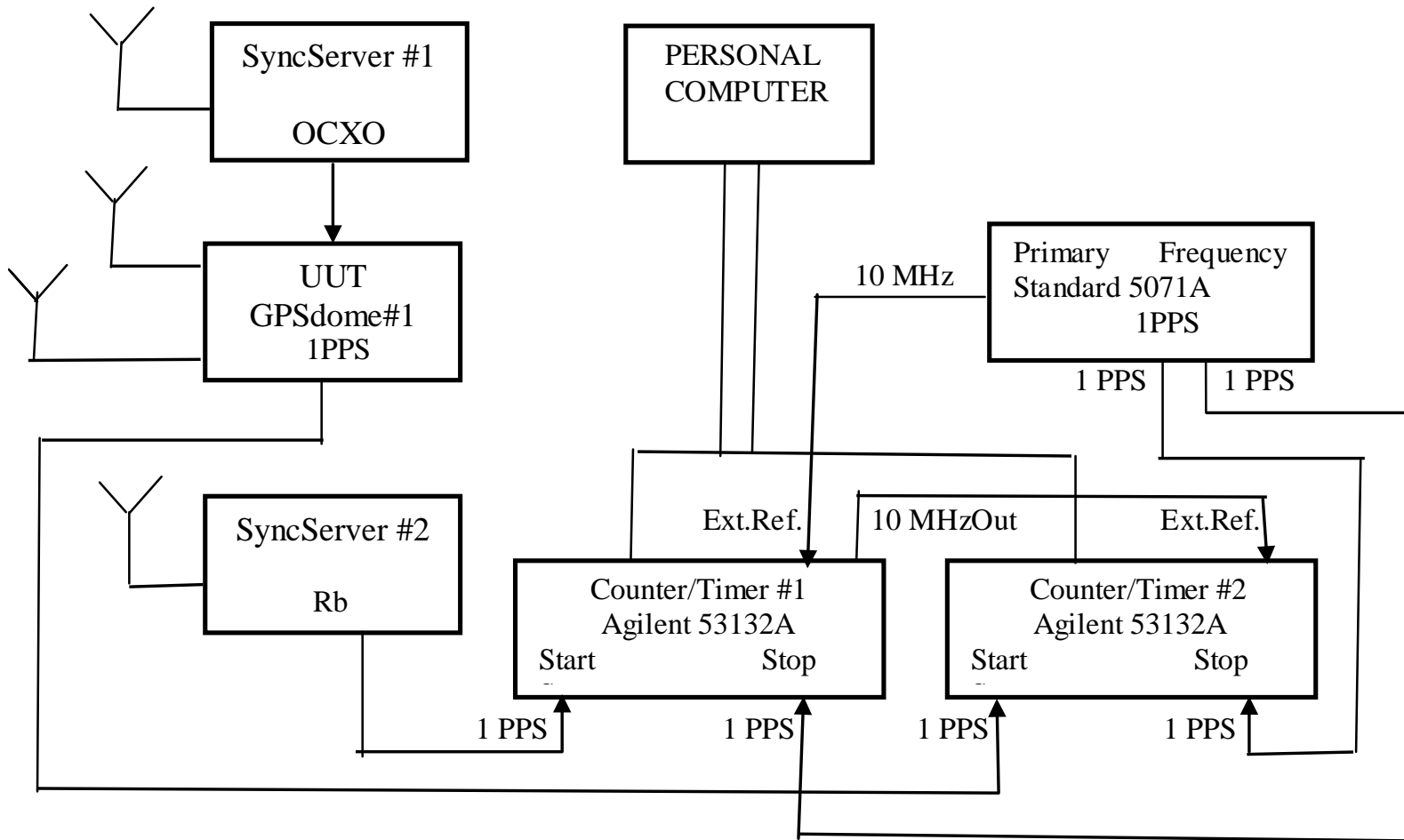
## New post on **GPS World**



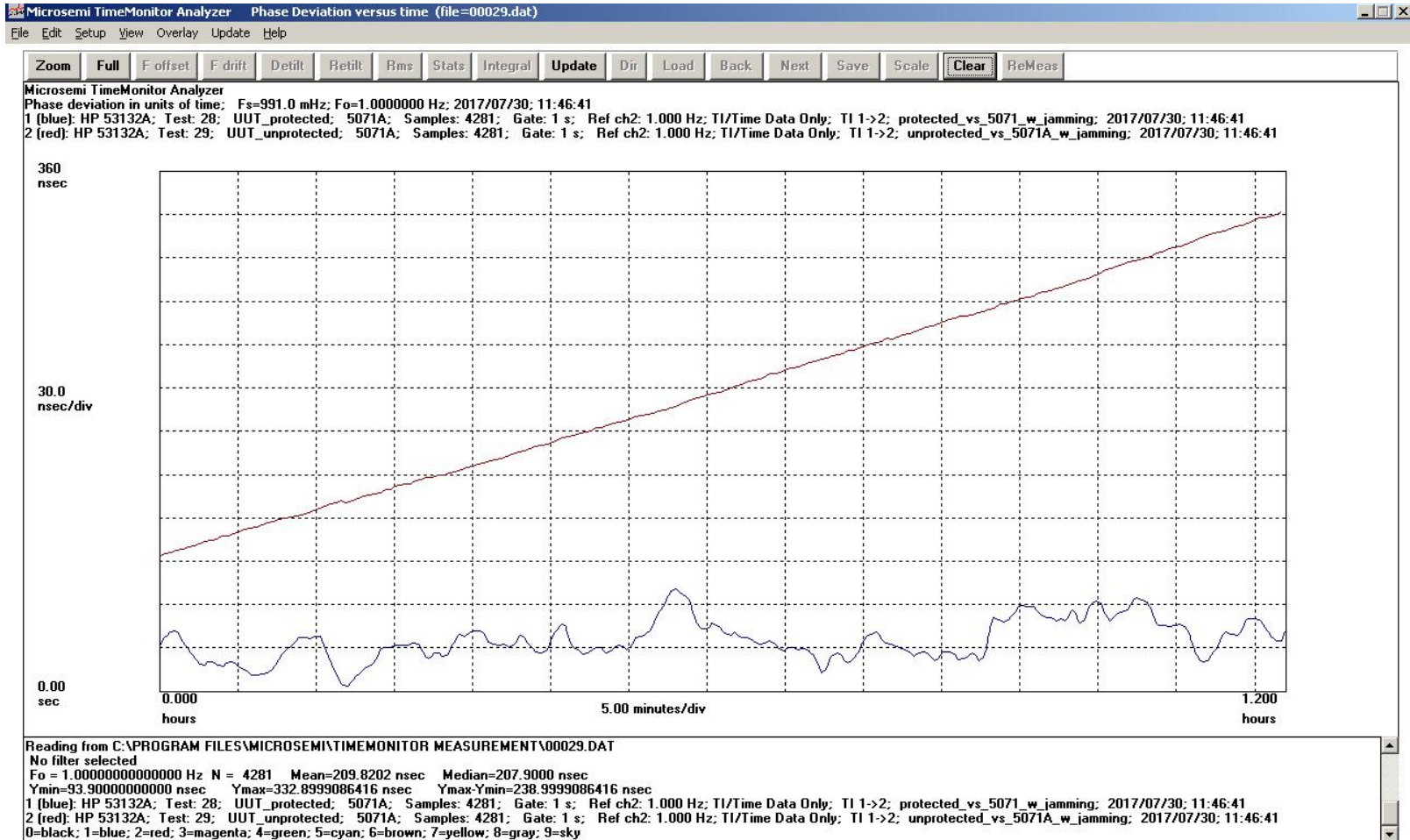
[Spoofing in the Black Sea: What really happened?](#)  
October 11, 2017 - By [Michael Jones](#)



# Impact on Timing Systems



# Impact on Timing Systems (Rb)



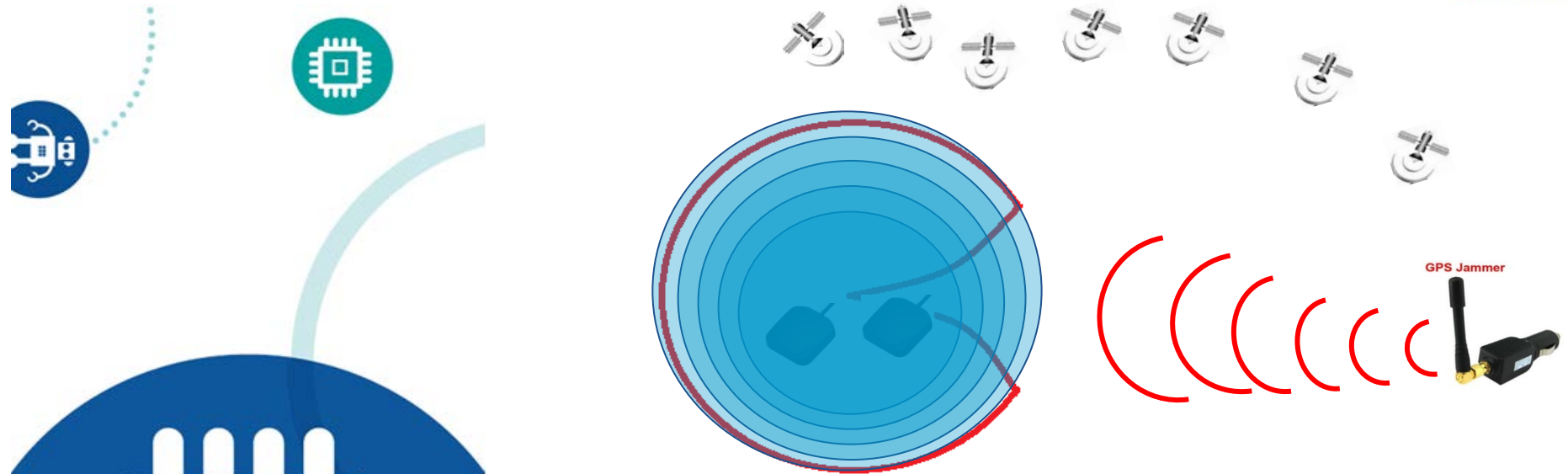
# Override Spoofing

- 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



[See us at our booth](#)

