



RESILIENT
NAVIGATION
and TIMING
FOUNDATION



NGOs & Commercial Entities

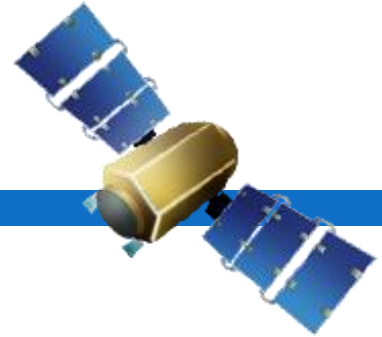
SPRING 2014

Roles in Providing Resilient PNT

The World Depends Upon GNSS



Words of Wisdom



“Reliance on satellite navigation and timing systems has become a single point of failure for much of America and is our largest, unaddressed critical infrastructure problem. ”

Dr. Brad Parkinson, “The father of GPS”

Critical Infrastructure Sectors

Oscillators & Holdover Times

GPS Timing Essential CIKR Sector	Timing Accuracy Requirements*	Oscillators Used**			Least Robust Oscillator	Osc. Holdover Time (Hours)
		TCXO	OCXO	Rb		
Communications Sector	~ Nanoseconds (SONET, CDMA)		X	X	OCXO (HS)	24 +
Emergency Services Sector	~ Nanoseconds (CDMA E911, LMRs)		X		OCXO (HS)	24 +
Information Technology Sector	20 to 100 Nanoseconds (PTP)*		X		OCXO (MS)	1
Banking and Finance Sector	Millisecond-Microsecond (HFT)^	X	X	X	TCXO	< .24 -1.7
Energy/Electric Power Subsector	1-4.6 Microsecond (Synchro-Phasors; Fault Loc.)		X		OCXO (MS)	1
Energy/Oil and Natural Gas Sector Subsector	Microsecond (exploration, SCADA)		X	X	OCXO (MS)	1
Nuclear Sector	1 Microsecond (Synchro-Phasors)		X		OCXO (MS)	1
Dams Sector	1 Microsecond (Synchro-Phasors)		X		OCXO (MS)	1
Chemical Sector	Sub Microsecond-Microsecond		X		OCXO (MS)	1
Critical Manufacturing Sector	Millisecond	X	X		TCXO	1.7
Defense Industrial Base Sector	Millisecond	X	X		TCXO	1.7
Transportation Sector	~ Nanoseconds (Wireless modal comms)		X	X	OCXO (HS)	24 +

James Caverly
US Department of Homeland Security, 2007

Unlikely, yet...



11 Hours...

**“GPS World
GLONASS
Gone... Then
Back”**

InsideGNSS
Engineering Solutions from the Global Navigation Satellite System Community

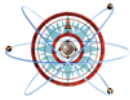
**“GLONASS Suffers
Temporary System-
wide Outage”**



10,000s of Disruptions Every Day...



Global Awareness



ENC-GNSS 2014
Technology – Innovation – Business



Resilient PNT Forum



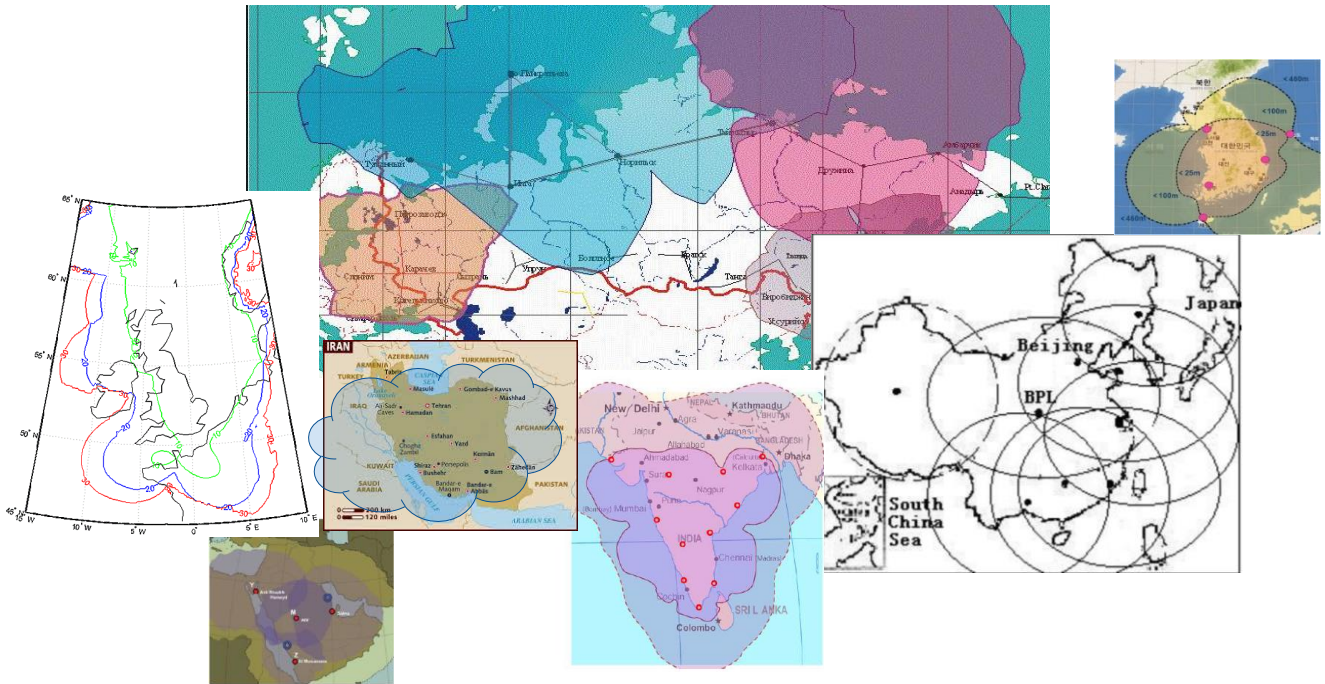
“GNSS Disruption Threat”

“Protect, Toughen, Augment”
(Dr. Brad Parkinson)

“So You Think You Are Safe”

“PNT – Growing up & Getting Serious”

Global Action



US Action & Inaction

Feb 2008
“We will Build”



Homeland
Security

Press Office
U.S. Department of Homeland Security
February 7, 2008
Contact: (202) 282-8010

**STATEMENT FROM DHS PRESS SECRETARY LAURA KEEHHNER ON
THE
ADOPTION OF NATIONAL BACKUP SYSTEM TO GPS**

Oct 2009



Homeland
Security

“Program de-funded”

**FY-2010 PRESIDENT’S BUDGET REQUEST AND
DEPARTMENT OF HOMELAND SECURITY APPROPRIATIONS ACT**

Situation in US – Congress Concerned



Administration must report on, when space systems “*...plan to provide necessary national security capabilities through alternative space, airborne, or ground systems...*”

2014 Nat Defense Auth Act (now law)

Situation in US – Congress Concerned



Situation in US – Congress Concerned



DHS Secretary:

- Must preserve old Loran-C infrastructure for possible re-use
- Has legal authority for Administration to enter Cooperative Agreement w/ public or private entity to build eLoran

2014 USCG Auth Act
(passed House, with Senate)

US Administration Concerned



“We have known about the problem since 2001.”

“Interested in eLoran as part of APNT.”



Others - concerned/ interested

RNT Foundation



Education



Better Laws & Enforcement



Strong, Difficult-to-Disrupt Terrestrial Signals



Government- NGO/Private Partnership

Government Partner

- Infrastructure
- Public Interest
- Assurance of longevity
- Encourage adoption & use
 - ✓ Critical Infrastructure
 - ✓ Critical Applications



NGO/Private Partner

- Investment
- Innovation
- Flexibility
- Speed to adapt
- Lower cost

**Greater
Utility for
Nation**

Business Case for Non-Profit/ Commercial eLoran



Cost - Low

- ✓ Compared with space
- ✓ Pre-existing Infrastructure
- ✓ Automated



Demand - High

- ✓ Telecom
- ✓ Financial
- ✓ Transportation
- ✓ Networks



Revenue

- ✓ Data Transfer/ Communications
- ✓ Encrypted precision
- ✓ Value Added Services

Partnerships can give you...

The Best of BOTH worlds!

