Exelis Inc., a wholly owned subsidiary of Harris Corporation

Signal Sentry
GPS Interference Detection
June 2015

Joe Rolli

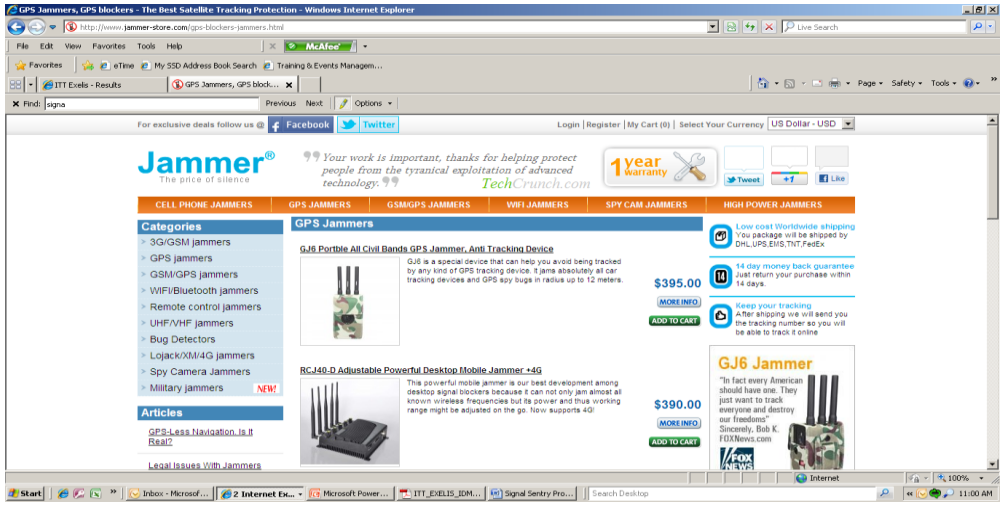
Business Development Manager

Geospatial Systems PNT

- **Exelis is the GPS Expert**
  - Developed Over 50 GPS satellite payloads
  - Payloads & Transmitters have been on every GPS satellite ever launched
  - Our payloads transmit the GPS signal from space
  - We have accumulated over 500 years of on-orbit life
  - No mission-related failure due to our equipment
  - Currently developing the next generation navigation payloads

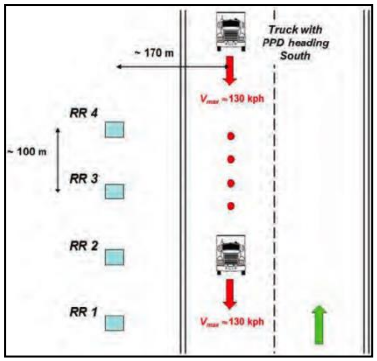
Jamming

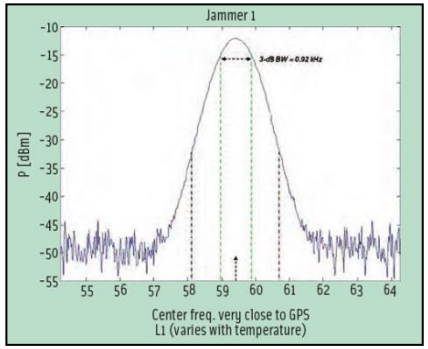
- GPS jamming does not allow receivers to lock onto the GPS signal
- GPS susceptible to outages due to intentional & unintentional jamming
- A small jammer can disrupt the GPS signal for a mile or more
- People jam because they are smuggling, stealing or trying to escape tracking
- Availability of low-cost GPS jamming devices has increased the risk

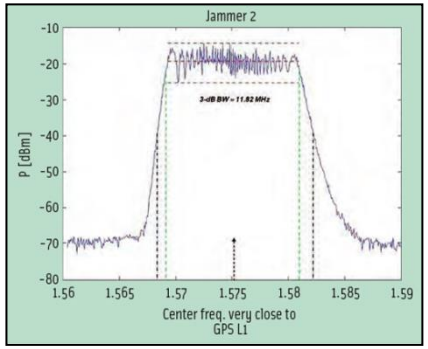


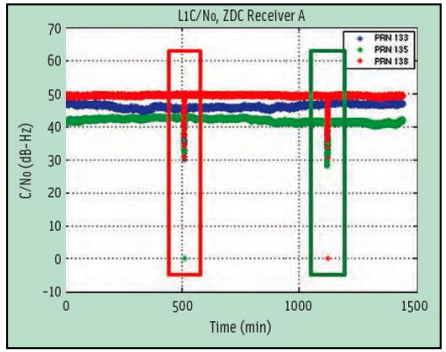
Real Risk of GPS Disruption

- November 2009
- Ground-based Augmentation Systems (GBAS) Jammed
- Took 8 months to find the source

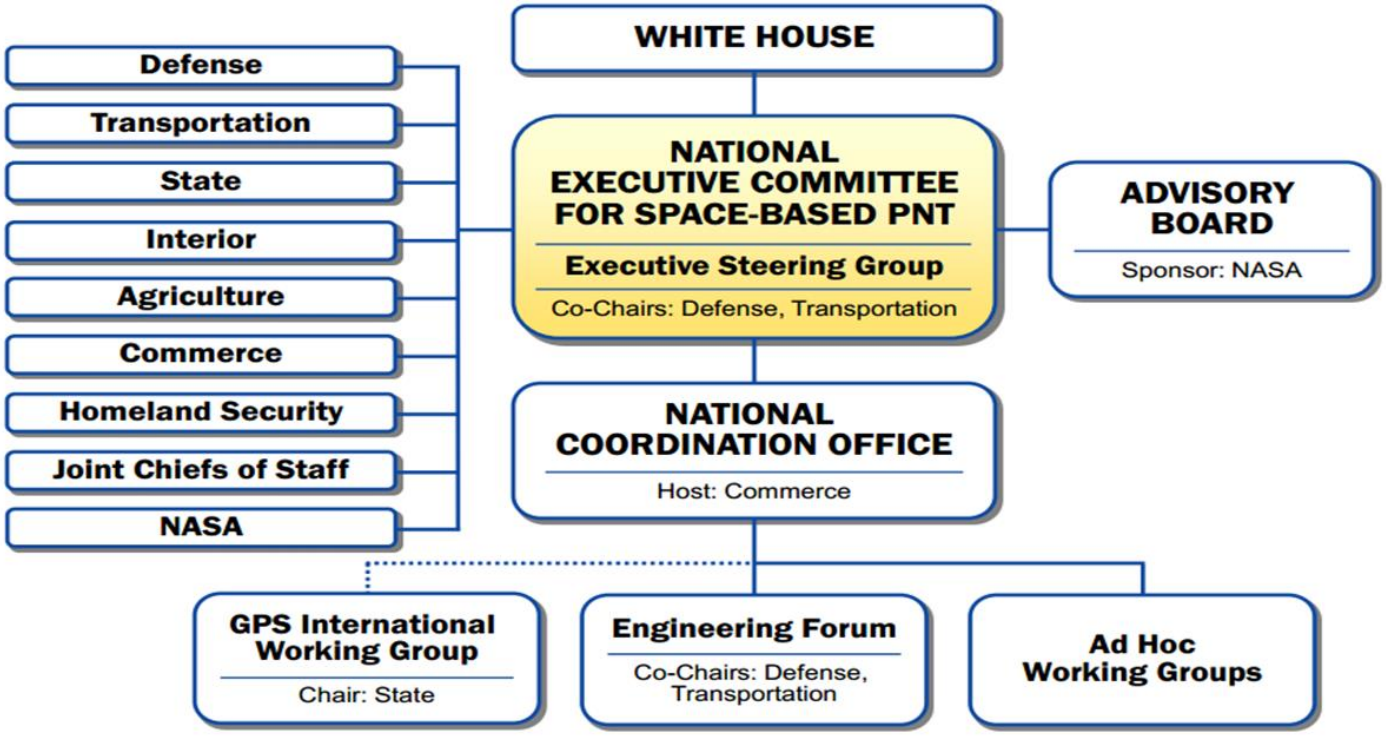








PNT Advisory Board



PNT Advisory Board Notice

Summary: ***The United States is now critically dependent on GPS. For example, cell*** **phone towers, power grid synchronization, new aircraft landing systems, and the future FAA Air Traffic Control System (NEXGEN) cannot function without it. Yet we find increasing incidents of deliberate or inadvertent interference that render GPS inoperable for critical infrastructure operations.**

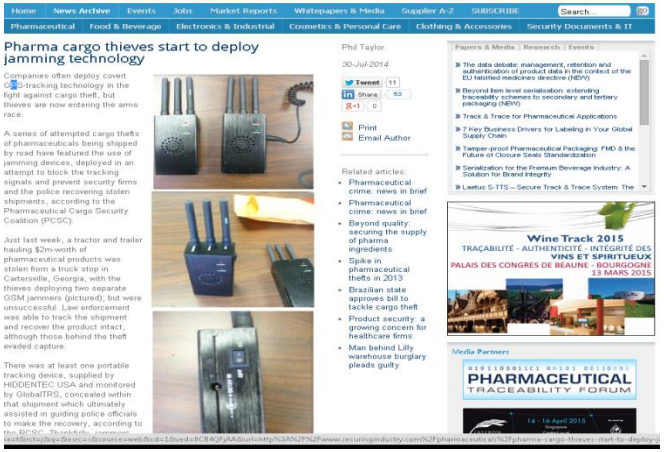
Most alarming, the very recent web availability of small GPS-Jammers suggests the problem will get worse. These so-called *personal protection devices (PPDs) as well as other, readily available,* more powerful devices can deliberately jam the Global Positioning System (GPS) signal over tens of square miles. They also can be devastating to the other, new foreign satellite navigation systems being deployed worldwide.

PPDs are illegal to operate, but many versions are available (for as little as $30) from foreign manufacturers over the Internet. The simplest models plug in to a cigarette lighter and prevent all GPS reception within a line of sight range of 5 to 10 miles. Current penalty for operation is simply that the device is confiscated.

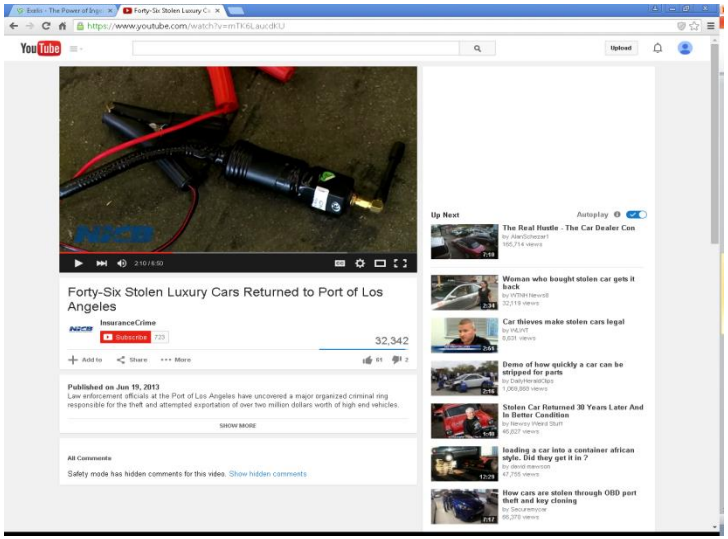
We currently lack sufficient capabilities to locate and mitigate GPS jamming. It literally took months to locate such a device that was interfering with a new GPS based landing system being installed at Newark Airport, NJ.

- ***We must quickly develop and field systems that will rapidly locate, mitigate and shutdown the interference.***

Real Risk of GPS Disruption



Pharmaceutical Cargo Security Coalition Symposium
* Novartis Pharmaceutical East Hanover February 10-11 2015



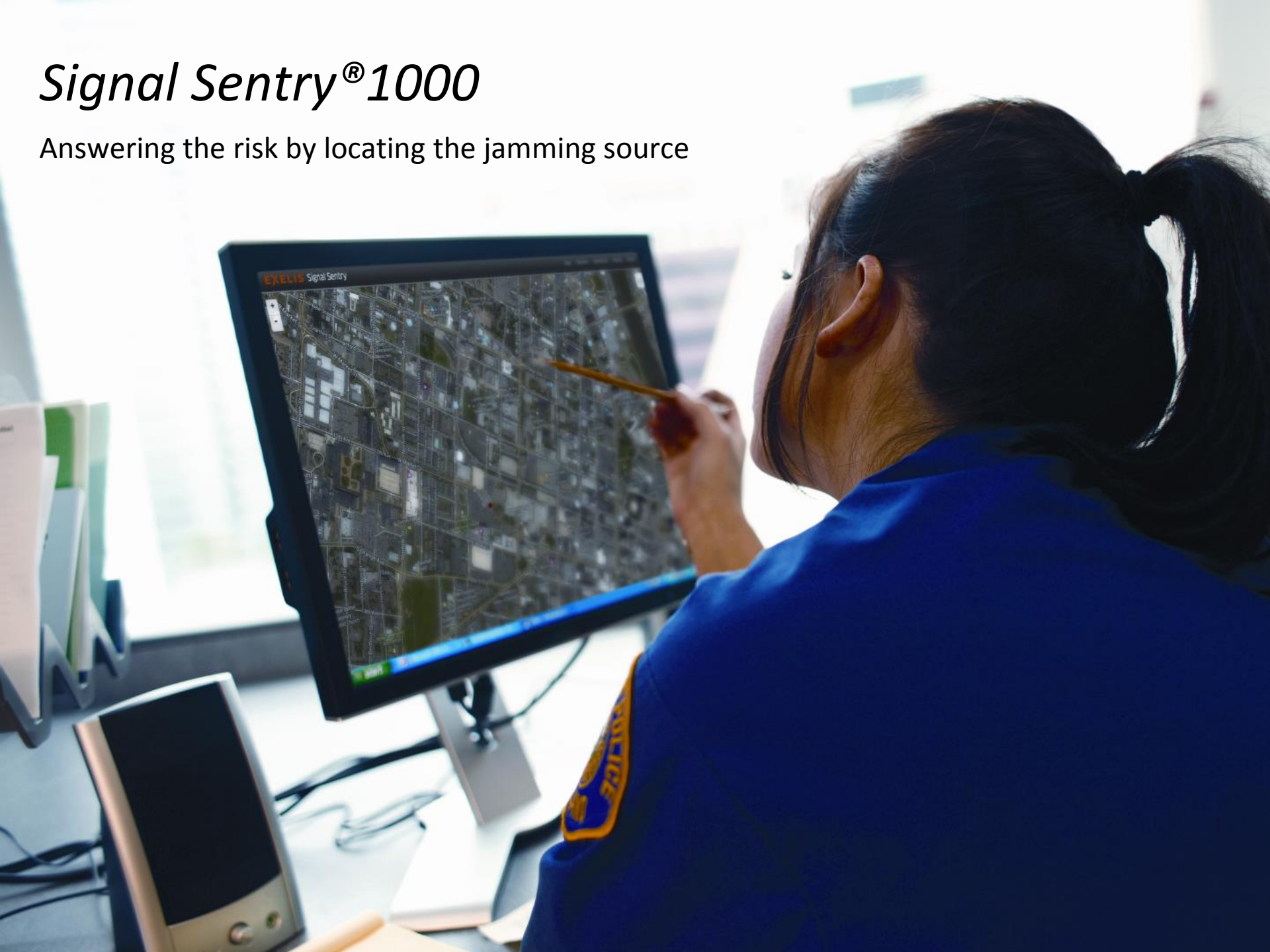
46 Stolen Cars and exported from LA Port Using GPS PPD

Coast Guard Vice-Admiral Chuck Michel saw it happen in one Eastern Seaboard port.

"It was believed to be sort of a vandal or a person messing around, actually blocked that GPS signal from that computer's ability to do that, and the port came to a halt," he said.
*Maritime Cyber Security Symposium March 2-3 2015

Signal Sentry®1000

Answering the risk by locating the jamming source

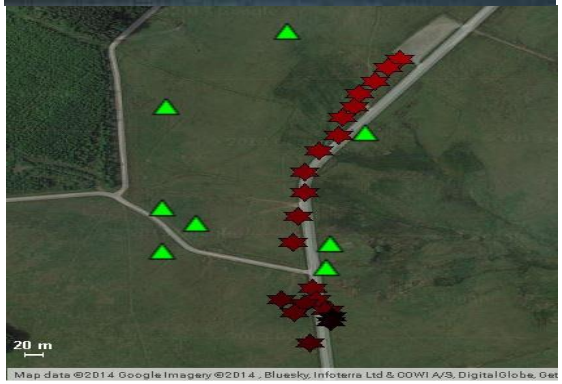


Signal Sentry® 1000 Overview

- Detects and locates sources of GPS signal interference
- Provides location of interference
- Presented in the form of geographical pin mapping
- Provides actionable intelligence to the user
- Leverages Exelis signal domain knowledge of GNSS
- Patented Exelis Technology
- Signal Sentry 1000 data aids Intelligence Led Policing

Assures safety, efficiency, and revenue

Signal Sentry



Signal Sentry

- Designed to protect critical infrastructure from GPS disruption jamming & spoofing
- Situational Awareness of GPS Interference
- Real time geolocation of GPS interference
- Actionable Intelligence for quick mitigation of GPS disruption

Deployed Systems

- 2014 Super Bowl at Met Life Stadium
- Southampton Port United Kingdom
- Newark N.J DHS & Essex County Sherriff

Field Tested

- Sennybridge Test Range UK
- Vidsel test range in Sweden

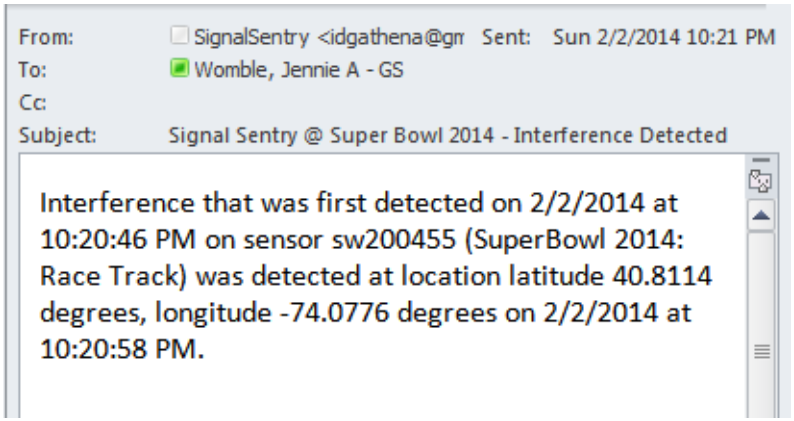
Southampton Port UK

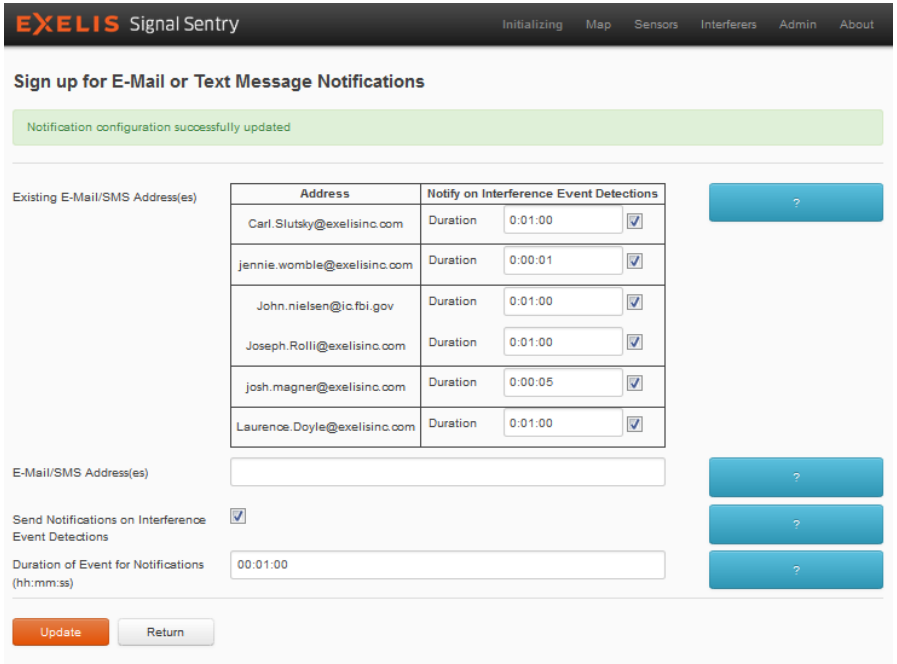
Interference Frequency – When & Where?

- Selecting histogram bar displays location of events on map below
- Can select more than one bar at a time

Alerts – Provides Real-time Actionable Intelligence

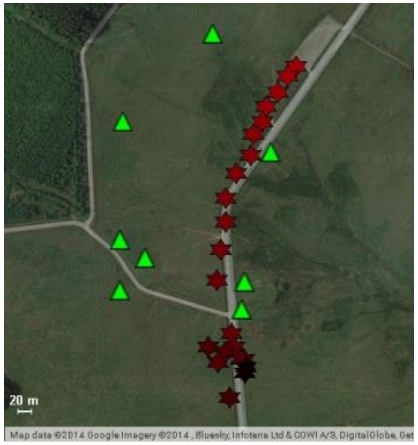
- Users can sign up for text or email alerts
- Alert sent when event has exceeded the user-defined duration
- Second alert sent once event has ended
- Alert signup is found under the Admin Menu





Signal Sentry 1000 Test Results

- Tested during GPS jamming trials in Sennybridge, UK in September 2014
- Trials administered by the Defence Science and Technology Laboratory
- Off-the-shelf jamming devices were used during the tests
- Located stationary & moving jammers in open & obstructed environments
- Identified jammers in moving vehicles within a 10-meter accuracy



Jammer in car at 50 mph

Target Markets

- Shipping Ports (Southampton UK)
  - $12.4B global maritime security expenditure 2011
- Law Enforcement (Newark NJ)
  - Global law enforcement equipment market to reach $6.99B in 2015
- Airports
  - $19.10B global airport security expenditure 2011
- Security (Super Bowl)
  - 2300+ municipalities are executing Safe City projects with price tags reaching $B's (e.g. Dubai $2.3B, Guangdong Province $6B, etc.)

Additional information Available

- Brochure (A4 Available)
- Presentation
- Position Paper on the Threat
- Infographics
  - Importance of GPS, how it works and Exelis
  - Signal Sentry 1000
- Data Sheet
- Video

Summary

- Most sectors of the economy rely on GPS
- GPS jamming devices becoming cheaper and more accessible
- Signal Sentry 1000 delivers actionable interference intelligence
  - Defends against disruption of guidance, traffic and asset control systems
  - Improves situational awareness
- Detects and Locates GPS Jamming
- Provides Actionable Intelligence

Signal Sentry 1000 – Assures safety, efficiency, and revenue

For more information visit:

www.exelisinc.com/signalsentry