# 1AC

### 1AC Interference ADV

The risk of Global Positioning System jamming is high now

**Roberts 12** (John, “GPS at risk from terrorists, rogue nations, and $50 jammers, expert warns”, <http://www.foxnews.com/tech/2012/02/23/gps-emerging-threat/?test=latestnews>, ZBurdette)

The Global Positioning System guides our ships at sea. It’s the centerpiece of the new next-gen air traffic control system. It even timestamps the millions of financial transactions made across the world each and every day. And it's at extreme risk from criminals, terrorist organizations and rogue states -- and even someone with a rudimentary GPS jammer that can be bought on the Internet for 50 bucks, said Todd Humphreys, an expert on GPS with the University of Texas. “If you’re a rogue nation, or a terrorist network and you’d like to cause some large scale damage -- perhaps not an explosion but more an economic attack against the United States -- this is the kind of area that you might see as a soft spot,” he told Fox News. Humphreys was the keynote speaker at a conference of world experts organized by the UK - ICT Knowledge Transfer Network in London yesterday. His predictions for what lies ahead with this emerging threat were dire.

**GPS interference collapses its effectiveness**

**DID 12** (“The USA’s GPS-III Satellites”, Jun 03, <http://www.defenseindustrydaily.com/The-USAs-GPS-III-Satellites-04900/>, ZBurdette)

Disruption or decay of the critical capabilities provided by the USA’s Global Positioning System (GPS) satellites would cripple both the US military, and many aspects of the global economy. GPS has become part of civilian life in ways that go go far beyond those handy driving maps, including timing services for stock trades, and a key role in credit card processing. At the same time, military class (M-code) GPS guidance can now be found in everything from cruise missiles and various precision-guided bombs, to battlefield rockets and even artillery shells. Combat search and rescue radios rely on this line of communication, and so does a broadening array of individual soldier equipment.

**GPS signals are vital to military functions**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>, victor]

For military missions, GPS provides an unparalleled force-enhancement tool. GPS aids in all aspects of military combat operations because of its common-datum, common-grid, common-time capabilities. GPS is unique in its ability to establish an unambiguous correlation in four dimensions between a target and a dynamic weapon system aimed at that target — all the time, anywhere on the earth, and under any conditions of light, weather, or other source of target obscuration. This translates directly into increased probability of kill for any particular weapon, increased force employment efficiency for military mission planners, and overall lower risk for the individual military members and units that must execute the missions. To the extent that a target point is defined and a weapon is guided by precise GPS signals, the probability that the target will be hit despite any other circumstances that exist is significantly higher with GPS than with any other combination of targeting and positioning technologies. Further, since GPS requires no electronic transmissions for access, it enables safe, efficient and precise operations in situations where complete radio silence is required. Because of those performance features, both the DoD and Congress have long mandated GPS for military operations. Its functionality has been or is being installed and integrated into virtually every significant operational warfighting and support system operated by the DoD, including communications and data systems. The following summarizes the Task Force assessment of GPS contributions to diverse military missions. 2.1.1 Air Operations GPS enables global precision air operations in all categories of manned and unmanned air platforms. It permits point-to-point air navigation anywhere in the world without reliance on ground-based navigation aids or ground control through all phases of flight up to precision approach and landing. GPS works best in aircraft applications when coupled with an inertial navigation unit. In this coupled configuration, GPS provides initialization for the inertial system and compensates for inertial drift, and the inertial system improves GPS tracking in the presence of high acceleration and changes in direction. In many applications, use of GPS allows lower cost inertial systems than would otherwise be required if the inertial were stand-alone. GPS positions relayed across Joint Tactical Information Distribution System (JTIDS) communications networks afford air commanders a continuous precise picture of the three-dimensional disposition of air assets. Both aircraft and weapons carried aboard aircraft employ GPS. However, only a few aircraft types provide the data transfer capability to directly initialize onboard GPS weapons so that they may rapidly acquire and track GPS signals once they are released from under the wing or from the bomb bay, thereby reducing their effectiveness. 2.1.2 Naval Operations GPS enables seamless global maritime navigation on the open ocean, littoral waters, harbors and inland waterways. It has replaced two former radio navigation systems used for open ocean navigation by naval vessels and submarines. It has eliminated the need for high-power radio transmissions formerly needed for open ocean aircraft recovery in carrier operations. It also improves safety of close proximity operations at night and in limited visibility conditions. 2.1.3 Land Operations GPS enables efficient and safe land operations globally. Use of GPS with properly gridded maps enables ground forces to conduct coordinated operations in featureless terrain and, when coupled with laser range finders, to precisely determine target coordinates from a distance for attack by GPS guided munitions. Integrated with tactical secure communications devices, GPS enables commanders to maintain continuous awareness of force location and movement for more effective operations and to mitigate fratricide. Unique constraints imposed on GPS by land operations in forests, mountainous terrain and urban areas can be mitigated by increasing military signal strength and by raising the mask angle below which signal reception from the satellites is blocked to at least 15 degrees. 2.1.4 Space Operations GPS enables highly precise and continuous determination of satellite orbits out to at least geosynchronous earth orbit (GEO – about 22,000 mi). For this purpose, GPS acts in place of ground-based radars, which must be scheduled and cannot track individual satellites continuously, and many of which are located on foreign soil. The GPS constellation orbits at about 11,000 nmi (medium earth orbit – MEO). For satellites orbiting below about 4,000 nmi (and low earth orbits are well below this altitude), continuous point positioning is possible, as with aircraft navigation. Satellites at or above MEO track GPS signals coming past the edge of the earth from the other side of the GPS constellation, and use serial data collection techniques for orbit determination. Use of GPS by MEO and GEO systems requires that GPS signals directed toward the earth be broadcast such that sufficient signal energy can be received by satellites on the other side of the earth so they can perform orbit determination calculations. 2.1.5 Weapons Delivery GPS enables all-weather, day/night precision weapons delivery anywhere in the world. GPS has improved employment efficiency and accuracy of all types of bombs, cruise missiles and artillery systems. It affords improved safety for aircrews by enabling weapon release at increased stand-off ranges from targets. It affords wider ranges of employment options for cruise missiles in cases where lack of terrain features or shortage of mission planning material would have otherwise precluded a mission. It affords improved safety for ground support of forces in close contact with adversaries by enabling precise GPS-guided bombing or artillery fires against GPS-designated target coordinates (see discussion on spatial uniformity – Appendix E). 2.1.6 Targeting Target location error (TLE) is the single largest contributor to total system error in the employment of GPS-guided munitions against fixed targets. To the extent that GPS is used in the determination of target coordinates, the ability to attack those coordinates with precision is significantly enhanced. GPS is used in conjunction with laser range finders by ground forces and forward air controllers. GPS is also used in conjunction with synthetic aperture radar aboard aircraft to obtain precise targeting information relative to the aircraft’s position (see discussion on spatial uniformity – Appendix E).2.1.7 Special Operations In addition to its contributions to land, sea and air navigation, targeting and weapons delivery as they apply to special operations, GPS enables covert and precise day/night rendezvous on land, sea and air under all weather conditions. The combination of precise position and timing information provides the capability to rendezvous without the need for radio transmissions or other displays which might attract unwanted attention. 2.1.8 Logistics Operations GPS enhances safety and efficiency of all types of logistics and supply operations. It enables pre-positioning of military supplies in covert locations for planned operations as well as precise delivery of needed supplies when pre-positioning is unfeasible. In sea-based resupply/refueling and air refueling operations, it allows precise, covert day/night rendezvous under all weather conditions. 2.1.9 Mine Clearing/Explosive Ordinance Disposal (EOD) GPS, augmented by differential techniques, enables precise charting of mine fields in land or water for construction of safe lanes and for improving safety of EOD operations. 2.1.10 Search & Rescue GPS enables precise location of downed aircrew members and improves the probability for a successful rescue. GPS is combined with low probability of intercept/low probability of detection (LPI/LPD) over-thehorizon and direct communications in Combat Survivor/Evader Locator (CSEL) handsets now in production. 2.1.11 Communications GPS provides timing and frequency synchronization for wired and wireless communications and data networks. Synchronization is necessary for encrypted communications and data transmissions, in particular, and for maintaining efficient throughput at connection nodes between different networks. The U.S. Naval Observatory (USNO) is the official timekeeper for the DoD. As a part of its mission, the USNO maintains its Alternate Master Clock at the GPS Master Control Station and provides the data necessary to steer GPS time directly to the USNO standard. The timing signal from the GPS satellite constellation represents the transmitted version of USNO time and has been designated in JCS publications as the official time source for military operations. 2.1.12 Intelligence, Surveillance and Reconnaissance (ISR) GPS enables increased efficiency in geo-referencing ISR data and provides the precise timing information used in ISR systems of all types. 2.1.13 Net-Centric Operations GPS provides the timing and synchronization necessary for effective netcentric operations for both support and attack activities. It also enables precise short- or long-duration navigation for all types of unattended vehicles that may be employed in net-centric operations. 2.1.14 Battlespace Awareness GPS enables the spatial and communications components underlying effective battlespace awareness. Spatial information relayed through tactical comm/nav networks such as JTIDS and Enhanced Position Location Reporting System (EPLRS), among others, provide the foundation for continuous battlespace awareness at all command levels. Precise spatial and timing information are also important components of Blue Force Tracking and Joint Blue Force Situational Awareness capabilities that contribute to reduced fratricide and coordinated operations.

**Military deterrence prevents great-power conflict**

**Kagan 7** (Robert, senior fellow at the Carnegie Endowment for International Peace, *Policy Review,* August/Sept, “End of Dreams, Return of History”)

If the world is marked by the persistence of unipolarity, it is nevertheless also being shaped by the reemergence of competitive national ambitions of the kind that have shaped human affairs from time immemorial. During the Cold War, this historical tendency of great powers to jostle with one another for status and influence as well as for wealth and power was largely suppressed by the two superpowers and their rigid bipolar order. Since the end of the Cold War, the United States has not been powerful enough, and probably could never be powerful enough, to suppress by itself the normal ambitions of nations. This does not mean the world has returned to multipolarity, since none of the large powers is in range of competing with the superpower for global influence. Nevertheless, several large powers are now competing for regional predominance, both with the United States and with each other. [..[. The jostling for status and influence among these ambitious nations and would-be nations is a second defining feature of the new post-Cold War international system. Nationalism in all its forms is back, if it ever went away, and **so is international competition for power**, influence, honor, and status. American predominance **prevents** **these rivalries from intensifying** —  its regional as well as its global predominance. Were the United States to diminish its influence in the regions where it is currently the strongest power**,** the other nations would settle disputes as great and lesser powers have done in the past: sometimes through diplomacy and accommodation but often **through confrontation and wars of varying scope, intensity, and destructiveness.** One novel aspect of such a multipolar world is that **most of these powers would possess nuclear weapons. That could make wars between them** less likely, or it could simply make them **more catastrophic.** It is easy but also dangerous to underestimate the role the United States plays in providing a measure of stability in the world even as it also disrupts stability. For instance, the United States is the dominant naval power everywhere, such that other nations cannot compete with it even in their home waters. They either happily or grudgingly allow the United States Navy to be the guarantor of international waterways and trade routes, of international access to markets and raw materials such as oil. Even when the United States engages in a war, it is able to play its role as guardian of the waterways. In a more genuinely multipolar world, however, it would not. Nations would compete for naval dominance at least in their own regions and possibly beyond. Conflict between nations would involve struggles on the oceans as well as on land. Armed embargos, of the kind used in World War i and other major conflicts, **would disrupt trade flows** in a way that is now impossible. **Such order as exists in the world rests** not merely on the goodwill of peoples but **on a foundation provided by American power**. Even the European Union, that great geopolitical miracle, owes its founding to American power, for without it the European nations after World War ii would never have felt secure enough to reintegrate Germany. Most Europeans recoil at the thought, but even today Europe ’s stability depends on the guarantee, however distant and one hopes unnecessary, that the United States could step in to check any dangerous development on the continent. In a genuinely multipolar world, that would not be possible **without renewing the danger of world war**. People who believe greater equality among nations would be preferable to the present American predominance often **succumb to a basic logical fallacy. They believe the order the world enjoys today exists independently of American power**. They imagine that in a world where American power was diminished, the aspects of international order that they like would remain in place. But that ’s not the way it works. **International order** does not rest on ideas and institutions. It **is** **shaped by configurations of power**. The international order we know today reflects the distribution of power in the world since World War ii, and especially since the end of the Cold War. A different configuration of power, a multipolar world in which the poles were Russia, China, the United States, India, and Europe, would produce its own kind of order, with different rules and norms reflecting the interests of the powerful states that would have a hand in shaping it. Would that international order be an improvement? Perhaps for Beijing and Moscow it would. But it is doubtful that it would suit the tastes of enlightenment liberals in the United States and Europe. The current order, of course, is not only far from perfect but also offers no guarantee against major conflict among the world ’s great powers. Even under the umbrella of unipolarity, regional conflicts involving the large powers may erupt. War could erupt between China and Taiwan and draw in both the United States and Japan. War could erupt between Russia and Georgia, forcing the United States and its European allies to decide whether to intervene or suffer the consequences of a Russian victory. Conflict between India and Pakistan remains possible, as does conflict between Iran and Israel or other Middle Eastern states. These, too, could draw in other great powers, including the United States. Such conflicts may be unavoidable no matter what policies the United States pursues. But they **are more likely to erupt if the U**nited **S**tates weakens or withdraws from its positions of regional dominance. **This is especially true in East Asia,** where most nations agree that a reliable American power has a stabilizing and pacific effect on the region. That is certainly the view of most of China ’s neighbors. But even China, which seeks gradually to supplant the United States as the dominant power in the region, faces the dilemma that an American withdrawal could unleash an ambitious, independent, nationalist Japan. In Europe, too, the departure of the United States from the scene — even if it remained the world’s most powerful nation — could be destabilizing. It could tempt Russia to an even more overbearing and potentially forceful approach to unruly nations on its periphery. Although some realist theorists seem to imagine that the disappearance of the Soviet Union put an end to the possibility of confrontation between Russia and the West, and therefore to the need for a permanent American role in Europe, history suggests that conflicts in Europe involving Russia are possible even without Soviet communism. If the United States withdrew from Europe — if it adopted what some call a strategy of **“offshore balancing**” — this could in time **increase the likelihood of conflict involving Russia and its** near neighbors, which could in turn draw the United States back in under unfavorable circumstances. It is also optimistic to imagine that a retrenchment of the American position in the Middle East and the assumption of a more passive, “offshore” role would lead to greater stability there. The vital interest the United States has in access to oil and the role it plays in keeping access open to other nations in Europe and Asia make it unlikely that American leaders could or would stand back and hope for the best while the powers in the region battle it out. Nor would a more “even-handed” policy toward Israel, which some see as the magic key to unlocking peace, stability, and comity in the Middle East, obviate the need to come to Israel ’s aid if its security became threatened. That commitment, paired with the American commitment to protect strategic oil supplies for most of the world, practically ensures a heavy American military presence in the region, both on the seas and on the ground. The subtraction of American power from any region would not end conflict but would simply change the equation. In the Middle East, competition for influence among powers both inside and outside the region has raged for at least two centuries. The rise of Islamic fundamentalism doesn ’t change this. It only adds a new and more threatening dimension to the competition, which neither a sudden end to the conflict between Israel and the Palestinians nor an immediate American withdrawal from Iraq would change. The alternative to American predominance in the region is not balance and peace. It is further competition. The region and the states within it remain relatively weak. A diminution of American influence would not be followed by a diminution of other external influences. One could expect deeper involvement by both China and Russia, if only to secure their interests. 18 And one could also expect the more powerful states of the region, particularly Iran, to expand and fill the vacuum. It is doubtful that any American administration would voluntarily take actions that could shift the balance of power in the Middle East further toward Russia, China, or Iran**. The world hasn ’t changed that much**. An American withdrawal from Iraq will not return things to “normal” or to a new kind of stability in the region. It will produce a new instability, one likely to draw the United States back in again. The alternative to American regional predominance in the Middle East and elsewhere is not a new regional stability. In an era of burgeoning nationalism, the future is likely to be one of intensified competition among nations and nationalist movements. Difficult as it may be to extend American predominance into the future, no one should imagine that a reduction of American power or a retraction of American influence and global involvement will provide an easier path.

**Additionally, economic stability is directly tied to the efficacy of GPS signals**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>, victor]

NATIONAL ECONOMIC INFRASTRUCTURE As an information resource, GPS provides an essential linkage between the largely locationless electronic/communications environment and the physical world. Even the best overhead images and maps must be accurately geo-referenced in order to be useful for precise navigation and GPS provides that direct connection. GPS also provides primary timing and synchronization for most of our national telecommunications and data networks. In addition to its economic and scientific contributions, GPS is also integral to enabling speed and precision in domestic emergency response operations of all types. DoD and Department of Homeland Security officials responsible for protection of our national infrastructures must be aware of the contributions GPS makes to their daily operation. In executing their responsibilities for ensuring homeland security, federal, State, and local agencies will have to be able to respond quickly in the real world to warning and attack information from a variety of sources. GPS is integral to making that information immediately and uniformly useful. The following summarizes the Task Force assessment of GPS contributions to national infrastructure elements. 2.2.1 Civil Telecommunications Beginning even before GPS became fully operational, global timing and communications infrastructures began adopting GPS as the primary distribution mechanism for time and frequency synchronization. The USNO maintains its Alternate Master Clock at the GPS Master Control Station and provides the data necessary to steer GPS time directly to the USNO standard. As a direct result, the timing signal from the GPS satellite constellation is being used internationally as a continuous, globally available source of UTC. Additionally, major national and international telecommunications service providers, including both wireless and wireline technologies, have recognized the value of using the freely accessible GPS timing signals. Beginning in the late 1980s, many have largely replaced their complements of ground-based atomic frequency standards in favor of receiving continuous precise time and frequency signals from GPS. With its signals providing a principal source of timing synchronization and frequency syntonization at the Stratum 1 (Primary Reference Source) level, GPS has become an essential component in the flow of digital data between multiple service providers, relevant to both Internet operations and diversified telecommunications networks. GPS has also become an essential, and largely transparent, enabling technology for the economical operation of cellular telephone and other wireless media nationwide and around the world. 2.2.2 Electrical Power Distribution Nationwide, many electric power companies have begun to use GPS timing and frequency services to improve the economy and efficiency of their operations. They primarily use GPS signals for monitoring stability of line frequencies, frequency synchronizing or “syntonizing” services with adjacent power company networks, and isolating faults in transmission networks. The fidelity of service provided by GPS exceeds the routine needs of power companies, but its ready, free availability makes it very appealing, and the precise timing signal is extremely useful in isolating damage in remote lines to within a single tower span. GPS is also the technology of choice for maintaining phase differences to very tight standards when loads are transferred among substations, as would happen as a consequence of a major power perturbation. Use of GPS has enabled load transfers to be accomplished in a few hours where previous techniques required days. As electrical service deregulation spreads across the country while the nation faces a real new threat of intentional power grid disruptions, interoperability dependencies between individual service providers heighten the importance of GPS as companies must respond to widespread load variations and to system surges created by environmental effects such as solar storms or potentially by hostile actions of terrorists. 2.2.3 Electronic Commerce and Finance Many banking and financial firms employ GPS timing for synchronization of their encrypted computer networks, though this function is in most cases buried within contracted telecommunications services and transparent to management. Also, computer transactions are routinely time-tagged, and with the advent of Internet trading, the precise timing of transactions is becoming more important. Presently, both the USNO and the National Institute of Standards and Technology (NIST) are legally certified time stamping services for the purpose of determining financial transaction sequences. The mechanism for distribution of the precise timing signals across the Internet is GPS. As e-commerce and etrading expand in the U.S. and internationally, the importance of precise time stamping will continue to increase.

**Economic decline increases the risk of conflict**

**Royal 10** — Jedidiah Royal, Director of Cooperative Threat Reduction at the U.S. Department of Defense, M.Phil. Candidate at the University of New South Wales, 2010 (“Economic Integration, Economic Signalling and the Problem of Economic Crises,” *Economics of War and Peace: Economic, Legal and Political Perspectives*, Edited by Ben Goldsmith and Jurgen Brauer, Published by Emerald Group Publishing, ISBN 0857240048, p. 213-215)

Less intuitive is how periods of economic decline may increase the likelihood of external conflict. Political science literature has contributed a moderate degree of attention to the impact of economic decline and the security and defence behaviour of interdependent states. Research in this vein has been considered at systemic, dyadic and national levels. Several notable contributions follow. First, on the systemic level, Pollins (2008) advances Modelski and Thompson's (1996) work on leadership cycle theory, finding that rhythms in the global economy are associated with the rise and fall of a pre-eminent power and the often bloody transition from one pre-eminent leader to the next. As such, exogenous shocks such as economic crises could usher in a redistribution of relative power (see also Gilpin. 1981) that leads to uncertainty about power balances, increasing the risk of miscalculation (Feaver, 1995). Alternatively, even a relatively certain redistribution of power could lead to a permissive environment for conflict as a rising power may seek to challenge a declining power (Werner. 1999). Separately, Pollins (1996) also shows that global economic cycles combined with parallel leadership cycles impact the likelihood of conflict among major, medium and small powers, although he suggests that the causes and connections between global economic conditions and security conditions remain unknown. Second, on a dyadic level, Copeland's (1996, 2000) theory of trade expectations suggests that 'future expectation of trade' is a significant variable in understanding economic conditions and security behaviour of states. He argues that interdependent states are likely to gain pacific benefits from trade so long as they have an optimistic view of future trade relations. However, if the expectations of future trade decline, particularly for difficult [end page 213] to replace items such as energy resources, the likelihood for conflict increases, as states will be inclined to use force to gain access to those resources. Crises could potentially be the trigger for decreased trade expectations either on its own or because it triggers protectionist moves by interdependent states.4 Third, others have considered the link between economic decline and external armed conflict at a national level. Blomberg and Hess (2002) find a strong correlation between internal conflict and external conflict, particularly during periods of economic downturn. They write, The linkages between internal and external conflict and prosperity are strong and mutually reinforcing. Economic conflict tends to spawn internal conflict, which in turn returns the favour. Moreover, the presence of a recession tends to amplify the extent to which international and external conflicts self-reinforce each other. (Blomberg & Hess, 2002. p. 89) Economic decline has also been linked with an increase in the likelihood of terrorism (Blomberg, Hess, & Weerapana, 2004), which has the capacity to spill across borders and lead to external tensions. Furthermore, crises generally reduce the popularity of a sitting government. “Diversionary theory" suggests that, when facing unpopularity arising from economic decline, sitting governments have increased incentives to fabricate external military conflicts to create a 'rally around the flag' effect. Wang (1996), DeRouen (1995). and Blomberg, Hess, and Thacker (2006) find supporting evidence showing that economic decline and use of force are at least indirectly correlated. Gelpi (1997), Miller (1999), and Kisangani and Pickering (2009) suggest that the tendency towards diversionary tactics are greater for democratic states than autocratic states, due to the fact that democratic leaders are generally more susceptible to being removed from office due to lack of domestic support. DeRouen (2000) has provided evidence showing that periods of weak economic performance in the United States, and thus weak Presidential popularity, are statistically linked to an increase in the use of force. In summary, recent economic scholarship positively correlates economic integration with an increase in the frequency of economic crises, whereas political science scholarship links economic decline with external conflict at systemic, dyadic and national levels.5 This implied connection between integration, crises and armed conflict has not featured prominently in the economic-security debate and deserves more attention. This observation is not contradictory to other perspectives that link economic interdependence with a decrease in the likelihood of external conflict, such as those mentioned in the first paragraph of this chapter. [end page 214] Those studies tend to focus on dyadic interdependence instead of global interdependence and do not specifically consider the occurrence of and conditions created by economic crises. As such, the view presented here should be considered ancillary to those views.

### 1AC Drones ADV

**US drones are vulnerable to electronic hijacking**

**Mills 12** (Elinor,“Drones can be hijacked via GPS spoofing attack”, <http://news.cnet.com/8301-1009_3-57464271-83/drones-can-be-hijacked-via-gps-spoofing-attack/>¸ ZBurdette)

Last year a U.S. military drone doing reconnaissance in Iran disappeared. Iranian government officials there said they had steered the device off course by interfering with its GPS signals. Such an attack, called GPS spoofing, had previously been considered theoretical. A research team at the University of Texas at Austin has demonstrated that the GPS signals of an unmanned aerial vehicle can be commandeered remotely. This demonstration highlights security concerns with plans to allow thousands of military and civilian drones in U.S. airspace by 2015. "I think this demonstration should certainly raise some eyebrows and serve as a wake-up call of sorts as to how safe our critical infrastructure is from spoofing attacks," Milton R. Clary, a senior Department of Defense (DoD) Aviation Policy Analyst at Overlook Systems Technologies, said in the university's news release on the research released today. The scenarios are worrisome. Drones could be re-routed to crash into people or buildings. Drones used in air strikes could be directed at other targets.

**Current programs don’t address vulnerabilities---that allows drones to be used as weapons**

**Kersey 12** (Ben, staffwriter, “Researchers find drones vulnerable to GPS spoofing”, Jun 29, <http://www.slashgear.com/researchers-find-drones-vulnerable-to-gps-spoofing-29236474/>, ZBurdette)

Spoofers are a new problem for GPS-guided drones, allowing hackers to trick navigation systems with false information. Humphreys and the team have designed a device costing less than $1,000 that sends out a GPS signal stronger than the ones coming down from orbiting satellites. At first, the rogue signal mimics the official one in order to trick the drone, and once it’s accepted new commands can be sent to the UAV. Naturally, Humphreys highlights the associated risks of such a device, saying that in the wrong hands drones could be turned into missiles. Right now drones can’t be used in US airspace on a wide basis, but Congress has asked the FAA to come up with regulations that would allows drones to fly over the United States by 2015. That could lead to usage in law enforcement, as well as by power companies and delivery firms. The US government says its aware of the potential dangers of spoofing, and officials from the FAA and Department of Homeland Security have seen Humphreys’ demonstration first hand. The Department of Homeland Security reportedly has a program in place to try and solve the problem of GPS interference, but it’s aimed at trying to deal with jammed signals, not spoofed ones.

**The US is about to open domestic skies to drones---vulnerabilities cause terrorist attacks**

**Fox 12** (July 5, “Drone ‘spoofing’ could allow terrorist groups to take control of unmanned aircraft”, <http://www.myfoxdc.com/story/18954475/drone-spoofing-could-allow-terrorist-groups-to-take-control-of-unmanned-aircraft>, ZBurdette)

Congress has given the FAA until 2015 to come up with rules to allow unmanned drones wide access to U.S. airspace. But one noted researcher on GPS navigation has discovered a problem that could jeopardize national security and is urging the federal government to either come up with a fix - or scrap the idea altogether. Todd Humphreys and his team from the University of Texas punched a few keystrokes into their computer transmitter during a drone demonstration and watched as the aircraft went off wildly off course. The transmitter sends false signals to the drone's navigation system - a so-called "Spoofer". The effect is so dramatic; a safety pilot with a radio control has to save the drone from crashing. "Spoofing a GPS receiver on an unmanned aerial vehicle (UAV) is just another way of hijacking a plane," Humphreys said. If that sounds shocking - it's because it is. With this experiment, Humphreys illuminated a gaping hole in the government's plan to open up us airspace to GPS-guided drones. "In 5 to 10 years, you could have 30,000 drones in the airspace and each one of these could be a potential missile used against us," he continued. Until now, GPS guided drones have been limited mostly to the battlefield in places like Iraq, Afghanistan and Yemen. Earlier this year, congress ordered the FAA to come up with rules to allow drones to fly over us soil by 2015. They could be used for law enforcement, monitoring transmission and pipelines for utilities, even delivering packages across the country. The founder of FEDEX has said he wants a fleet of cargo-plane sized drones in the air as soon as possible. The reason why this is so concerning is because as drones get more and more integrated in us airspace, they won't have an operator with a joystick backing them up. They'll rely almost exclusively on a GPS radio to get from place to place. And that radio can be hacked. "What if you could take down one of these drones delivering FEDEX packages and use that as your missile. That's the same mentality the 9-11 hijackers had," Humphreys continued. The government is acutely aware of the problem. Last week - at the White Sands Missile Range in New Mexico, officials from the FAA and Department of Homeland Security watched as Humphreys' team repeatedly took control of a drone. These experiments are the first time in the U.S. that anyone has used a "Spoofer" to hijack an unmanned aerial vehicle. But Humphreys says, if he can do it, so could a terrorist group with the right resources. "I'm worried about them crashing into other planes. I'm worried about them crashing into buildings," Humphreys said. Last December, Iran claimed that it took control of this U.S. drone, forcing it from the sky.

That risks escalatory retaliation

Robert Ayson, Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington, 2010 (“After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, Available Online to Subscribing Institutions via InformaWorld)

A terrorist nuclear attack, and even the use of nuclear weapons in response by the country attacked in the first place, would not necessarily represent the worst of the nuclear worlds imaginable. Indeed, there are reasons to wonder whether nuclear terrorism should ever be regarded as belonging in the category of truly existential threats. A contrast can be drawn here with the global catastrophe that would come from a massive nuclear exchange between two or more of the sovereign states that possess these weapons in significant numbers. Even the worst terrorism that the twenty-first century might bring would fade into insignificance alongside considerations of what a general nuclear war would have wrought in the Cold War period. And it must be admitted that as long as the major nuclear weapons states have hundreds and even thousands of nuclear weapons at their disposal, there is always the possibility of a truly awful nuclear exchange taking place precipitated entirely by state possessors themselves. But these two nuclear worlds—a non-state actor nuclear attack and a catastrophic interstate nuclear exchange—are not necessarily separable. It is just possible that **some sort of terrorist attack**, and especially an act of nuclear terrorism, could precipitate a chain of events leading to a massive exchange of nuclear weapons between two or more of the states that possess them. In this context, today’s and tomorrow’s terrorist groups might assume the place allotted during the early Cold War years to new state possessors of small nuclear arsenals who were seen as raising the risks of a catalytic nuclear war between the superpowers started by third parties. These risks were considered in the late 1950s and early 1960s as concerns grew about nuclear proliferation, the so-called n+1 problem. t may require a considerable amount of imagination to depict an especially plausible situation where an act of nuclear terrorism could lead to such a massive inter-state nuclear war. For example, in the event of a terrorist nuclear attack on the United States, it might well be wondered just how Russia and/or China could plausibly be brought into the picture, not least because they seem unlikely to be fingered as the most obvious state sponsors or encouragers of terrorist groups. They would seem far too responsible to be involved in supporting that sort of terrorist behavior that could just as easily threaten them as well. Some possibilities, however remote, do suggest themselves. For example, how might the United States react if it was thought or discovered that the fissile material used in the act of nuclear terrorism had come from Russian stocks,40 and if for some reason Moscow denied any responsibility for nuclear laxity? The correct attribution of that nuclear material to a particular country might not be a case of science fiction given the observation by Michael May et al. that while the debris resulting from a nuclear explosion would be “spread over a wide area in tiny fragments, its radioactivity makes it detectable, identifiable and collectable, and a wealth of information can be obtained from its analysis: the efficiency of the explosion, the materials used and, most important … some indication of where the nuclear material came from.”41 Alternatively, if the act of nuclear terrorism came as a complete surprise, and American officials refused to believe that a terrorist group was fully responsible (or responsible at all) suspicion would shift immediately to state possessors. Ruling out Western ally countries like the United Kingdom and France, and probably Israel and India as well, authorities in Washington would be left with a very short list consisting of North Korea, perhaps Iran if its program continues, and possibly Pakistan. But at what stage would Russia and China be definitely ruled out in this high stakes game of nuclear Cluedo? In particular, if the act of nuclear terrorism occurred against a backdrop of existing tension in Washington’s relations with Russia and/or China, and at a time when threats had already been traded between these major powers, would officials and political leaders not be tempted to assume the worst? Of course, the chances of this occurring would only seem to increase if the United States was already involved in some sort of limited armed conflict with Russia and/or China, or if they were confronting each other from a distance in a proxy war, as unlikely as these developments may seem at the present time. The reverse might well apply too: should a nuclear terrorist attack occur in Russia or China during a period of heightened tension or even limited conflict with the United States, could Moscow and Beijing resist the pressures that might rise domestically to consider the United States as a possible perpetrator or encourager of the attack? Washington’s early response to a terrorist nuclear attack on its own soil might also raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China. For example, in the noise and confusion during the immediate aftermath of the terrorist nuclear attack, the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment, when careful planning runs up against the friction of reality, it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow, although it must be admitted that any preemption would probably still meet with a devastating response.

### 1AC Solvency

**Plan: The United States federal government should deploy a GPS III based Global Positioning Satellite system.**

**GPS III increases accuracy and solves interference**

**UPI 12** (“Lockheed building more GPS III satellites”, <http://www.upi.com/Business_News/Security-Industry/2012/01/16/Lockheed-building-more-GPS-III-satellites/UPI-25391326723087/>, ZBurdette)

The third and fourth GPS III satellites of the U.S. Air Force are to be manufactured at the same time by Lockheed Martin under a $238 million contract. The next-generation Global Positioning System satellites are designed to be interoperable with civilian GPS systems, are more accurate than predecessors and have enhanced anti-jamming capability. "GPS is a global gold standard, providing accurate, reliable, continuous, free worldwide positioning, navigation and timing services," said Col. Bernie Gruber, director of the U.S. Air Force's Global Positioning Systems Directorate. "And we are focused on delivering world-class space-based PNT capabilities to our users around the world. "As the need for more capability increases, GPS III will allow us to affordably sustain and modernize the constellation by providing increased capabilities incrementally to better meet current and future needs."

**GPS III has funding now, but only for 4 satellites**

**GPS.gov 12** (Official gov info about GPS, “Space Segment”, <http://www.gps.gov/systems/gps/space/#III>, ZBurdette)

Currently under development by Lockheed Martin, the GPS III series is the newest block of GPS satellites (SVN-74 and up). GPS III will provide more powerful signals in addition to enhanced signal reliability, accuracy, and integrity -- all of which will support precision, navigation, and timing services. Based on the current contracts and funding, four GPS III satellites will be produced with options to purchase an additional eight satellites. Future versions will feature increased capabilities to meet demands of military and civilian users alike.

**18 satellites are necessary to access GPS III benefits---including solving both military and civilian interference**

**Duncan 11** (Geoff, “GPS III explained: Everything you need to know about the next generation of GPS”, <http://www.digitaltrends.com/mobile/gps-iii-explained-everything-you-need-to-know-about-the-next-generation-of-gps/>, ZBurdette)

The higher power for civilian GPS signals means they should be less subject to interference and jamming. Current GPS signals are low power, and GPS receivers have to be notoriously sensitive to accurately pick up GPS signals. (This is why LightSquared’s LTE network base stations seem to be wreaking havoc with nearby GPS receivers.) High-sensitivity receivers are very easy to jam, and (illegal) pocket-sized GPS jammers have been widely available since the late 1990s, with some of the most notorious uses happening in Iraq and Afghanistan in an effort to derail the U.S. military’s GPS-assisted vehicles and weapons systems. From a security perspective, the U.S. and other countries have also been concerned about the use of GPS jammers to disrupt aviation, shipping, and transportation. The GPS III design, and the L5 signal in particular, are designed to make GPS more resistant to jamming. And that’s just the civilian signals: GPS III also includes high-bandwidth M-code signals designed for military use. GPS III satellites will also sport a tremendous departure from the designs of previous GPS satellites: In addition to a standard wide-angle (whole Earth) antenna for broad coverage, the GPS II satellites will include a high-gain directional antenna. The direction antenna will operate with 100 times (+20db) the power of the wide-angle antenna, and will be exclusively for use with M-code transmissions. This means the U.S. military will be able to use GPS III satellites’ directional antennas to boost the power of military GPS signals by 100 times in particular regions, making military GPS will be even harder to jam.When will GPS III be available? So here’s the downside to all these GPS improvements: They take time develop, test, and get up into orbit. Once the systems are in space, users on the ground will need to upgrade to new GPS receivers that can use the new signals. That means your current smartphone isn’t going to support L2C, L1C, or L5, nor are your handheld GPS or the satellite navigation system in your car. You’ll have to buy new kit. The new GPS signals can’t be particularly effective until they’re available on at least 18 GPS satellites. Support for the L2C signal has been included in every Block IIR-M satellite that’s been launched since 2005: As of right now, L2C is supported by about 10 GPS satellites, and by 2016, that should be about two dozen. So L2C will get out the door first, improving GPS reception and accuracy.

**Current GPS III funding will be cut for cheaper models that don’t solve**

**Thompson 11** (Loren, Lexington Institute, former Deputy Director of the Security Studies Program at Georgetown University, former prof at Harvard University's Kennedy School of Government, doctoral and masters degrees in government from Georgetown University, “Battle Brewing Over Future Of GPS Constellation”, <http://www.lexingtoninstitute.org/battle-brewing-over-future-of-gps-constellation>, ZBurdette)

The U.S. Department of Defense is an engine of innovation. From jet engines to lasers to digital networking, America's military has pioneered the development of new technologies with the potential to transform commerce and culture. One of the most spectacularly successful examples is the Global Positioning System, an orbital constellation that allows users anywhere on or near the earth's surface to precisely establish their location in three dimensions and time. GPS-generated information is essential to military activities such as navigation, targeting and reconnaissance, and has found myriad civilian uses in areas such as cellular communication and air traffic control. The U.S. Air Force is responsible for the operation and modernization of this vital global utility, and most observers agree it has done a very good job. But the federal government is entering a prolonged period of fiscal austerity that will force the service to carefully scrutinize all of its plans for space. One issue that may end up on the table is whether to proceed with plans to develop a new generation of "GPS III" satellites, or try to save money by sticking with the existing GPS IIF design. The issue has far-reaching budgetary implications, because it impacts on launch costs, the design of ground segments for managing and utilizing GPS satellites, and the compatability of future satellites with other navigation systems.

**Increased funding is crucial to mitigate vulnerabilities**

**Divis 12** (Dee, March 1, 2012, “GPS Program Budget: A Lot, But Is It Enough?”, <http://www.insidegnss.com/node/2965>, ZBurdette)

The details of President Obama’s 2013 budget have been gradually filtering out and, in general, the GPS system and those programs closely linked to satellite navigation, have escaped deep cuts. On the hardware side the White House has requested $58.2 for GPS IIF satellite procurement. According to Air Force budget documents, the plan is to then wrap up the total IIF procurement of 12 satellites with a request for $77.6 million in FY14 and $7.3 million in FY15. The funding is the “normal and expected allocation year by year,” according to Boeing spokesperson Diana Ball, whose firm is building the IIFs. Eight IIF spacecraft are still under construction, two more in storage, and two in orbit. The budget request incorporates support for launch, including satellite integration and on-orbit check out. There may, however, be a need for a bit more spending. GPS expert, who spoke on condition of anonymity, confirmed that a problem has arisen with one of the clocks on one of the two IIF satellites in orbit. Though backup clocks are in place on board to ameliorate any glitches — and Ball said no “operational issues” have appeared yet — the problem could ultimately shorten the life of the satellite, the expert explained Given this situation, additional resources may be needed to determine what caused the problem and then make changes to the satellites still on the ground. This, however, will not become a government budget issue. As noted by Ball, her company has a fixed-price contract to build the IIF satellites. The cost of any work to understand and address the clock question will be borne by Boeing. The president’s budget also requests a total of $14.3 million for research and development for the GPS IIF program. The money would pay for training simulators, integrated logistics support (ILS) products, and research into providing anti-jam capability through increased military (M-code) signal power. If granted, the funding would also be used to develop “upgrades to integrate the SAASM [Selective Availability/Anti-spoofing Module] mission planning system (SMPS) and implement the new STRATCOM/SAASM operations concept,” according to Air Force budget documents. Looking further out, the White House requested a total of $492.9 million for advance procurement of GPSIII satellite components with total procurement spending of $563 million planned in FY14, $660 million in FY15, $772 million in FY16 and a surge to $1.018 billion in FY17. This is in line with previous plans, sources told Inside GNSS. In fact, Lockheed Martin announced on January 12 that the Air Force awarded it a $238 million contract for production of the third and fourth GPSIII satellites The White House requested an additional $318.99 for GPS III development for FY13. This will cover research and development as well as testing of GPS III spacecraft 1 and 2. The plan is to then spend $219 million in FY14, $214 million in FY15, $160 million in FY16, and $75 million in FY17. Launch Concerns Reappear The development budget also includes research on capabilities such as dual launch — the ability to loft more than one GPS spacecraft on a single rocket. It is, in fact, the limits of the nation’s space launch capabilities that appear to be among the greatest challenges to sustaining the constellation. As with other defense and intelligence spacecraft, GPS satellites have been launching recently on the Evolved Expendable Launch Vehicle or EELV, and launch costs have risen so much that some experts consider them a threat to the future of the constellation. The cost of reaching orbit has been the subject of debate in Congress, with some elected officials favoring opening up requirements to enable new commercial launchers to complete for Air Force and other launch contracts. To stabilize rocket production, support industrial capacity, and hopefully help control costs, the House and Senate agreed during negotiations on the 2012 omnibus spending bill to a “core” purchase of eight EELVs per year — a plan endorsed by the Air Force. The first GPS III should be ready for launch in 2014. Experts who follow the program closely and spoke on condition of anonymity said that some concern has arisen that not enough launch vehicles will be available at the right time for the GPS III satellites. For example, with the other defense and intelligence programs vying for EELV launch services, explained one insider, a need will likely arise for more than eight launches per year in 2015 and 2016. Given the age of the current GPS satellites, if a sudden spate of spacecraft failures occurred at the same time, a launcher shortage could result in fewer satellites on orbit and a less capable constellation. “One of the drivers for us looking at the dual-launch capability is not only saving on cost but also being able to save on the number of boosters you need to populate the GPS constellation,” said Lockheed Martin spokesman Michael Friedman. Unless the situation changes the Air Force would need to make the shift by the ninth GPS III satellite, said a source familiar with the issue. Lockheed Martin submitted a study to the Air Force in early December 2011, Friedman said, that showed it would be possible to accomplish dual launches on an Atlas 5 rocket beginning with GPS III satellites 5 and 6. Alternatively, Congress is urging the Air Force to broaden its stable of vehicles to tap the new commercial rockets. These could potentially include SpaceX’s new Falcon 9 rocket, which is set for another test launch this spring. Beyond the funding requested for the spacecraft, the Obama administration has asked for $7.7 million in the budget for ground equipment and $372 million to continue development of the Next Generation Operational Control System or OCX. Like other programs this one appears to have been given fairly steady funding. Of the total requested for FY13, some $308 million will actually go to OCX, for which Raytheon is the contractor, and the rest will be allocated to other firms doing related systems engineering, tech support and system integration. A Walk on the Civil Side On the civilian side, the president’s budget request includes $40 million to fund the civil contribution to the GPS program. This is the money given to the Air Force to cover the expense of the civil requirements supported by the GPS system. The White House also allocated $96 million for the Federal Aviation Administration’s Wide Area Augmentation System. WAAS allows airports in the National Airspace System to have vertical and horizontal guidance without expensive legacy navigation hardware installed at each runway, the administration explained in its request. If approved, the money will pay for the lease of geostationary satellites, improvements to communications equipment, a number of technology support services. and the surveys and procedure development necessary for using WAAS. Congress is also being asked to approve $5.6 million for Nationwide Differential GPS (NDGPS), $3 million for the FAA’s Ground Based Augmentation Systems (GBAS) and $4 million for Alternative Positioning, Navigation, and Timing. APNT will support the Next Generation Air transportation System (NextGen) and help back up capabilities that could be lost if there were interference to the GPS signal. NextGen is at the center of the FAA Reauthorization and Reform Act of 2011, which was signed into law on Valentine’s Day. The subject of a bitter and protracted fight, largely over labor issues, the $63.3 billion bill gives the FAA a four-year authorization to pursue this massive effort to upgrade and expand the nation’s air traffic control system. The program will shift aircraft from using radar towers for point-to-point-to-point travel to using GPS-based navigation — a step essential to handling the growth in U.S. air traffic. In addition to authorizing funding for the NextGen program itself, the legislation directs FAA to work on developing an incentive program to encourage aircraft operators to equip their planes to utilize NextGen services. It is important to remember, though, that the FAA legislation is a Congressional authorization, not an appropriation. The measure gives permission for the federal government to spend money, but it doesn’t actually provide the funds. The President’s budget request is a step in the separate appropriations process. Though details were not available about the funding requests for some of the other programs integral to the operation of GPS, the submitted budget for the National Executive Committee for Space-Based Positioning, Navigation, and Timing (PNT) held relatively steady at about $900,000 according to Tony Russo, director of the National Coordination Office for Space-Based PNT. One area not funded, however, was testing. The idea of setting aside monies for interference and other testing was discussed, said Russo, but dropped.

**Congress cut funding for GPS III development and procurement**

**National Executive Committee 11** (“Fiscal Year 2012 Program Funding,” 10/3/11, National Executive Committee for Space-Based PNT, <http://www.pnt.gov/policy/legislation/funding/2012.shtml>)
On June 14, the House Appropriations Committee passed a defense appropriations bill (H.R. 2219) that would cut GPS IIIB development by $50 million in FY 2012 due to "excess to need" (view source) and cut Next Generation Operational Control System (OCX) development by $48 million due to "slow execution" (view source), while adding $40 million to GPS IIF procurement for "production support" (view source). The bill would also rescind (take back) $122.5 million in FY 2011 advance procurement funds for GPS III satellites -- the entire amount requested and already appropriated for this activity (view source). On September 15, the Senate Appropriations Committee passed their version of H.R. 2219 with cuts of $40 million for GPS III advance procurement due to "Advance Procurement Addressed by Prior Reprogramming" (view source) and $24 million for OCX development due to "Directorate support—reduction to growth" (view source).

**Action now is key to prevent coverage gaps**

**GAO 10** (“Global Positioning System: Challenges in Sustaining and Upgrading Capabilities Persist,” Report to the Subcommittee on National Security and Foreign Affairs, Committee on Oversight and Government Reform, House of Representatives, Government Accounting Office, September 2010, <http://www.gao.gov/new.items/d10636.pdf>)

Excluding random failures, **the operational life of a GPS satellite tends to be limited by the amount of power that its solar arrays can produce**. This power level declines over time as the **solar arrays degrade in** the **space** environment **until** eventually **they cannot produce enough power to** maintain all of **the satellite’s subsystems**. The effects of this power loss can be mitigated somewhat by actively managing satellite subsystems—shutting them down when they are not needed—thereby reducing the satellite’s overall consumption of power. The Air Force currently employs this approach—referred to as current management—to extend the life of GPS satellites. According to the Air Force, it would also be possible to significantly reduce a satellite’s consumption of power and further extend the life of its PNT mission by shutting off a second payload on a GPS satellite once the satellite could not generate enough power to support both the missions. Shutting off the second payload once the satellite cannot support both missions—known as power management—would further mitigate the impact of a delay in GPS III. However, the impact is limited to increasing the predicted size of the constellation by about 1 satellite. For example, **if the GPS III program were delayed by 1 year, the guaranteed size of the constellation** (at the 95 percent confidence level) **would decline to about 21 satellites by** fiscal year **2017** if current management were employed and to about 22 satellites if power management were employed. See figure 5 for details. **If the GPS III program were delayed by 2 years, the guaranteed size of the constellation** (at the 95 percent confidence level) **would decline to about 18 satellites by** fiscal year **2018** if current management were employed and to about 19 satellites if power management were employed. See figure 6 for details.

# Case

### Inherency

**Congress cut funding for GPS III**

**National Executive Committee 11** (“Fiscal Year 2012 Program Funding,” 10/3/11, National Executive Committee for Space-Based PNT, http://www.pnt.gov/policy/legislation/funding/2012.shtml)

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**Cuts devastate GPS III budget**

**Gibbons 11** (“The Fire Next Time,” Glen, Editor and Publisher of Inside GNSS, managing partner of Gibbons Media & Research LLC, July/August 2011, http://www.insidegnss.com/node/2709)

Common interests abound, and I’m not just referring to the RF issues that fuel the present furor. Already, some in Congress seem to be toying with the idea of requiring receiver standards that could include GPS products. In the great national deficit debate, **program budgets are often laid waste — this year congressional committees have already whacked FY12 funds for GPS III** and OCX space and ground **segment modernization.**

### Vulnerable now

**Signals are vulnerable now**

**DOE 12** (Vulnerability Assessment Team (VAT), “GPS is easy to spoof”, <http://www.ne.anl.gov/capabilities/vat/spoof.html>, ZBurdette)

The Global Position System (GPS) is increasingly being used for crucial safety and security applications such as emergency response services, law enforcement, cargo security, nuclear materials transport, aircraft navigation, and critical time & synchronization standards for utilities, telecommunications, and computer networks. This heavy reliance on GPS may be a mistake. The Department of Transportation (DOT) has warned that the civilian GPS signals (the only ones available to most government users and all private users) are not secure. Few GPS users are paying attention. In a recent paper [Journal of Security Administration 25, 19-28 (2003)], the VAT demonstrated how civilian GPS satellite signals can be easily spoofed, not just jammed. With spoofing, an adversary provides fake GPS signals. This convinces the GPS receiver that it is located in the wrong place and/or time. Remarkably, spoofing can be accomplished without having much knowledge about electronics, computers, or GPS itself.

**Defenses aren’t adequate**

**Charette 12** (Robert, interviewing Humpreys: assistant professor in the department of Aerospace Engineering and Engineering Mechanics at the University of Texas at Austin, M.S. in Electrical and Computer Engineering, Ph.D. in Aerospace Engineering from Cornell University, July 6, “Drones and GPS Spoofing Redux”, <http://spectrum.ieee.org/riskfactor/aerospace/aviation/-drones-and-gps-spoofing-redux>, ZBurdette)

Charette: Okay. Now, the Association of Unmanned Vehicle Systems International (AUVSI) put out a statement in response to your demonstration that states in part that, "The industry is well-aware of so-called ‘spoofing’ and is already advancing technologies, such as Selective Availability Anti-Spoofing Module (pdf) – to prevent it. This technology is already in use by the military to thwart GPS spoofing abroad and we expect it will transition to civilian unmanned aircraft in the coming years to protect aircraft flying in the National Airspace. Meanwhile, some unmanned aircraft also have alternate navigation systems, such as radio links and backup inertial systems, which will provide redundancy to GPS." The statement goes on to say that there is always a controller ready to intervene in case of problems. Do you have any comments on their statement and their position? Humphreys: Sure. Well, I like to make clear from the very beginning that I am a big fan of drones and I'm looking forward to the time when I can get Chipotle burritos delivered to my doorstep with a drone and other takeout foods, other great efficiency boosts to the national economy, etc. So I am not an enemy of drones as they come onto our national stage. I simply want the adoption of drones, the incorporation of drones, to be done safely. As far as the SAASM receivers being used in civilian drones, these are the SAASM-type receivers that are typically used in military context. I don't think it's likely that will see SAASM military-grade receivers incorporated into civilian drones. These have been a huge logistical headache for the military. You have to re-key them every few months and you have to keep them only in a trusted community. I don't see them proliferating among civilians. And what about redundancies on UAVs that can help protect against any kind of GPS sabotage or GPS hacking like we've done? I believe that is a good way forward; unfortunately most of the drones today don't have a sufficient sense of paranoia about their GPS readout, so they don't double-check things. We shouldn't also be lolled into any kind of false sense of security here to the extent that you depend on GPS, to the extent that you use it in any way - civilian GPS - you are vulnerable to a spoofing attack. So even though you might have other sensors against which are cross-referencing GPS, those sensors tend to drift in the case of inertial sensors or altimeters, etc. We tend to always go back to GPS as the bedrock against which we compare these drifts and estimate biases. So if an attack is carried out slowly, under the drift rate of your inertial measurement package, for example, then it can still be effective and dangerous. So I would caution against too much optimism in what we can do by just cross-checking against our sensors.

### Interference Scenario

**Large scale interference to GPS is coming now**

**Scolese et al. 11** (Save Our GPS, a coalition of industries, <http://www.saveourgps.org/pdf/Whitepaper_GPS_Threatened_With_Widespread_Interference_May_2011.pdf>, ZBurdette)

LightSquared plans to transmit radio signals that would be one billion or more times more powerful than the signals that GPS receives- potentially causing severe interference impacting hundreds of millions of GPS users. This includes receivers used by U.S. federal agencies, state and local governments, first responders, airlines, industry, civil engineering, construction and surveying, agriculture, and everyday consumers in their cars and on hand-held devices. Results of initial technical analyses show that GPS signals, which are low-powered and originate from distant satellites, would receive substantial interference from LightSquared's network of high-powered, close-proximity ground station transmissions. GPS satellites are solar powered and send signals using 50 or fewer watts, about what it takes to power a refrigerator light bulb. That signal then travels 12,000 miles, and the resulting amount of power received on Earth by a GPS receiver is extremely faint. Contrast that to LightSquared's planned ground transmissions powered with 1,500 watts of power transmitting as short a distance as a few hundred feet. This leads to a situation where the low powered, distant GPS signals would be "drowned out" by the nearby, high-powered transmissions in the immediately neighboring frequency band.

**Interference uniqueness**

**HTIC 11** (The House Transportation and Infrastructure Committee, “JOINT SUBCOMMITTEE HEARING FOCUSES ON POTENTIAL GPS INTERFERENCE WITH AVIATION AND MARINE TRANSPORTATION SAFETY”, June 23, 2011, <http://transportation.house.gov/News/PRArticle.aspx?NewsID=1326>, ZBurdette)

“Analysis conducted by two independent technical teams show significant GPS interference would result if LightSquared were to roll out its terrestrial network as originally planned. In fact, the government team, the National Space-Based PNT Systems Engineering Forum (NPEF), recommended that the FCC rescind the waiver which allows LightSquared to proceed in its plans to offer service in the spectrum neighboring GPS.

### GPS leadership scenario

**The US leads GPS now---but other countries are starting to surpass it**

**Scolese et al. 11** (Save Our GPS, a coalition of industries, <http://www.saveourgps.org/pdf/Whitepaper_GPS_Threatened_With_Widespread_Interference_May_2011.pdf>, ZBurdette)

The Global Positioning System was first launched more than 30 years ago and is now a critical and extremely reliable part of our national infrastructure. Millions use it routinely every day. The Federal government has invested $35 billion in the GPS satellite constellation alone, and many more billions in critical systems that use GPS. Industry and users have also spent billions on GPS based technologies and devices. The US is the world's leader in GPS technology, and our GPS infrastructure is the envy of the world. Russia, China, and the European Union are all building competitive systems that could supersede a hobbled US system.

**New GPS satellites solve**

**Kienitz 11** (Roy, Under Secretary for Policy of the DOT, “GPS Reliability: A Review of Aviation Industry Performance, Safety Issues and Avoiding Potential New and Costly Government Burdens”, <http://republicans.transportation.house.gov/Media/file/TestimonyAviation/2011-06-23%20Keintz.pdf>, ZBurdette)

As with so many other technologies that we have pioneered, our leadership in GPS technology and application is opening new doors to American R &D and creating countless new jobs. Each new satellite that we launch, and each new ground augmentation we develop, not only makes our nation safer and more efficient, but increases our leadership potential exponentially.

### Jamming

**GPSIII is key to boost signal strength to prevent jamming**

**Hyten 08** (“GPS On and Off the Battlefield: An Interview with Brig Gen John E. Hyten,” High Frontier, the Journal for Space & Missile Professionals, May 2008, <http://www.afspc.af.mil/shared/media/document/AFD-080522-087.pdf>)

Hyten: To me the most important thing **GPS III** brings is a larger bus, which is the platform of the satellite. It allows you to do additional things. It **has more power** so it can provide more power to the ground. **The GPS signal right now is very weak, GPS III will provide signals that would be hard to interfere with, either accidentally or on purpose**. In the future we will have a more robust power system in space. We can then transmit a more powerful signal to the ground. We will have a lot of **anti-jam capabilities** on those future satellites that **will make the system more difficult to jam, more robust, more capable, and will allow us to fight through a lot of different problems** that we really can’t do with the previous versions. Our efforts are focused on the warfighter. Most of the **new capabilities** are designed to **provide** that ensured **navigation and timing signal to warfighters around the world**.

**Rogue states can jam GPS signals**

**Ars technica 12** (“North Korea pumps up the GPS jamming in week-long attack”, <http://arstechnica.com/information-technology/2012/05/north-korea-pumps-up-the-gps-jamming-in-week-long-attack/>, ZBurdette)

Over the past two weeks, North Korea has used jamming equipment to interfere with global positioning system (GPS) signals near South Korea’s two largest airports outside its capital city Seoul and across the center of the Korean peninsula. The jamming caused no accidents or loss of life, but it demonstrates that North Korea is getting more and more brazen in its efforts to mess with South Korea's high-tech infrastructure. In 2010, South Korean Defense Minister Kim Tae-young said that North Korea had imported truck-based jamming systems from Russia that could jam GPS signals out to a 100 kilometer radius. Since then, there have been at least three GPS-jamming incidents along the border—which is just 60km north of Seoul. GPS jamming could conceivably be used by itself or in combination with other electronic and network-based attacks to disrupt South Korea’s highly digital society, and perhaps cause aircraft or ships to stray into North Korean territory. And as Ars reported in February, public safety experts say that even jamming on a small scale can create a security threat, especially in coastal waters like those west of Seoul. In the latest incident, according to a report from the Korea Herald, a total of 553 aircraft flying in and out of South Korea’s Inchon and Gimpo airports reported failures of GPS systems, as did hundreds of ships and fishing boats in the West Sea. The jamming signals, which were first detected on April 28 and apparently ended on May 6, were traced to the North Korean border city of Kaeson. The jamming—the most large-scale effort to block GPS signals by North Korea thus far—is seen by South Korean defense officials as a demonstration of the North’s wider efforts to build up electronic and cyber warfare capabilities. It’s also a much cheaper way to attempt to intimidate the South than the recently failed attempt to put a satellite into orbit. Lee Sang-wook, chief of South Korea’s Electronics and Telecommunications Research Institute’s satellite navigation research team, told the Herald, “If it takes the right approach, North Korea can send out jamming signals over a wide bandwidth, affecting the greater number of facilities without consuming much energy, say, for costs as low as 100,000 won (about $88 US).”

### Military IL

**GPS is key to global economic infrastructure and US military effectiveness**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>

The GPS is a space-based positioning, navigation and timing (PNT) system developed by the DoD and currently managed by the U.S. government through an interagency process that seeks to fuse civilian and military interests. That process was the subject of the recently signed Presidential Directive. The U.S. Air Force finances and operates the system of 24+ GPS satellites (distributed in six orbital planes) and a control segment with associated ground monitoring stations located around the world. GPS signals permit simultaneous determination of both precise three-dimensional position and precise time. GPS was the first and remains the only global, three-dimensional radio navigation and timing system providing continuous operational service today. Its civil signal represents a commodity service, provided as a public good by the U.S. government (for safe navigation, improved quality of life and diverse economical purposes) and freely available to all without direct cost or other encumbrance. Its military signals are encrypted for exclusivity of access by U.S. and allied military forces. GPS Pervades National Security and Economic Infrastructures – GPS is vital to the United States and to the DoD because, as a fundamental information system, it provides a common thread of precise position and time throughout our national security and economic infrastructures. This global, seamless service is invaluable for safe and efficient movement, measurement, and tracking of people, vehicles, and other objects anywhere from the earth’s surface to geosynchronous orbit, as well as providing timing and synchronization for global communications, electronic transactions of all types, and power-distribution networks. GPS is used by national mapping agencies worldwide as a basic component of geographic information systems and for natural hazards mitigation (earthquakes, volcanoes, sealevel rise), climate monitoring, severe storm predictions, and in characterizing space weather (ionosphere). Scientific applications involving GPS on-board Low Earth orbiters are revolutionizing weather forecasting and gravity field determination from space.

**GPS is key to overall military effectiveness and integrating Net Centric Warfare in the military**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>

GPS Quietly Underpins Quality of Life and Economic/Military Performance -- GPS represents a quintessential enabling technology – but one whose contributions are not always apparent, recognized or widely publicized. GPS services directly enable improved mobility, warfighting and communications and indirectly enable many other national infrastructure components to function more efficiently, safely and economically than they could in the absence of GPS. These infrastructure components interact to create quality of life for our citizens, enhance safety of life in our enterprises and produce efficiencies that sustain and enhance our economic performance and provide a critical advantage in military actions. Through its contributions, GPS has not only created its own service infrastructure that must be maintained at a high level of robustness and availability, it has also become an indispensable component of many other infrastructures on which our nation depends. These include telecommunications, electrical power distribution, banking and finance, transportation, emergency services, and military operations and involve hundreds of applications whose discrete contributions are virtually impossible to quantify. GPS Brings Safety & Precision to Military Operations – Militarily, GPS provides a constant worldwide source for highly precise position and time, both of which are critical for the safe and efficient conduct of military operations and for a transformation to net-centric operations. GPS enhances interoperability in all aspects of military combat operations because of its common-datum, common-grid, and commontime capabilities. GPS has also been the catalyst for precision operations by increasing individual weapon effectiveness and minimizing collateral damage, a combination relevant to the new Air Force initiative of the Small Diameter Bomb. This new concept requires extremely precise target location and weapon delivery and, consequently, is particularly demanding of accuracy and availability from GPS. GPS Becoming a Global Standard – Internationally, GPS provides significant benefits for civil and scientific users. GPS enables global georeferencing – tying all points to a common grid. Also, GPS observations dominate contributions to realizing the International Terrestrial Reference Frame (ITRF) - which even Galileo will adhere to.

### Econ IL

**Jamming collapses trade**

**Solon 12** (Olivia, “GPS 'spoofers' could be used for high-frequency financial trading fraud”, <http://www.wired.co.uk/news/archive/2012-02/22/gps-spoofing>, ZBurdette)

GPS "spoofers" -- devices that create false GPS signals to fool receivers into thinking that they are at a different location or different time -- could be used to defraud financial institutions, according to Todd Humphreys from the University of Texas. On an innocuous level, GPS spoofing can lead to the confusing of in-car GPS systems so that users think they are in a different location to their actual location. However, a more sinister use could be to interfere with the time-stamping systems used in high frequency trading. Financial institutions depend on timing that is accurate to the microsecond on a global scale so that stock exchanges in, say, London and New York are perfectly synchronised. One of the main ways of doing this is through GPS, and major financial institutions will have a GPS antenna on their main buildings. "They are always visible because they need a clear view of the sky," Humphreys told Wired.co.uk. He explains that someone who directed a spoofer towards the antenna could cause two different problems which could have a major impact on the largely automated high-frequency trading systems. The first is simply causing confusion by manipulating the times -- a process called "time sabotage" -- on one of the global stock exchanges. This sort of confusion can be very damaging. If the automated trading systems notice something anomalous they will back out of the market; this happened in 2010 during the Flash Crash of 2.45. Secondly, it could used by an unscrupulous individual or an organisation to change the timestamp of a particular market to give them, for example, a 20 millisecond trading advantage. They could exploit that knowledge for financial gain through inter-market arbitrage.

**And it causes a stock liquidity crisis**

**Roberts 12** (John, “GPS at risk from terrorists, rogue nations, and $50 jammers, expert warns”, <http://www.foxnews.com/tech/2012/02/23/gps-emerging-threat/?test=latestnews>, ZBurdette)

Hijacking a cargo container is one thing. Spoofing the global financial system is quite another. In his London presentation, Humphreys warned about another emerging GPS threat -- the worldwide network of stock and commodity trades. Every trade is time-stamped using GPS clocks. Computer programs monitor those time stamps down to the millisecond. If something seems amiss, many programs are designed to pull out of the market. Humphreys says a hacker could fairly easily interfere with those time stamps, triggering trading programs, creating a sudden liquidity crisis and potentially a mini market crash.

### Terrorism Scenario

**Drones can be used for terrorist attacks**

**BBC 12** (29 June, “Researchers use spoofing to 'hack' into a flying drone”, <http://www.bbc.co.uk/news/technology-18643134>, ZBurdette)

A University of Texas at Austin team used "spoofing" - a technique where the drone mistakes the signal from hackers for the one sent from GPS satellites. The same method may have been used to bring down a US drone in Iran in 2011. Analysts say that the demo shows the potential danger of using drones. Drones are unmanned aircraft, often controlled from a hub located thousands of kilometres away. They are mostly used by the military in conflict zones such as Afghanistan. Todd Humphreys and his colleagues from the Radionavigation Lab at the University of Texas at Austin hacked the GPS system of a drone belonging to the university. They demonstrated the technique to DHS officials, using a mini helicopter drone, flown over a stadium in Austin, said Fox News, who broke the story. "What if you could take down one of these drones delivering FedEx packages and use that as your missile?" Fox News quoted Mr Humphreys. "That's the same mentality the 911 attackers had." Potential dangers The spoofed drone used an unencrypted GPS signal, which is normally used by civilian planes, says Noel Sharkey, co-founder of the International Committee for Robot Arms Control. "It's easy to spoof an unencrypted drone. Anybody technically skilled could do this - it would cost them some £700 for the equipment and that's it," he told BBC News. "It's very dangerous - if a drone is being directed somewhere using its GPS, [a spoofer] can make it think it's somewhere else and make it crash into a building, or crash somewhere else, or just steal it and fill it with explosives and direct somewhere. "But the big worry is - it also means that it wouldn't be too hard for [a very skilled person] to work out how to un-encrypt military drones and spoof them, and that could be extremely dangerous because they could turn them on the wrong people.

### 2AC Solvency

**Current GPS Capabilities are ineffective – stable federal funding for more GPSIII satellites are key to efficiency**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>, victor]

Based on the forgoing, the current schedule and future investment plan for GPS involves significant risk of sustaining sufficient satellites for a full constellation. The current on-orbit inventory is 28 satellites; however, with expected failures, the AF Space Command December 2004 PNT Functional Availability Report reflects a nominal probability between 5 – 20 percent and a worst-case probability between 20-40 percent that the constellation will fall to fewer than 24 satellites in the 2007-2012 period based on current satellite replacement schedules. The Air Force has committed for the long term to maintaining only a 24 satellite constellation. While this may be satisfactory for aviation and open ocean maritime missions, the Task Force does not consider it sufficient to support missions in confined urban areas and mountainous regions of the world. The nominal 24-satellite constellation only ensures consistent four satellite coverage with mask angles (angle to horizon which cuts off GPS reception) above five degrees elevation, a value the Task Force finds to be inadequate for surface operations. For missions involving land operations, assuring availability of four satellites above a fifteen-degree mask angle will provide adequate signals to support operations in urban and mountainous areas. To achieve at least four satellite coverage above fifteen degrees elevation requires at least a thirty satellite constellation. The Task Force considers this to be vitally important to obtaining the broadest military utility from GPS for future operations and a major factor in system design decisions for GPS III. Considerations for 30-satellite GPS III constellation configurations include adding one satellite to each of the existing six planes or changing the constellation to a three-plane configuration with ten satellites per plane. The Task Force is aware that many studies have been performed and computer simulations conducted relative to GPS constellation design over the past three decades. While the studies show relative strengths and weaknesses for both three- and six-plane configurations, on balance, the Task Force consensus is that a three-plane constellation is the more effective design. Further, if GPS III satellite weight can be constrained to permit two satellites at a time to be launched on a medium-lift booster, the three plane configuration will be more economical to sustain than six-planes. Recall from Section 1.2 that the original GPS constellation design was a three-plane configuration; the six plane design was only adopted when the satellite

count dropped to 18 and coverage had to be spread more thinly.

**Status qou GPS will fail – GPSIII is key to efficiency**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>, victor]

The GPS Operational Control Segment (OCS) consists of a software intensive Master Control Station (MCS) at Schriever AFB, CO connected to a global network of six monitor stations (Schriever, Cape Canaveral, Hawaii, Kwajalein Atoll, Diego Garcia and Ascension Is.) and uplink antennas at Kwajalein, Diego Garcia, Ascension Is. and Cape Canaveral. Additional antennas can be used if necessary, though access for GPS use must be separately scheduled. The MCS is operated by the Air Force 2nd Satellite Operations Squadron (2SOPS). Monitor stations are unmanned and maintained by contractor personnel. With Air Force acquisition attention in recent years focused on GPS satellites and signal structure, the Task force believes the control segment has been seriously neglected. As the system was becoming operational in 1993-1995, delays in control segment software deliveries (IBM Federal Systems – Loral – Lockheed Martin) began to be a problem. Since that time, the problems have been sporadically addressed but never really solved. The Block IIF contract placed responsibility for both the Block IIF space segment and control segment under the prime; however delivery delays continued, and coordination between Block II/IIR and Block IIF software was an additional problem. A further change of contractor responsibility called the Single Prime Initiative was supposed to bring improvement, but it was accompanied by additional software delivery segmentation and capability deferrals – necessary to maintain baseline system performance. The control segment currently operates with a combination of Commercial Off-The Shelf (COTS) and uniquely modified COTS products that are minimally adequate for maintaining system integrity. In addition to the chronic software problems, Air Force Space Command has routinely deferred equipment maintenance and modernization of the monitor stations and ground antennas. As of today, the control segment is operating the GPS constellation of Block IIA and Block IIR satellites basically as Block IIA satellites. Activations of improved signal processing capabilities already in space in the baseline Block IIR satellites have been deferred for up to 7 years, and attention is focused on delivery and test of operational software necessary to minimally operate the new versions of Block IIR-M and Block IIF that will be in space beginning in 2005 and 2007, respectively. Over the last several months, funding shortages have forced the Air Force to terminate work already on contract for Versions 6.0 and 6.1 of OCS software. These software versions are necessary to permit operation of all the new signals being launched on Block IIR-M and Block IIF satellites. Version 6.0 allows operational control of L2C and L5, and Version 6.1 allows operational control of the military M-Code. Version 6.0 was also intended to implement the flex-power initiative and permit power shifting among the available signals as dictated by operational priorities. Delivery of both versions had recently slipped to 2009 and 2010, respectively, and new delivery dates are now forecast in 2010-2011. With termination of those elements of control software from the current contract, the Task Force considers it essential that new signals be activated on launch of each Block IIR-M and Block IIF satellite and made available at the users’ risk for testing and other applications, even if they cannot be declared operational until some time in the future. Based on this history of chronic problems, the intent of the GPS III effort is to replace rather than upgrade the existing control infrastructure. However, even when GPS III satellites eventually begin to replace the Block II versions, experience indicates that legacy satellites will likely require operational support well beyond 2020. The ability of the control segment to absorb further new requirements and implement additional operational changes is non-existent within current resources. The Task Force believes new approaches are necessary as soon as possible to enable consistent and timely operation of improved inspace capabilities. In this regard, the Air Force should also reevaluate the practice of a totally blue-suit operation at the MCS. Outsourcing of part of the operations mission or insertion of selected contractor support personnel could both aid in long-term operations continuity as well as in supporting consistent operation of new signal capabilities in advance of a “fully operational” declaration.

### AT: Cost Overruns

**Manufacturer fees solve cost overruns**

**Denver Post 12** (“Lockheed takes $70 million hitover GPS III satellite overruns”, <http://www.denverpost.com/business/ci_20411085/lockheed-takes-70-million-hitover-gps-iii-satellite>, ZBurdette)

Lockheed Martin will lose its entire fee of about $70 million to defray an 18 percent cost overrun on the first Global Positioning System satellites of a new design, according to the Air Force. The Air Force estimates the first two GPS-III satellites will cost $1.62 billion, spokeswoman Vicki Stein said in an e-mailed statement. Lockheed Martin has a $1.5 billion contract to build and test a prototype for the GPS III and the first two of what could be 32 GPS III satellites over 20 years. In January, Lockheed received a $238 million contract to build the third and fourth GPS III satellites for the Air Force. The work is being done in Lockheed Martin's Waterton Canyon facility in south Jefferson County, where a 40,000-square-foot processing facility has been constructed. The GPS III program is on schedule and the first satellite will be ready for launch in 2014, Lockheed spokesman Michael Friedman said in an e-mail. "While we have encountered challenges associated with higher standards for parts testing and first-time technical issues, the program remains on firm footing, and our cost estimate at completion remains within the original Air Force program office budget," Friedman said. He said it is company policy to not discuss specifics about incentives or fees. The GPS network, operated by the Air Force, provides navigation and timing for national security and civilian uses, from traffic-mapping devices in cars to tracking systems for freight. The new GPS-III satellites are designed to be more accurate, have anti-jamming capability and a civilian signal that can operate with Europe's Galileo system, the company says. Lockheed Martin's fee is 5 percent of the target cost, which includes one-time engineering tasks, test equipment and satellite assembly, the Air Force said. "Cost incentives on the contract" caused Lockheed Martin to lose the fee, although the government continues to bear the "cost-risk" for development and production of the first two satellites, Stein said.

# 2AC Add-On

### Ag

**GPS OPERATION KEY TO CROP YIELDS**

**GPS.gov 11** (“Agriculture,” National Coordination Office for Space-Based Positioning, Navigation, and Timing, <http://www.gps.gov/applications/agriculture/>)

Precision agriculture is now changing the way farmers and agribusinesses view the land from which they reap their profits. **Precision agriculture is about collecting timely geospatial information** on soil-plant-animal requirements and prescribing **and applying site-specific treatments to increase agricultural production** and protect the environment. Where farmers may have once treated their fields uniformly, they are now seeing benefits from micromanaging their fields. Precision agriculture is gaining in popularity largely due to the introduction of high technology tools into the **agricultural** community that are more accurate, cost effective, and user friendly. Many of the new **innovations rely on** the integration of on-board computers, data collection sensors, and **GPS time and position reference systems**. Many believe that the benefits of precision agriculture can only be realized on large farms with huge capital investments and experience with information technologies. Such is not the case. There are inexpensive and easy-to-use methods and techniques that can be developed for use by all farmers. **Through the use of GPS**, GIS, and remote sensing, **information needed for improving land and water use can be collected**. Farmers can achieve additional benefits by combining better utilization of fertilizers and other soil amendments, determining the economic threshold for treating pest and weed infestations, and protecting the natural resources for future use. GPS equipment manufacturers have developed several tools to help farmers and agribusinesses become more productive and efficient in their precision farming activities. Today, many farmers use GPS-derived products to enhance operations in their farming businesses. Location **information is collected by GPS receivers for mapping field boundaries**, roads, **irrigation systems, and** problem areas in crops such as **weeds or disease**. The accuracy of GPS allows farmers to create farm maps with precise acreage for field areas, road locations and distances between points of interest. GPS allows farmers to accurately navigate to specific locations in the field, year after year, to collect soil samples or monitor crop conditions. Crop advisors use rugged data collection devices with GPS for accurate positioning to map pest, insect, and weed infestations in the field. Pest problem areas in crops can be pinpointed and mapped for future management decisions and input recommendations. The same field data can also be used by aircraft sprayers, enabling accurate swathing of fields without use of human “flaggers” to guide them. Crop dusters equipped with GPS are able to fly accurate swaths over the field, applying chemicals only where needed, minimizing chemical drift, reducing the amount of chemicals needed, thereby benefiting the environment. GPS also allows pilots to provide farmers with accurate maps. **Farmers** and agriculture service providers **can expect even further improvements as GPS continues to modernize**. In addition to the current civilian service provided by GPS, the United States is committed to implementing a second and a third civil signal on GPS satellites. The first satellite with the second civilian signal was launched in 2005. **The new signals will enhance both the quality and efficiency of agricultural operations** in the future.

**Extinction**

Lugar 4 (Richard G., U.S. Senator – Indiana and Former Chair – Senate Foreign Relations Committee, “Plant Power”, Our Planet, 14(3), http://www.unep.org/ourplanet/imgversn/143/lugar.html)

In a world confronted by global terrorism, turmoil in the Middle East, burgeoning nuclear threats and other crises, it is easy to lose sight of the long-range challenges. But we do so at our peril. One of the most daunting of them is meeting the world’s need for food and energy in this century. At stake is not only preventing starvation and saving the environment, but also world peace and security. History tells us that states may go to war over access to resources, and that poverty and famine have often bred fanaticism and terrorism. Working to feed the world will minimize factors that contribute to global instability and the proliferation of weapons of mass destruction. With the world population expected to grow from 6 billion people today to 9 billion by mid-century, the demand for affordable food will increase well beyond current international production levels. People in rapidly developing nations will have the means greatly to improve their standard of living and caloric intake. Inevitably, that means eating more meat. This will raise demand for feed grain at the same time that the growing world population will need vastly more basic food to eat. Complicating a solution to this problem is a dynamic that must be better understood in the West: developing countries often use limited arable land to expand cities to house their growing populations. As good land disappears, people destroy timber resources and even rainforests as they try to create more arable land to feed themselves. The long-term environmental consequences could be disastrous for the entire globe. Productivity revolution To meet the expected demand for food over the next 50 years, we in the United States will have to grow roughly three times more food on the land we have. That’s a tall order. My farm in Marion County, Indiana, for example, yields on average 8.3 to 8.6 tonnes of corn per hectare – typical for a farm in central Indiana. To triple our production by 2050, we will have to produce an annual average of 25 tonnes per hectare. Can we possibly boost output that much? Well, it’s been done before. Advances in the use of fertilizer and water, improved machinery and better tilling techniques combined to generate a threefold increase in yields since 1935 – on our farm back then, my dad produced 2.8 to 3 tonnes per hectare. Much US agriculture has seen similar increases. But of course there is no guarantee that we can achieve those results again. Given the urgency of expanding food production to meet world demand, we must invest much more in scientific research and target that money toward projects that promise to have significant national and global impact. For the United States, that will mean a major shift in the way we conduct and fund agricultural science. Fundamental research will generate the innovations that will be necessary to feed the world. The United States can take a leading position in a productivity revolution. And our success at increasing food production may play a decisive humanitarian role in the survival of billions of people and the health of our planet.

### NextGen

**GPS is the underlying structure for NextGen**

**HTIC 11** (The House Transportation and Infrastructure Committee, “JOINT SUBCOMMITTEE HEARING FOCUSES ON POTENTIAL GPS INTERFERENCE WITH AVIATION AND MARINE TRANSPORTATION SAFETY”, June 23, 2011, <http://transportation.house.gov/News/PRArticle.aspx?NewsID=1326>, ZBurdette)

The potential impact of LightSquared’s planned broadband signal on the air traffic control modernization effort known as Next Generation Air Transportation System (NextGen) was especially emphasized, given its strong reliance on GPS. Not only might safety be compromised, but according to today’s witnesses, 150,000 new aviation sector jobs that would be created by NextGen could be threatened by any interference with GPS. The following are the opening statements of Chairmen Petri and LoBiondo: Chairman Petri: “Today, we will explore LightSquared’s plans to build out terrestrial broadband internet service and its potential impacts on GPS users, safety, and NextGen. Safety is a top priority of the Aviation Subcommittee. Sadly, advancements in aviation safety have often come only after fatal accidents. But, over the years, the FAA has shifted to a risk-based, data driven safety system in order to act proactively and prevent the loss of life. The Subcommittee supports this proactive effort to identify and address safety issues before there is an accident. “When a potential safety issue is brought to our attention, we must seek information and work with the community and FAA to ensure the risk is properly addressed. “The Global Positioning System, or GPS, serves a critical role in aviation safety airspace modernization, known as NextGen. “Aviation infrastructure--and efforts to update it with the DOT’s NextGen program--are a platform for growth in the U.S. economy and a key driver of economic activity. NextGen is also a key component for job creation within the aviation industry.

### Port Security

**GPS is essential for port security efforts**

**HTIC 11** (The House Transportation and Infrastructure Committee, “JOINT SUBCOMMITTEE HEARING FOCUSES ON POTENTIAL GPS INTERFERENCE WITH AVIATION AND MARINE TRANSPORTATION SAFETY”, June 23, 2011, <http://transportation.house.gov/News/PRArticle.aspx?NewsID=1326>, ZBurdette)

“During tests of the LightSquared signal, the Coast Guard observed varying levels of interference with GPS dependent technologies critical for search and rescue, port security, maritime safety, and environmental stewardship. I look forward to hearing testimony from the Coast Guard this morning elaborating on the issue of interference and what can be done to mitigate it.

### Laundry List

**GPS solves a litany of impacts**

**HTIC 12** (The House Transportation and Infrastructure Committee, February 8, 2012, “SUBCOMMITTEE HEARING EXAMINES GPS USE IN AVIATION INDUSTRY”, <http://transportation.house.gov/news/PRArticle.aspx?NewsID=1524>, ZBurdette)

Porcari added, “In addition to the transportation applications I mentioned, GPS is essential for the operations of first responders, search and rescue, resource management, weather tracking and prediction, earthquake monitoring, national security, and critical infrastructure such as dams and power plants, financial transactions, surveying and mapping, and industries such as precision agriculture, where the ability to fertilize plants with centimeter-level accuracy increases conservation, reduces waste run-off, and saves American farmers up to $14-30 billion, annually.” As important to aviation safety and efficiency as GPS is, and as far a reach as the GPS system has in the economy, the system is vulnerable to interference due to a relatively weak signal broadcast from space. Since current aviation operations, as well as NextGen, are dependent on GPS, some in the aviation community have pointed to potential negative impacts GPS interference may have on aviation safety, air traffic control modernization, and job creation within the aviation industry.

**Laundry list of scenarios**

**Scolese et al. 11** (Save Our GPS, a coalition of industries, <http://www.saveourgps.org/pdf/Whitepaper_GPS_Threatened_With_Widespread_Interference_May_2011.pdf>, ZBurdette)

Significant interference with GPS would endanger the use of GPS in many critically important sectors, including: Homeland Security: GPS equipment is widely used by the Departments of Defense, Interior, Transportation, Commerce and Homeland Security. Federal, state, and local government employees rely on GPS equipment in disaster response, public safety, and security and management of national assets and infrastructure. Public Safety: First responders such as law enforcement, fire fighters, and emergency medical personnel rely on GPS day-in and day-out to provide critical instant location and route information. Consumers: Millions of Americans use GPS-enabled consumer devices in their cars and on their cell phones and other hand-held devices as vital, reliable every day navigational tools. Aviation: More than 150,000 aircraft use GPS receivers. GPS and the Wide Area Augmentation System - which would also be affected -- have long been approved by the Federal Aviation Administration for aircraft navigation and GPS instrument approaches now provide a landing system option at the many U.S. airports which lack land-based instrument landing systems. GPS also plays a critical role in the FAA Next Generation Air Transportation System, designed to modernize air traffic control and meet expanded air traffic capacity. Marine: GPS is used for navigating the open seas as well as congested harbors, ports and waterways by commercial vessels, search and rescue operations and recreational boating. It is also used for commercial fishing, underwater surveying, dredging, marine construction, buoy placement, navigational hazard location and mapping as well as automated container placement and management in some of the world's largest ports. Transportation: GPS equipment is used in critical asset management activities for road and rail infrastructure - improving efficiency, lowering costs and enabling better decision making. The Federal Rail Administration's Positive Train Control mandate further drives the use of GPS to prevent train-to-train collisions, derailments, and casualties or injuries to railway workers. GPS is used to help fleets lower fuel consumption and decrease their carbon footprint. Agriculture: Farmers use GPS to in precision agriculture to improve planting efficiency and increase crop yields, more efficiently use scarce water and fuel, and comply with U.S. Department of Agriculture reporting regulations. GPS allows for the precise application of pesticides and fertilizer, reducing environmental impacts, and is used in nearly 95 percent of all crop dusting. Forestry: The U.S. Forestry industry and Forest Service use GPS in forest land management and for Forest Automation Systems that improve logging efficiency and reduce environmental harm. Engineering and Construction: The U.S. building, construction, and civil engineering industry - one of the economic sectors most severely impacted by the recent recession - has made large investments in the use of GPS technology to modernize and automate construction sites, machines and processes. GPS is also used to monitor the movement of bridges, dams, mines, and other natural and manmade structures. Surveying, Mapping, and Land Management: GPS is an essential part of the national geodetic infrastructure and is used in surveying and mapping activities necessary for land title transactions, land development, civil engineering and accident investigations as well as the field creation, maintenance and use of geographic information systems (GIS) databases that underpin our national digital mapping infrastructure. Utilities: GPS signals aid utility services such as electrical power, water, gas and telecommunications in multiple ways. This includes synchronizing utility networks and the power grid, maintaining and managing infrastructure and coordinating rapid responses to network outages and incidents. Natural Resources: Natural resources industries engaged in the exploration, production and distribution of energy and minerals rely on the GPS service throughout their operations. Disaster Management and Scientific Research: High-accuracy GPS networks are deployed along crustal faults and around volcanoes. The resulting data is used to study and better understand crustal movements that cause earthquakes and volcanic eruptions. In addition to disaster prevention and relief, GPS is also used for weather services and scientific research.

### Transportation Congestion

**GPS effectiveness prevents transportation congestion**

**Nick 12** (Trinity, “GPS: A Key In Tackling Overpopulation”, <https://techpatio.com/2012/articles/gps-key-tackling-overpopulation>, ZBurdette)

More and more industries are looking towards innovations like GPS vehicle tracking software to tackle the transportation landscape of the future. Back in February, Bill Ford, chairman of Ford Motor, spoke at the annual Mobile World Congress in Barcelona, where he urged governments, the auto world, and communication companies to work together in solving global gridlock. Many experts predict that if traditional driving infrastructure remains the same by 2050, overpopulation will make traffic jams in certain urban areas unending. The future of highway and transportation infrastructure is clearly one where vehicle navigation is coordinated on a network. While these calls for refining existing technology, GPS tracking products already hold the key to Mr. Ford’s vision becoming a reality very soon. Vehicle locators, fleet management systems, and data logging are all features and variations of GPS that are already out on the roads providing better organization and flow of vehicle movement. Partnerships like the ones Ford and AT&T Wireless made for the Ford Focus Electric can facilitate GPS in becoming not just an accessory to standard driving infrastructure, but the main component of driving infrastructure itself.

# 2AC Blocks

### AT: T---“TI”

**GPS is a part of transportation infrastructure**

**The House Transportation and Infrastructure Committee 12** (February 8, 2012, “SUBCOMMITTEE HEARING EXAMINES GPS USE IN AVIATION INDUSTRY”, <http://transportation.house.gov/news/PRArticle.aspx?NewsID=1524>, ZBurdette)

The Subcommittee on Aviation, chaired by U.S. Rep. Tom Petri (R-WI) held a hearing this morning to review the Global Positioning System (GPS) as a critical part of transportation infrastructure. GPS is the global navigation satellite system (GNSS) that provides position and timing information at any place on the globe with a high degree of accuracy. The use of GPS in the aviation industry benefits safety and efficiency by providing highly reliable information when compared to the 1950’s era based technology currently in use. GPS will soon replace radar in the primary surveillance method, and the Department of Transportation (DOT) and the Federal Aviation Administration (FAA) already utilize GPS technology in a broad variety of surveillance, navigation, safety, and efficiency applications. “Today’s hearing brought focus on the importance of the Global Positioning System to aviation and the broader economy. Witnesses’ testimony further underscored the vital nature of GPS as an element of transportation infrastructure, ensuring the safe and efficient use of the aviation system,” said Chariman Petri.

**DoT has the authority to operate, upgrade, and manage all GPS systems**

National Executive Committee for Space-Based PNT 04

[U.S. Space-Based Positioning, Navigation, and Timing Policy, December 15, 2004, <http://www.pnt.gov/policy/2004-policy.shtml>]

The Secretary of Transportation shall: Have lead responsibility for the development of requirements for civil applications from all United States Government civil Departments and Agencies; Ensure, in cooperation with the Secretary of Defense and the Secretary of Homeland Security, the performance monitoring of U.S. civil space-based positioning, navigation, and timing services; Consistent with the guidance in Section V of this policy, and in coordination with the Secretary of Commerce and the Secretary of State, facilitate: (1) foreign development of civil positioning, navigation, and timing services and systems based on the Global Positioning System; and (2) international participation in the development of civil applications for U.S. space-based positioning, navigation, and timing services; Ensure, in coordination with the Secretary of Defense, that space-based positioning, navigation, and timing public safety services meet or exceed international performance standards, including but not limited to those used for these services in aviation and/or maritime applications; In cooperation with other Departments and Agencies, promote the use of U.S. civil space-based positioning, navigation, and timing services and capabilities for transportation safety; Represent the civil Departments and Agencies in the development, acquisition, management, and operations of the Global Positioning System; Develop, acquire, operate, and maintain Global Positioning System space or terrestrial augmentations for civil transportation applications; Ensure the earliest operational availability for modernized civil signals and services on the Global Positioning System and its augmentations,

**DoT has primary authority over managing and developing civil GPS technologies in the United States**

NSC 96 [National Security Council, Office of Science and Technology Policy, March 29, 1996 FACT SHEET U.S. GLOBAL POSITIONING SYSTEM POLICY, <http://clinton2.nara.gov/WH/EOP/OSTP/html/gps-factsheet.html> Agency Roles and Responsibilities]

The Department of Defense will: Continue to acquire, operate, and maintain the basic GPS. Maintain a Standard Positioning Service (as defined in the Federal Radionavigation Plan and the GPS Standard Positioning Service Signal Specification) that will be available on a continuous, worldwide basis. Maintain a Precise Positioning Service for use by the U.S. military and other authorized users. Cooperate with the Director of Central Intelligence, the Department of State and other appropriate departments and agencies to assess the national security implications of the use of GPS, its augmentations, and alternative satellite-based positioning and navigation systems. Develop measures to prevent the hostile use of GPS and its augmentations to ensure that the United States retains a military advantage without unduly disrupting or degrading civilian uses. The Department of Transportation will: Serve as the lead agency within the U.S. Government for all Federal civil GPS matters. Develop and implement U.S. Government augmentations to the basic GPS for transportation applications. In cooperation with the Departments of Commerce, Defense and State, take the lead in promoting commercial applications of GPS technologies and the acceptance of GPS and U.S. Government augmentations as standards in domestic and international transportation systems. In cooperation with other departments and agencies, coordinate U.S. Government-provided GPS civil augmentation systems to minimize cost and duplication of effort. The Department of State will: In cooperation with appropriate departments and agencies, consult with foreign governments and other international organizations to assess the feasibility of developing bilateral or multilateral guidelines on the provision and use of GPS services. Coordinate the interagency review of instructions to U.S. delegations to bilateral consultations and multilateral conferences related to the planning, operation, management, and use of GPS and related augmentation systems. Coordinate the interagency review of international agreements with foreign governments and international organizations concerning international use of GPS and related augmentation systems.

**GPS is transportation infrastructure**

**Adams 1** [Bill, “U.S. COAST GUARD NAVIGATION CENTER”, U.S. Department of Transportation, Sept 1, <http://www.navcen.uscg.gov/?pageName=pressRelease>]

The U.S. Department of Transportation (DOT) today released the results of a study assessing the vulnerability of the national **transportation infrastructure** that **relies on** the Global Positioning System (**GPS**) (Adobe Acrobat). The study notes that GPS is susceptible to unintentional disruption from such causes as atmospheric effects, signal blockage from buildings, and interference from communications equipment, as well as to potential deliberate disruption. It contains a number of recommendations to address the possibility of disruption and ensure the safety of the national transportation infrastructure. The report was mandated by a Presidential Decision Directive and prepared by the DOT Volpe National Transportation Systems Center. “This report provides a roadmap for addressing possible vulnerabilities in GPS so that we can continue maintaining the highest standards of transportation safety,” **said U.S. Transportation Secretary** Norman Y. **Mineta**. “The Department of Transportation takes this report’s findings very seriously, and **we will be working to ensure that GPS will fulfill its potential as a key element of the nation’s transportation infrastructure**.” Secretary Mineta charged the administrators of each DOT operating administration to thoroughly review this report and consider the adequacy of backup systems for each area of operation in which GPS is being used for critical transportation applications. The administrators are to report their findings back to the Secretary within 60 days. DOT, in consultation with the Department of Defense (DOD), sponsored the study to assure the continued safe operation of the U.S. transportation system. **All modes of transportation are increasingly reliant on GPS** and, according to the study, GPS is susceptible to various forms of interference. This study identified transportation operations that employ GPS, methods for GPS disruption, possible impacts to transportation safety, and approaches to ensure service reliability.

**GPS is a vital component of transportation infrastructure**

**GSN 2** [Global Security Newswire, “Transportation pledges to secure Global Positioning System”, March8, <http://www.govexec.com/defense/2002/03/transportation-pledges-to-secure-global-positioning-system/11207/>]

The Transportation Department will implement an action plan to secure the **G**lobal **P**ositioning **S**ystem, Transportation Secretary Norman Mineta announced Thursday. Emergency teams responding to an attack with weapons of mass destruction would use the system, which **supports U.S. transportation infrastructure.** The department's decision followed a September report by the Volpe National Transportation System Center that determined GPS is vulnerable to unintentional and intentional disruptions. The report offered several recommendations, and the department has concurred with all of them, according to a Transportation press release. "The action plan we are announcing today will ensure that the vulnerabilities identified in the report do not affect the safety and security of our transportation system as we work to ensure that **GPS fulfills** its potential as **a key element of the nation's transportation infrastructure**," Mineta said.

**Gov definition**

**DOT 2** (“DOT Vulnerability Study”, <http://www.mitrecaasd.org/library/presentations/navigation_workshop/DOT_Vulnerability_Study.pdf>)

Ensure that GPS fulfills its potential as a key element of the nation’s transportation infrastructure

**Err aff**

**Marshall 10** (Alex, “Getting in Front of Communication and Transportation Investments”, <http://www.governing.com/topics/transportation-infrastructure/getting-front-communication-transportation-investments.html>, ZBurdette)

Ultimately, communication and transportation are connected. The first transatlantic cable changed shipping in the 19th century by speeding the flow of information, which improved industrial production and the flow of people and goods. The federally subsidized Pony Express combined communication and transportation to make the frontier more livable and profitable. It’s no accident that government tends to invest in both communication and transportation, since so much progress stems from each of them. And the boundary between them is blurry. Is a truck delivering a load of newspapers engaged in communication, transportation or both? Advances in one often affect the other, just as my cell phone changed my need to travel to the bank.

**GPS is transportation infrastructure – the FAA and Coast Guard have embraced it as a vital part of their missions**

Defense Science Task Force 05 [Defense Science Board Task Force, The Defense Science Board provides independent advice to the Secretary of Defense.  The 13 member task force, chaired by Craig Fields and Lydia Thomas, “The Future of the Global Positioning System”, October 2005, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA443573&Location=U2&doc=GetTRDoc.pdf>]

2.2.4 Transportation Since GPS reached operational status in the early 1990s, its consistently high-quality performance and low cost of use have created dramatic changes in the civil and commercial transportation infrastructure. Two federal agencies, the U.S. Coast Guard and the Federal Aviation Administration (FAA), have both embraced GPS and have initiated programs to augment GPS accuracy. The Coast Guard initially began with a differential augmentation service to provide sub-10 meter accuracy using marine radio-beacons around the contiguous US coastline (Maine-Texas and California-Alaska), the Great Lakes and St. Lawrence Seaway, and the Mississippi and Missouri River watersheds. That service is now fully operational at an actual precision of 1-2 meters. The service has also been expanded to interior land applications in the last several years in a cooperative venture with the Federal Railroad Administration and the Air Force and called Nationwide Differential GPS (NDGPS). NDGPS is transmitting augmentation signals to provide one-meter accuracy to rail and other land users across the U.S. using Low Frequency signals from the obsolete AF Ground Wave Emergency Network which is being dismantled. This service was originally intended to support positive train control, but has service implications far beyond railways. At the same time, the FAA has implemented a multi-billion dollar program called the Wide-Area Augmentation System (WAAS) to increase the accuracy, reliability and availability of GPS-based services for aviation users by transmitting special augmentation signals over satellite communications links. The FAA has also begun a companion project called the Local Area Augmentation System (LAAS) wherein signals are transmitted in the area of an airport to aid instrument landings and ground operations. The WAAS is a model for international civil aviation ventures in Europe and Japan to provide seamless global augmentation to GPS. Japan is also planning a complementary space-based adjunct to GPS, transmitting civil GPS signals, called the Quazi-Zenith Satellite System (QZSS). The QZSS comprises a small number of satellites in an orbital arrangement configured to increase the number of civil GPS signals over Japan to improve availability in dense urban areas. In addition to these activities, foreign differential GPS services, mostly (but not all) government sponsored, are widely available to serve a diverse range of positioning (Geographic Information Systems) and transportation needs. Together, these international activities reflect a growing commitment to satellite navigation services, and specifically to GPS.

### AT: DA---Agenda

**The plan is popular**

**Wireless Industry News 11** (“LightSquared grilled by Congress over its ongoing GPS interference issues”, September 9, 2011, [http://www.wirelessindustrynews.org/news-sep-2011/2704-090911-win-news.html](http://www.wirelessindustrynews.org/news-sep-2011/2704-090911-win-news.html%22%20%5Ct%20%22_blank))

During a congressional hearing before the House Science Committee yesterday, LightSquared again found itself in some very hot water when it faced some very pointed questions about its network's impact on GPS service. At issue is the ongoing interference that its network is causing to GPS navigational systems aboard commercial aircraft, and the light approach that LightSquared has around these critical problems that can endanger the lives of passengers. On average, lawmakers voiced skepticism about LightSquared's ability to mitigate its network's effect on GPS, especially federal uses such as hurricane tracking, navigation systems and disaster response. "I just don't think we're quite there yet," California Democrat Jerry McNerney said during the hearing. "We need jobs, and this could help create them, but in my opinion we're not quite there yet."McNerney and other members of Congress at the hearing stopped short of calling for an outright block of LightSquared's planned LTE network, but made it very clear that the company would not be allowed to proceed if it was unable to resolve the severe GPS interference issues. "LightSquared has proposed a network to support the President's challenge to identify 500 megahertz of new mobile spectrum for broadband service. While the President's goal is certainly commendable, it should not be accomplished by destroying existing systems and applications, especially if such systems can endanger the lives of American citizens," said Texas Republican Ralph Hall, head of the House Science Committee. Other lawmakers also expressed a desire to move forward with expanded mobile broadband service, but said it would not come at the expense of GPS navigation systems. Hall and other members of Congress at the hearing called for more testing to be done before the FCC and the FAA allows LightSquared to begin commercial service. Lawmakers heard testimony from five top federal agencies, including NASA, the Transportation Department, the U.S. Geological Survey and the National Oceanic and Atmospheric Administration (NOAA). Witnesses from the agencies called for another round of thorough testing before LightSquared is allowed to move forward with its hybrid satellite-terrestrial mobile broadband service. When asked by Hall how the nation's weather forecasting could be effected by LightSquared's network, Mary Glackin, deputy under secretary of NOAA, said the agency "has concerns about the impacts of LightSquared." "GPS touches so many parts of our warning mission. I couldn't give you any confidence today that we would be able to deliver on that mission," Glackin said. "We need much more testing to understand that." Government agencies want to fully ensure LightSquared's revised plan to deploy its network in 10 MHz of spectrum further away from GPS bands will not affect receivers. LightSquared says the plan will resolve the interference problem for nearly all GPS receivers, but challenges remain for high-precision devices used by the military, aviation and agriculture industries. "LightSquared will address this issue for over 99 percent of the receivers currently used. These steps are not inexpensive to us, and they are not easy, but they can and must be done," said LightSquared spokesman Jeff Carlisle in his prepared remarks. "We are stepping up to this commitment so that Americans can get the benefit of our significant investment in critical infrastructure, and continue to have all the benefits of a robust and accurate GPS system that works under any conditions."

**Grassley loves the plan**

**Grassley 11** (Chuck, “Radio silence on new wireless service draws concern,” 2011, [http://www.grassley.senate.gov/about/Radio-Silence-on-New-Wireless-Service-Draws-Concern.cfm](http://www.grassley.senate.gov/about/Radio-Silence-on-New-Wireless-Service-Draws-Concern.cfm%22%20%5Ct%20%22_blank))

This week, as LightSquared was testing in Nevada, the Federal Aviation Administration warned that Global Positioning System service in a 300-mile area could be “unreliable or unavailable” for six-hour periods during testing, according to media reports. Other tests showed some disruption of this service for emergency first responders in New Mexico. A LightSquared official was quoted as saying the company doesn’t want to jeopardize national security or public safety interests. He also said, “We’re trying to get our arms around this problem.” Given the Federal Communications Commission’s haste so far, I worry that LightSquared will not have interference problems resolved before given the green light to become fully operational. Farmers shouldn’t have to worry that they’re planting the correct seed or applying the precise amount of fertilizer needed for the soil to optimally produce the crop, and ambulance drivers shouldn’t have to weather taking a wrong turn or driving into a ditch because a new system is scrambling their existing navigational technology. Just today, I joined 33 fellow senators in urging the agency to consider interference concerns.

**Grassley is key to the agenda**

**[Grassley.senate.gov](http://grassley.senate.gov/%22%20%5Ct%20%22_blank) 11** ([Grassley.senate.gov](http://grassley.senate.gov/%22%20%5Ct%20%22_blank), “Budget/Economy/Tax,” 2011, [http://www.grassley.senate.gov/issues/Budget\_Economy\_Tax.cfm](http://www.grassley.senate.gov/issues/Budget_Economy_Tax.cfm%22%20%5Ct%20%22_blank))

As a senior member of the Senate Budget Committee, Senator Grassley is one of the architects who maps out the federal government’s spending blueprint. After Congress adopts the budget resolution for the coming fiscal year, lawmakers then must determine how to raise revenue and spend tax dollars that will fit within the blueprint. Here is where the devil certainly lies in the details. It’s tough to get 535 members of Congress singing off the same song sheet, especially when it comes to deciding how tax dollars are raised and spent. Some members of Congress can’t raise taxes high enough to satisfy their spending appetites. The new majority leadership in Congress essentially proposed rolling back existing tax policy.  As then-chairman of the tax-writing Finance Committee, Senator Grassley helped steer through Congress the landmark 2001 and 2003 tax relief laws that lowered marginal tax rates, creating a first-ever 10 percent bracket. However, if this job-creating, economy-growing tax policy is allowed to lapse, American families and businesses will face a $900 billion tax increase over five years. Americans should not be paying more in taxes. Congress needs to maintain the job-creating fiscal policy that expands the economic pie.

### AT: DA---Galileo

**The link isn’t sufficient to stop Galileo deployment**

**Campbell et al. 3** (CSIS, “U.S.-Japan Space Policy: A Framework for 21 st Century Cooperation”, <http://csis.org/files/media/csis/pubs/taskforcereport.pdf>, ZBurdette)

**The second major shift in the playing field for navigation satellite systems has been the decision by Europe to develop** an autonomous Global Navigation Satellite System (GNSS), called **Galileo**. In May 2003, the European Space Agency (ESA) gave its final approval for the development of Galileo, elevating a long-running dispute between the United States and Europe to the next stage. In the late 1990s, the United States saw its development and promotion of GPS as a public good, in which it had invested $10 billion over 25 years and provided to the entire world at no cost. In spite of this economic logic, **Europe began to develop Galileo in 1999**, a new navigation satellite system that could be launched within the next decade **to rival GPS. European ministers gave various reasons for proceeding with Galileo: spurring the development of new user applications, building markets for ancillary products (such as receivers), creating new jobs in Europe, challenging a U.S. ‘monopoly’ in a strategic industry, and ensuring control over its navigation satellite future.**

**Current GPS deficiencies will cause US linkage with Galileo---that exacerbates satellite vulnerabilities**

**Thiel 10** (Bob, “GPS problems pose major dangers for USA, Galileo is not the answer”, <http://www.examiner.com/article/gps-problems-pose-major-dangers-for-usa-galileo-is-not-the-answer>, ZBurdette)

**The USA continues to have problems with its GPS system:**

**GPS problems pose major dangers for USA, Galileo is not the answer**

GPS Compatibility Problem Sidelines Some U.S. Weapons Systems Space - May 3, 2010

WASHINGTON — The most recent upgrade to the GPS ground control segment created an incompatibility issue with a specific type of military GPS receiver used on at least 86 different U.S. weapon systems, some of which cannot be used until the problem is fixed, according to the U.S. Air Force…

http://www.spacenews.com/military/100503-gps-problem-sidelines-weapons.html

GPS problems were warned about on page 85 of the 2009 book 2012 and the Rise of the Secret Sect. This was partially due to the technical problems and **budgetary problems** that the USA was (and still is) having. Furthermore, the book speculates that these problems will **mean that the USA will likely rely on Europe’s upcoming Galileo system** for part of its space defense–and this is also apparently going to happen (see also Warning! US GPS to be linked to Europe's Galileo).

The USA was originally opposed the development of Galileo because it considered it a military threat, now it has apparently agreed to link up to it:

**The U.S. Defense Department is linking its Global Positioning System with Europe’s Galileo**, another space-based global navigation satellite system. GPS will feature a new military signal called M-code to boost anti-jamming, facilitate secure access and increase the local signal strength. http://www.reuters.com/article/idUSN0411054720100205

**This will turn out to be a disaster for the USA as it will make it directly vulnerable to attack as well as likely limit the USA's ability to respond to certain attacks coming from overseas.**

**Galileo turns heg**

**Greeley No Date** (Brian, degree from Princeton, A “Friendly” Competition: Galileo and Trans-Atlantic relations”, PowerPoint, ZBurdette)

**With Europe’s aspirations to be a truly major player in global affairs, Galileo gives the E.U. the opportunity to apply significant leverage on the U.S. and even interfere in its foreign policy.**

**Galileo deployment risks military confrontation**

**Greeley No Date** (Brian, degree from Princeton, A “Friendly” Competition: Galileo and Trans-Atlantic relations”, PowerPoint, ZBurdette)

**China became a major partner in the Galileo system in** September of **2003**, funding roughly a fifth of the initial cost of 1.1 billion Euros.

While the E.U. and China insist that Galileo will be employed for civilian purposes, the military applications of Galileo are immense. China is bound to employ Galileo in its weapons systems.

China could effectively develop a way to regionally neutralize American GPS signals while enjoying the use of the Galileo system. This is a concern due to the ever-present Taiwan situation

As a major partner in the project, it seems hard to see the E.U. denying China (or any partner country) access on the account of a U.S. request.

Galileo: Current and Future Affairs

American Policy

Peter Teets, under-secretary of the US Air Force, sums up the dilemma when he asks: "What will we do 10 years from now when American lives are put at risk because an adversary chooses to leverage the global positioning system of perhaps the Galileo constellation to attack American forces with precision?"

Without E.U. assistance, **the US has stated that it would first try unilaterally to jam Galileo's signals, but then would attack Galileo’s satellites** to destroy one or all of its units **if jamming failed.**

**Galileo will be ineffective**

**The Guardian No Date** (Europe and US clash on satellite system, <http://www.prisonplanet.com/120803satellitesystem.htm>, ZBurdette)

But **news of Europe's intentions provoked strong objections in the US, which claims the plans pose a threat to national security.**

The US relies heavily on GPS in war zones to guide troops and munitions to their targets. To prevent enemy forces also benefiting from GPS, US and allied forces tune into a specially encrypted military signal while jamming the second, publicly available GPS signal. The US fears that Galileo, which would offer a free positioning service to everyone, would make such tactics ineffective.

The US is also vexed by China's investment of �160m in the Galileo project. The US has already leaned hard on European officials to abandon the �1.1bn (�772m) project.

Last year, **the EU press spokesman for Galileo,** Gilles Gantelet, **declared that under the strain of American pressure, "Galileo is almost dead".**

**While US pressure has not killed off the Galileo project entirely, concessions made by European officials mean Galileo will now be a much weaker rival to GPS** than the system they had envisioned.

**The EU economy is low now**

**Jones 11** (Alex, “22 Reasons Why We Could See An Economic Collapse In Europe In 2012”, <http://www.infowars.com/22-reasons-why-we-could-see-an-economic-collapse-in-europe-in-2012/>, ZBurdette)

**Will 2012 be the year that we see an economic collapse in Europe? Before you dismiss the title of this article as “alarmist”, read the facts listed** in the rest of this article first. Over the past several months, **there has been an astonishing loss of confidence in the European financial system.**

Right now, virtually **nobody wants to loan money** **to** financially troubled nations in **the EU and** virtually nobody wants to lend money to major **European banks**. Remember, one of the primary reasons for the financial crisis of 2008 was a major credit crunch that happened here in the United States. **This burgeoning credit crunch in Europe is just one element of a “perfect storm” that is rapidly coming together** as we get ready to go into 2012. The signs of trouble are everywhere. All over Europe, governments are implementing austerity measures and dramatically cutting back on spending. **European banks are substantially cutting back on lending** as they seek to meet new capital requirements that are being imposed upon them. Meanwhile, **bond yields are going through the roof** all over Europe **as investors lose confidence** and demand much higher returns for investing in European debt. It has become clear that without a miracle happening, quite a few European nations and a significant number of European banks are not going to be able to get the funding that they need from the market in 2012. The only thing that is going to avert a complete and total financial meltdown in Europe is dramatic action, but right now European leaders are so busy squabbling with each other that a bold plan seems out of the question.

**The following are 22 reasons why we could see an economic collapse in Europe in 2012….**

#1 Germany could rescue the rest of Europe, but that would take an unprecedented financial commitment, and the German people do not have the stomach for that. It has been estimated that it would cost Germany 7 percentof GDP over several years in order to sufficiently bail out the other financially troubled EU nations. Such an amount would far surpass the incredibly oppressive reparations that Germany was forced to pay out in the aftermath of World War I.

A host of recent surveys has shown that the German people are steadfastly against bailing out the rest of Europe. For example, according to one recent poll 57 percent of the German people are against the creation of eurobonds.

At this point, German politicians are firmly opposed to any measure that would place an inordinate burden on German taxpayers, so unless this changes that means that Europe is not going to be saved from within.

#2 The United States could rescue Europe, but the Obama administration knows that it would be really tough to sell that to the American people during an election season. The following is what White House Press Secretary Jay Carneysaid today about the potential for a bailout of Europe by the United States….

“This is something they need to solve and they have the capacity to solve, both financial capacity and political will”

Carney also said that the Obama administration does not plan to commit any “additional resources” to rescuing Europe….

“We do not in any way believe that additional resources are required from the United States and from American taxpayers.”

#3 Right now, banks all over Europe are in deleveraging mode as they attempt to meet new capital-adequacy requirements by next June.

According to renowned financial journalist Ambrose Evans-Pritchard, European banks need to reduce the amount of lending on their books by about 7 trillion dollars in order to get down to safe levels….

**Europe’s banks face a $7 trillion lending contraction** to bring their balance sheets in line with the US and Japan, threatening to trap the region in a credit crunch and chronic depression for a decade.

So what does that mean?

**It means that European banks are going to be getting really, really stingy with loans.**

**That means that it is going to become really hard to buy a home or expand a business in Europe, and that means that the economy of Europe is going to slow down substantially.**

#4 **European banks are overloaded with “toxic assets” that they are desperate to get rid of**. Just like we saw with U.S. banks back in 2008, major European banks are busy trying to unload mountains of worthless assets that have a book value of trillions of euros, but virtually nobody wants to buy them.

#5 **Government austerity programs are now being implemented all over Europe. But government austerity programs can have very negative economic effects.** **For example, we have already seen what government austerity has done to Greece.** 100,000 businesses have closed and a third of the population is now living in poverty.

But now governments all over Europe have decided that austerity is the way to go. The following comes from a recent article in the Economist….

France’s budget plans are close to being agreed on; further cuts are likely but will be delayed until after the elections in spring. Italy has yet to vote through a much-revised package of cuts. Spain’s incoming government has promised further spending cuts, especially in regional outlays, in order to meet deficit targets agreed with Brussels.

#6 The amount of **debt owed by some of these European nations is so large that it is difficult to comprehend**. For example, Greece, Portugal, Ireland, Italy and Spain owe the rest of the world about 3 trillion euros combined.

So what will massive government austerity do to troubled nations such as Spain, Portugal, Ireland and Italy? Ambrose Evans-Pritchard is very concernedabout what even more joblessness will mean for many of those countries….

Even today, the jobless rate for youth is near 10pc in Japan. It is already 46pc in Spain, 43pc in Greece, 32pc in Ireland, and 27pc in Italy. We will discover over time what yet more debt deleveraging will do to these societies.

#7 Europe was able to bail out Greece and Ireland, but there is no way that Italy will be able to be rescued if they require a full-blown bailout.

Unfortunately, **Italy is in the midst of a massive financial meltdown** as you read this. The yield on two year Italian bonds is now about double what it was for most of the summer. There is no way that is sustainable.

It would be hard to overstate how much of a crisis Italy represents. The following is how former hedge fund manager Bruce Krasting recently described the current situation….

At this point there is zero possibility that Italy can refinance any portion of its $300b of 2012 maturing debt. If there is anyone at the table who still thinks that Italy can pull off a miracle, they are wrong. I’m certain that the finance guys at the ECB and Italian CB understand this. I repeat, there is a zero chance for a market solution for Italy.

Krasting believes that either Italy gets a gigantic mountain of cash from somewhere or they will default within six months and that will mean the start of a global depression….

I think the Italian story is make or break. Either this gets fixed or Italy defaults in less than six months. The default option is not really an option that policy makers would consider. If Italy can’t make it, then there will be a very big crashing sound. It would end up taking out most of the global lenders, a fair number of countries would follow into Italy’s vortex. In my opinion a default by Italy is certain to bring a global depression; one that would take many years to crawl out of.

#8 An Italian default may be closer than most people think. As the Telegraphrecently reported, just to refinance existing debt, the Italian government must sell more than 30 billion euros worth of new bonds by the end of January….

Italy’s new government will have to sell more than EURO 30 billion of new bonds by the end of January to refinance its debts. Analysts say there is no guarantee that investors will buy all of those bonds, which could force Italy to default.

The Italian government yesterday said that in talks with German Chancellor Angela Merkel and French President Nicolas Sarkozy, Prime Minister Mario Monti had agreed that an Italian collapse “would inevitably be the end of the euro.”

#9 European nations other than just the “PIIGS” are getting into an increasing amount of trouble. For example, S&P recently slashed the credit rating of Belgium to AA.

#10 Credit downgrades are coming fast and furious all over Europe now. At this point it seems like we see a new downgrade almost every single week. Some nations have been downgraded several times. For instance, Fitch has downgraded the credit rating of Portugal again. At this point it is being projected that Portuguese GDP will shrink by about 3 percent in 2012.

#11 The financial collapse of Hungary didn’t make many headlines in the United States, but it should have. Moody’s has cut the credit rating of Hungarian debt to junk status, and Hungary has now submitted a formal request to the EU and the IMF for a bailout.

#12 Even faith in German debt seems to be wavering. Last week, Germany had “one of its worst bond auctions ever“.

#13 **German banks are also starting to show signs of weakness.**  The other day, **Moody’s downgraded the ratings of 10 major German banks.**

#14 As the Telegraph recently reported, the British government is now making plans based on the assumption that **a collapse of the euro is only “just a matter of time”….**

As the Italian government struggled to borrow and Spain considered seeking an international bail-out, British ministers privately warned that **the break-up of the euro, once almost unthinkable, is now increasingly plausible.**

Diplomats are preparing to help Britons abroad through a banking collapse and even riots arising from the debt crisis.

The Treasury confirmed earlier this month that contingency planning for a collapse is now under way.

A senior minister has now revealed the extent of the Government’s concern, saying that Britain is now planning on the basis that a euro collapse is now just a matter of time.

#15 The EFSF was supposed to help bring some stability to the situation, but the truth is that the EFSF is already a bad joke. It has been reported that the EFSF has already been forced to buy up huge numbers of its own bonds.

#16 Unfortunately, it looks like a run on the banks has already begun in Europe. The following comes from a recent article in The Economist….

“We are starting to witness signs that corporates are withdrawing deposits from banks in Spain, Italy, France and Belgium,” an analyst at Citi Group wrote in a recent report. “This is a worrying development.”

#17 Confidence in European banks has been absolutely shattered and virtually nobody wants to lend them money right now.

The following is a short excerpt from a recent CNBC article….

Money-market funds in the United States have quite dramatically slammed shut their lending windows to European banks. According to the Economist, Fitch estimates **U.S. money market funds have withdrawn 42 percent of their money from European banks in general.**

And for France that number is even higher — 69 percent. European money-market funds are also getting in on the act.

#18 **There are dozens of major European banks that are in danger of failing.** The reality is that most major European banks are leveraged to the hilt and are massively exposed to sovereign debt. Before it fell in 2008, Lehman Brothers was leveraged 31 to 1. Today, major German banks are leveraged 32 to 1, and those banks are currently holding a massive amount of European sovereign debt.

#19 According to the New York Times, the economy of the EU is already projected to shrink slightly next year, and this doesn’t even take into account what is going to happen in the event of a total financial collapse.

#20 There are already signs that **the European economy is seriously slowing down. Industrial orders in the eurozone declined by 6.4 percent** during September. That was the largest decline that we have seen since the midst of the financial crisis in 2008.

#21 Panic and fear are everywhere in Europe right now. The European Commission’s index of consumer confidence has declined for five months in a row.

#22 European leaders are really busy fighting with each other and a true consensus on how to solve the current problems seems way off at the moment. The following is how the Express recently described rising tensions between German and British leaders….

The German Chancellor rejected outright Mr Cameron’s opposition to a new EU-wide financial tax that would have a devastating impact on the City of London.

And she refused to be persuaded by his call for the European Central Bank to support the euro. Money markets took a dip after their failure to agree.

Are you starting to get the picture?

The European financial system is in a massive amount of trouble, and when it melts down the entire globe is going to be shaken.

But it isn’t just me that is saying this. As I mentioned in a previous article, **there are huge numbers of respected economists all over the globe that are now saying that Europe is on the verge of collapse.**

**EU collapse inevitable**

**Steiner 11** (Craig, “Imminent Economic Collapse in Europe”, <http://www.craigsteiner.us/comments/397>, ZBurdette)

As everyone now recognizes, **Europe is in an accelerating death-spiral--collapsing under the weight of its government debt and government spending. An economic collapse**--or fundamental restructuring--**of Europe is imminent.**

The accelerating rate of Europe's collapse is surprising some people, but I'm actually surprised it's taken this long. Eighteen months ago I wrote that events in Europe might cause the Euro to collapse or force the strongest economic powers to abandon it. These conclusions were considered "fringe" just a few months ago, not to mention a year and a half ago.

Now it finally appears to be being fulfilled at breakneck speed.

In the span of just a few months, Greece has required another bailout, instituted a new government, Italy got a new government, Spain got a new government, Italy is reaching bailout-level interest rates, Spain's interest rates are going up dangerously, Portugal's debt has been downgraded to "junk" status, Belgium has been downgraded and is asking for European support, and there is increasing speculation that France is ultimately in trouble. There are assertions that the European Central Bank must take action (ie print money) to prevent an Italian death spiral, and must stand ready to "purchase the debt of troubled sovereigns in whatever size proves necessary." Even economic powerhouse Germany had a failed bond auction that has raised concerns about its ability to backstop all of Europe.

At this point it's becoming increasingly clear that Europe will either attempt to resolve its problems by creating a true fiscal union that will crush the sovereignty of member nations, or **there will be a spectacular economic disintegration.**

**Despite the proclamations of politicians trying to calm the markets and saying a Eurozone breakup is impossible, their statements lack credibility. Eurozone banks are preparing for the possibility of a disorderly breakup of the Euro which is increasingly described as "probable" rather than "possible."**

Meanwhile, European politicians are now proclaiming that the real problem is that they have monetary union without fiscal union--implying that the solution is fiscal unification. But Europe's problems aren't a result of a lack of fiscal unity but a lack of fiscal responsibility. This will not be solved by unifying their fiscal irresponsibility.

**The European Union**--as it is currently instituted--**is doomed**. **Whether it collapses now or they succeed at kicking the can down the road a little longer, this will not be a minor economic event.**

**No impact to European economic collapse**

**Jones 11** (Alex, “22 Reasons Why We Could See An Economic Collapse In Europe In 2012”, <http://www.infowars.com/22-reasons-why-we-could-see-an-economic-collapse-in-europe-in-2012/>, ZBurdette)

**If Europe experiences a massive economic collapse and a prolonged depression, it may seem like “the end of the world” to some people, but things will eventually stabilize.**

**Allowing Galileo Operability is bad- kills NATO, heg, and the industrial base**

**Roftiel Constantine,** is commander, 18th Mission Support Group, Kadena Air Base, Japan. The 18th Mission Support Group is the largest in the Air Force with a direct budget of $10 million, service revenues of $62 million, and 4,200 military and civilian members comprising five squadrons. The group is also responsible for the operation of the Okuma Recreation Facility on Okinawa as well as the Bellows Air Force Station Recreation Facility in Hawaii. Colonel Constantine was born in Fairfax, Virginia in May 1967, and graduated from Fairfax High School in 1985. He received an Air Force ROTC scholarship, graduated from Georgetown University, and entered the Air Force in September 1989, “GPS & GALILEO. FRIENDLY FOES? “, April 2007, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA476927>]

The European Union is developing Galileo, its own global positioning and navigation satellite system, scheduled to be operational by 2010. The European Union states that Galileo will provide greater precision to all users than is currently available from the United States’ Global Positioning System, improved coverage of satellite signals at higher latitudes, and will be guaranteed to be available in times of war or political disagreement. In light of the enormous importance of the Global Positioning System to the United States and hundreds of millions of users worldwide, the prospect of a second, competing and potentially interfering global satellite navigation system could have serious military, foreign policy, and industrial implications. The emergence of the Galileo system will affect the transatlantic alliance, the North Atlantic Treaty Organization, the US dominance in defense and security of Europe, and there are serious commercial and industrial concerns as well. The US government would benefit from a heightened awareness of the risks and opportunities for the United States surrounding the Galileo program.

**No trade-off---GPS III is designed to co-exist with Galileo**

**Global Security.org no date** (“GPS III/GPS Block III,” <http://www.globalsecurity.org/space/systems/gps_3.htm>)

On 12 July 2007, the Global Positioning Systems Wing announced the release of the Request for Proposal for the development and production of the GPS Block IIIA satellites. GPS IIIA is the first of three GPS III increments and is the foundation for enhancements in later blocks. New capabilities on GPS IIIA will provide improved Position, Navigation, and Timing (PNT) services to the warfighter and civil users by improving accuracy, integrity, and resistance to hostile jamming. GPS IIIA will transmit a new civilian signal (L1C), which is designed to be highly interoperable with the European Galileo satellite navigation system signal and intended to be fully compatible and interoperable with those signals planned for broadcast on Japan's Quazi-Zenith Satellite System (QZSS). For military users, GPS IIIA satellites will provide further increases in the anti-jam capability of the M-Code signals.

**GPS III is Interoperable With Galileo**

**Working Group C 10** [Working Group C, The US-EU Agreement on GPS-Galileo Cooperation signed in 2004 laid down the principles for the cooperation activities between the United States of America and the European Union in the field of satellite navigation. In particular, the work undertaken by Working Group A has lead to an interoperable and compatible signal design for the GPS and Galileo systems. The Agreement also foresaw "a working group to promote cooperation on the design and development of the next generation of civil satellite-based navigation and timing systems", which is the focus of Working Group C. “COMBINED PERFORMANCES FOR OPEN GPS/GALILEO RECEIVERS”, July 19, 2010, <http://ec.europa.eu/enterprise/policies/satnav/galileo/files/combined-open-gps-galileo_en.pdf>]

Thanks to the degree of interoperability and compatibility achieved already in the definition of GPS and Galileo through the US-EU Cooperation Agreement, GPS and Galileo systems can be easily combined in a satellite navigation receiver by the effective use of the same frequency bands, bandwidths and modulations. The time synchronisation between constellations also assists in this interoperability. This note presents an analysis on the performances that can be obtained by combining GPS and Galileo future constellations for non-aviation open service users. This analysis was performed by Working Group C of the US-EU GPS-Galileo Cooperation Agreement. The objective of the note is to promote the combined use of GPS and Galileo by showing the performance improvement gained thanks to dual use and the advantages of the system interoperability. The work presented in this note is intended to serve as a precedent for future bilateral analyses on combined performance for other services and systems, and to facilitate multilateral discussions in other forums. The following sections present an evaluation of the positioning accuracy obtained with GPS, Galileo and combined GPS/Galileo. Results are provided for several generic nonaviation use cases (open sky, urban, half sky) for a number of receivers. Several assumptions were made concerning the receiver characteristics, propagation models and also the GPS and Galileo constellations, and are described in this note.

**GPS III is Interoperable With Galileo**

**Working Group C 10** [Working Group C, The US-EU Agreement on GPS-Galileo Cooperation signed in 2004 laid down the principles for the cooperation activities between the United States of America and the European Union in the field of satellite navigation. In particular, the work undertaken by Working Group A has lead to an interoperable and compatible signal design for the GPS and Galileo systems. The Agreement also foresaw "a working group to promote cooperation on the design and development of the next generation of civil satellite-based navigation and timing systems", which is the focus of Working Group C. “COMBINED PERFORMANCES FOR OPEN GPS/GALILEO RECEIVERS”, July 19, 2010, <http://ec.europa.eu/enterprise/policies/satnav/galileo/files/combined-open-gps-galileo_en.pdf>]

This note presents the user performances for future GPS-III, Galileo and combined GPSIII/Galileo in different study cases, including open, urban and half occluded environments, as well as different ionospheric activity periods. All study cases were analyzed for three different receivers of increasing performance and complexity. The studies demonstrate and quantify the improvements that can be expected when using GPS and Galileo open services in combination under different environmental conditions. In all studied cases, the combination of GPS and Galileo led to noteworthy performance improvements as compared to single system performance. The most significant improvement is for partially obscured environments, where buildings, trees or terrain block portions of the sky. The increased number of satellites available provides robust performance even as some signals are blocked, which is reflected in a significant increase of positioning accuracy and availability. The results also confirm that dual-frequency receivers provide an improvement over single-frequency in most environments, and the best performances were generally achieved with a dual-frequency dual-constellation receiver. The document also highlights the benefit expected from future broadband signals on GPS L1 and Galileo E1 signals designed in accordance with the joint EU-US agreement reached in 2006. This work concludes the first stage of activities in the context of the EU-US Working Group C on the next generation of civil satellite-based navigation and timing systems. It confirms that the two systems, thanks to their interoperable and compatible signal baselines, can easily be integrated and processed by civil user equipment and that such a combined use offers tremendous benefits to a broad range of user communities. It is intended that further synergies will be investigated in the context of Working Group C for the future generations of GPS and Galileo systems, with the objective to offer ever improving combined service performance to civil users through US and EU cooperation. Future activities of the Working Group will address other services and an even broader range of civil user communities. These studies are intended to serve as a precedent for future analyses on combined performance of different systems and services and to facilitate multilateral discussions in other forums.

### AT: DA---Space Weaponization

**No link---GPS isn’t a space weapon**

**Eastabrooks 3** (Sarah, “Preventing the Weaponization of Space: Options for moving forward”, <http://www.ploughshares.ca/content/preventing-weaponization-space-options-moving-forward>, ZBurdette)

**Space has been “militarized” since the earliest communications satellites** were launched into orbit. Today, **militaries worldwide rely heavily on satellites for** command and control, communications, reconnaissance and monitoring, early warning, treaty verification, and navigation with the Global Positioning System (**GPS**). Research and development is frequently funded by defence contracts. **States accept that “peaceful purposes” include military use, even that which is not particularly peaceful,** and space is considered a sanctuary only in that no weapons are deployed there.

**Although space is heavily militarized, it is not yet weaponized. Space “weaponization” is generally understood to refer to the placement in orbit of space-based devices that have a destructive capacity. Therefore, while satellites may be used for aggressive measures, such as GPS** navigation of fighter jets or precision guided missile delivery, **satellites themselves have no destructive capacity and their support of military operations would not be considered weaponization.**

**No perception based links**

**The Royal Air Force** **4** (Air Power Review, Volume 7, Spring 2004, <http://www.airpowerstudies.co.uk/APR%20Vol%207%20No%201.pdf>, ZBurdette)

Intermediate steps along this continuum include direct ascent ASATs (which are launched into space but not into orbit), suborbital weapons including ballistic missiles (which travel through space en route to their targets but do not linger there), and launch-on-demand orbital weapons (which are deployed into space only when needed, thus perhaps avoiding crossing the weaponization threshold during peacetime). **Somewhere along the way, fall weapons such as today’s global positioning system (GPS)-guided munitions, in which a terrestrial weapon depends upon space systems in order to operate**; in some respects a satellite-guided bomb or cruise missile is thus very much a space weapon, although **policy makers and the public clearly do not consider the deployment of such weapons to constitute space weaponization**

**Turn---preventing GPS interference key to solve weaponization**

**Hays 2** (Lt Col Peter L. Hays, Ph.D., Professor of Comparative Military Studies School of Advanced Airpower Studies, PATHS TOWARD SPACE WEAPONIZATION, <http://isanet.ccit.arizona.edu/noarchive/hays.html>, ZBurdette)

It is not difficult to foresee, then, how nations could begin gradually sliding down a slippery slope toward the weaponization **of** near-earth **space** without being fully cognizant of the eventual end state. Over a period of years **nations could engage in numerous activities short of outright weaponization that**, in the long run, **could lead to an environment in which the deployment and use of weapons in or from space would emerge as a logical and natural next step.** Consider the following activities:

· using earth-based lasers to dazzle the optical arrays of electro-optical imaging reconnaissance satellites whenever they appear above the horizon;

· active jamming of imaging radar satellites;

**· widespread jamming of GPS location and timing information;**

· positioning satellites in orbit in close proximity with the satellites of one’s military, economic or political competitors;

· the use of satellites with active, high-power radars to degrade the electronics of adversary satellites; and

· **capturing or corrupting the data streams to or from competitors’ satellites**.[21]

**GPS signals are key to space traffic control and transparency**

**Hays 99** (Peter, prof of comparative military studies at the school of advanced airpower studies, MILITARY SPACE COOPERATION: OPPORTUNITIES AND CHALLENGES, ZBurdette)

Finally, **due again to the increasing use of space, the U**nited **S**tates and global space community **must carefully consider the need for and implications of space traffic control systems (STCS) that could be analogous to current air traffic control systems.** The idea for such a system is obviously related to the orbital debris problem discussed above, but it goes well beyond just this problem to include a wide range of factors such as: how space traffic might coordinate and be approved for specific orbital positions, how space traffic would be located and tracked, sanctions and liability for noncompliance and collisions under an STCS, and how such a regime might be established and funded. As with many space-related issues, the technology to at least begin implementing such a system appears to be closer at hand than is the political will to begin down this path. For example, the Ballistic Missile Defense Organization’s Midcourse Space Experiment (MSX) satellite launched in April 1996 is the only operational space-based surveillance instrument. It has found some “150 objects in the last three years that were completely lost” and demonstrated the potential value of spacebased sensors to an STCS.39 Likewise, **GPS positioning signals could be used to locate many space systems very accurately, and a transponder-like system aboard space systems could provide this data automatically in response to queries from the STCS.**40 On the political side of the equation, however, the United States must consider very carefully how its objectives in space might benefit or be harmed via the creation and operation of an STCS. It is not obvious that an air traffic control model is the appropriate regime for space, or that the political and financial costs of creating and operating such a system (many of 39 Leonard David, “Eye in the Sky to Track Space Junk,” Space.com, November 7, 2000, available at: <http://www.space.com/businesstechnology/techn ology/ space\_trafficcontrol\_001102.html>. 40 For a detailed discussion of STCS (especially the technical requirements for such a system), see “Space Traffic Control: The Culmination of Improved Space Traffic Operations,” SPACECAST 2020, append. D, available at: <http://www.au.af.mil/Spacecast/app-d/appd. html>. which would likely be borne by the United States) would be outweighed by its benefits. Most of the benefits would seem to be in the commercial and civilian space sectors, while the potential drawbacks might be most severe for the military and intelligence sectors. The United States most likely would not, for example, want the ephemeris on its military and intelligence-gathering satellites to be preapproved and available worldwide through an STCS. At the very least, since an STCS could be such a powerful tool for denial, deception, and even targeting, the United States and other members of the global space-faring community must think through very carefully exactly what type of control regime would be most appropriate for space and how such a regime would operate in practice.

**That solves space weaponization**

**Eastabrooks 3** (Sarah, “Preventing the Weaponization of Space: Options for moving forward”, <http://www.ploughshares.ca/content/preventing-weaponization-space-options-moving-forward>, ZBurdette)

**Another option for a gradual approach calls for interim measures to address the major threats of space weaponization**, until such time as a treaty is in place. **Some suggestions include a space debris management regime, confidence-building measures, and a space traffic control initiative.**

**Space debris already poses a serious threat to satellites**, the International Space Station, and space travel, and testing of any space weapons would increase this threat exponentially. Debris mitigation might include initiatives to minimize debris during launches, strengthen the 1972 Liability Convention to include the potential damage to space assets by debris, and research debris removal (Hitchens 2002b). Theresa Hitchens has argued that, as debris is a concern for all space users, and the US is a leader in debris tracking and mitigation, **this could be an important area for international cooperation** (2002b). This is an area of particular concern for industry and commercial space users and therefore one that might have wider support for immediate action.

**Confidence-building measures would likely be an element of a treaty on space weapons, but could also be implemented separately in the interim.** The working paper Russia and China submitted to the CD with suggested Treaty elements included a call for confidence-building measures:

### AT: CP---States

**Stable federal funding is key to effective GPS – the CP results in delays and military acquisition failures**

**GAO 09** [GAO, “GLOBAL POSITIONING SYSTEM Significant Challenges in Sustaining and Upgrading Widely Used Capabilities”, April 2009, <http://www.gao.gov/new.items/d09325.pdf>]

GPS has enabled transformations in military, civil, other government, and commercial operations and has become part of the critical infrastructure serving national and international communities. Clearly, the United States cannot afford to see its GPS capabilities decrease below its requirement, and optimally, it would stay preeminent. Over the past decade, however, the program has experienced cost increases and schedule delays. While the Air Force is making a concerted effort to address acquisition problems, there is still considerable risk that satellites will not be delivered on time, leading to gaps in capability. Focused attention and oversight are needed to ensure the program stays on track and is adequately resourced, that unanticipated problems are quickly discovered and resolved, and that all communities involved with GPS are aware of and positioned to address potential gaps in service. But this is difficult to achieve given diffuse responsibility over various aspects of the GPS acquisition program. Moreover, disconnects between the space, ground control, and user equipment components have significantly lessened the military’s ability to take advantage of enhancements, particularly as they relate to assuring the continuity of service during military engagements. Without more concentrated leadership attention, such disconnects could worsen, particularly since (1) both the ground control and user equipment programs have been subject to funding shifts to pay for problems affecting the satellite segment, and (2) user equipment programs are executed by separate entities over which no one single person has authority. Lastly, ensuring that GPS can continue to produce dramatic improvements to civil agencies’ applications, calls for any weaknesses that are identified in the civil agency GPS requirements process to be addressed. Because of the criticality of the GPS system and potential delays, and given the importance of GPS to the civil community, we are making the following recommendations. • We recommend that the Secretary of Defense appoint a single authority to oversee the development of the GPS system, including DOD space, ground control, and user equipment assets, to ensure that the program is well executed and resourced and that potential disruptions are minimized. The appointee should have authority to ensure DOD space, ground control, and user equipment are synchronized to the maximum extent practicable; and coordinate with the existing positioning, navigation, and timing infrastructure to assess and minimize potential service disruptions should the satellite constellation decrease in size for an extended period of time.

**No solvency---GPS is a military system**

**RAND No Date** (“The Global Positioning System”, <http://www.rand.org/content/dam/rand/pubs/monograph_reports/MR614/MR614.sum.pdf>, ZBurdette)

The Global Positioning System (GPS) is a U.S. military space system operated by the U.S. Air Force. **The space segment of GPS consists of a constellation of 24 satellites that broadcast precise time signals. When the satellites are in view of a suitable GPS receiver, these signals aid position-location, navigation, and precision timing**. GPS was developed by the U.S. Department of Defense and deployed over two decades at a cost of over $10 billion. The U.S. armed forces are increasingly reliant on its signals for a variety of purposes from navigation to munitions guidance. However, over the past 10 years, GPS has evolved far beyond its military origins. It is now a worldwide information resource supporting a wide range of civil, scientific, and commercial functions, from air traffic control to the Internet. GPS has also spawned a substantial commercial industry in the United States and abroad with rapidly growing markets for related products and services.

**Even if there are commercial users, it’s run by the military**

**Dana 2k** (Peter, prof of geography at Boulder, “GPS is a Satellite Navigation System”, <http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html>, ZBurdette)

GPS is funded by and controlled by the U. S. Department of Defense (DOD). While there are many thousands of civil users of GPS world-wide, the system was designed for and is operated by the U. S. military.

**Any commercial system relies on military data**

**Williams 12** (Alison, February 23, “Maritime GPS Navigation at Risk from Jammers and Spoofers”, <http://sailinginart.com/maritime-gps-navigation-at-risk-from-jammers-and-spoofers/>, ZBurdette)

GPS is a more sophisticated version of earlier satellite navigation (satnav) systems that surfaced in the nineteen seventies. It had its origin in the US military’s need to deploy “seek and destroy” cruise missiles that could locate and blow up an enemy target using a GPS aided detection system buried in their nose cones. The US military kindly allowed its many orbiting position indicating satellites to be used by civilian devices. These were quickly developed for use at sea and, a little later, adapted for widespread use on land as well. From the tiniest fishing dinghy to the largest oil tanker, from family cars to taxis and buses, and from gliders to passenger aeroplanes, the GPS system lets people know wherever they are on the surface of the planet.

### AT: CP---Private

**Federal action key – classified jamming technology**

**McDonald 10** (Devin, Brick House Security, April 09, 2011, “why We Don’t Sell GPS Jammers”, [http://blog.brickhousesecurity.com/2010/04/09/gps-jammers/](http://blog.brickhousesecurity.com/2010/04/09/gps-jammers/%22%20%5Ct%20%22_blank))

Government Action Despite the concerns about GPS jammers being in operation, it’s a relief knowing that the government is currently working on technology to better defend GPS satellites from jammers. “[Jam resistance] is an important part of what we’ve done with our GPS constellation, and we continually work to improve jam-resistant capability,” stated said Andy Roake, chief of current operations at Air Force Space Command Public Affairs. “However, we cannot discuss technical elements of how we achieve this due to the sensitivity of revealing capabilities to any potential adversary.”

**Full privatization fails—only an approach that combines federal funding with market incentives solves—Europe proves**

**Zervos & Seigel, 08** – Professor of economics and space policy at the International Space University; and Dean and Professor in the School of Business at the University at Albany (Vasilis and David, October. “Technology, Security, and policy implications of future transatlantic partnerships in space: lessons from Galileo.” Research Policy, Volume 37, Issue 9, pp 1630-1642.)

US efforts to privatize space capabilities have focused on key markets, such as space telecommunications, space transportation and earth observation. However, full privatization of assets such as the Space Shuttle is controversial, given the investment entailed and security concerns (Macauley, 2003). In Europe, the focus on more civil-oriented programs facilitates public–private partnerships and the formation of European multinationals in similar key markets. A breakdown of the consolidated turnover of the European space manufacturing industry in 2002 is illustrative, with Telecommunications, Launching and Earth Observations activities accounting for over €3.5 billion out of a total €4.7 billion, which includes Navigation (€80 million) and scientific activities (Eurospace, 2004). The navigation market was expected to grow rapidly by 2010, based on novel technological uses of navigation and positioning services by automobiles, mobile communication users and commercial airliners (EC, 2002), and other commercial applications. Despite encouraging market projections for navigation markets for example, such industries are subject to numerous market failures. The most prominent market failures are related to early-stage technology and risks associated with future market size, as well as uncertainties in the development of competing and existing publicly developed and owned systems and future security restrictions. Thus, it is unlikely that such a project can be undertaken by industry alone despite the existence of optimistic market projections and returns (see Section 3). For example, in the presence of conflict, such as war between two nations or civil war, where adversaries utilize the signals for military purposes, the stakeholders exercising political pressure for or against regionally jamming the signal could range from the UN and the authorities in the country in question, to financial institutions owning shares in the enterprise. Although ultimately the commercial entity is responsible for obeying the laws and regulations of the licensing country, numerous issues relating to politics and international law are likely to turn potential investors with no public involvement away into ‘safer’ and less strategically significant investments. Multi-public–private partnerships (MP3) spread the financial risk associated with high-technology requirements, while easing investor concerns over politically sensitive security issues and decisions. Moreover, the presence of multiple countries in space projects results in more resilient public commitments, reassuring the private firms.

**Space privatization leads to space pollution, waste of taxpayer dollars, and privatization of any profits.**

**Gagnon 03** (Bruce, Coordinator of the Global Network Against Weapons & Nuclear Power in Space and Senior Fellow at The Nuclear Policy Research Institute, “Space Privatization: Road to Conflict?”, 6-21, http://www.space4peace.org/articles/road\_to\_conflict.htm)

The news brings us the story of "space pioneers" launching privately funded craft into the heavens. A special prize is offered to the first private aerospace corporation who can successfully take a pilot and a "space tourist" into orbit. Is this "privatization" of space a good thing? Is there any reason to be concerned about the trend? Are there any serious questions that should be raised at this historic moment? Three major issues come immediately to mind concerning space privatization . Space as an environment, space law, and profit in space. We've all probably heard about the growing problem of space junk where over 100 ,000 bits of debris are now tracked on the radar screens at NORAD in Colorado as they orbit the earth at 18,000 m. p. h. Several space shuttles have been nicked by bits of debris in the past resulting in cracked windshields. The International Space Station (ISS) recently was moved to a higher orbit because space junk was coming dangerously close . Some space writers have predicted that the ISS will one day be destroyed by debris. As we see a flurry of launches by private space corporations the chances of accidents, and thus more debris, becomes a serious reality to consider. Very soon we will reach the point of no return, where space pollution will be so great that an orbiting minefield will have been created that hinders all access to space. The time as certainly come for a global discussion about how we treat the sensitive environment called space before it is too late. The taxpayers, especially in the U. S. where NASA has been funded with taxpayer dollars since its inception, have paid billions of dollars in space technology research and development (R & D). As the aerospace industry moves toward forcing privatization of space what they are really saying is that the technological base is now at the point where the government can get out of the way and lets private industry begin to make profit and control space . Thus the idea that space is a "free market frontier. " Of course this means that after the taxpayer paid all the R & D, private industry now intends to gorge itself in profits. One Republican Congressman from Southern California, an ally of the aerospace industry, has introduced legislation in Congress to make all space profits "tax free". In this vision the taxpayers won't see any return on our "collective investment. " Plans are now underway to make space the next "conflict zone " where corporations intend to control resources and maximize profit. The so-called private "space pioneers" are the first step in this new direction. And ultimately the taxpayers will be asked to pay the enormous cost incurred by creating a military space infrastructure that would control the "shipping lanes" on and off the planet Earth. Privatization does not mean that the taxpayer won't be paying any more . Privatization really means that profits will be privatized . Privatization also means that existing international space legal structures will be destroyed in order to bend the law toward private profit . Serious moral and ethical questions must be raised before another new "frontier" of conflict is created.