

Lightsquared Impact to Aviation

FAA Perspective

Presented to: House Committee on Science, Space and
Technology

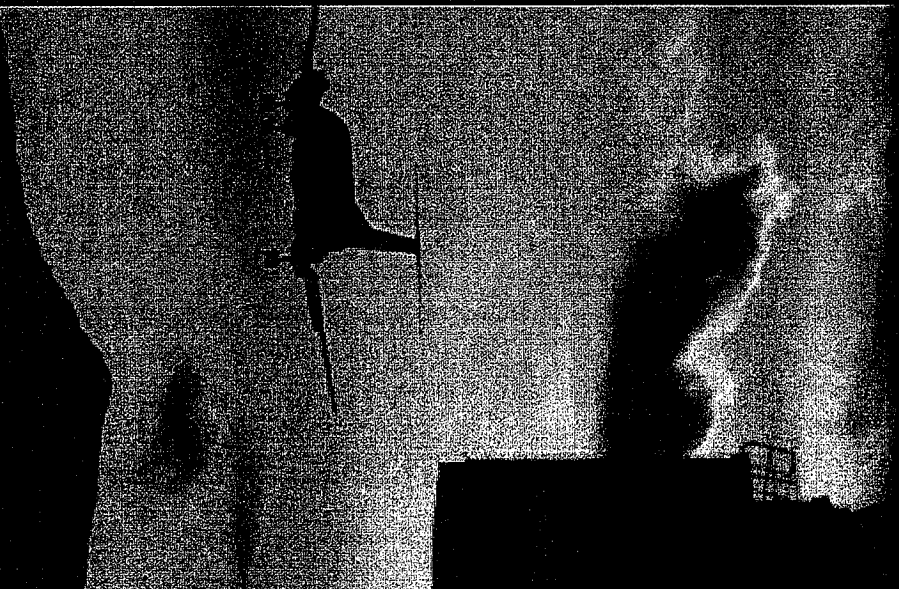
By: JC Johns, Director

FAA Navigation Services

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**Federal Aviation
Administration**



Background

- **Federal Aviation Administration (FAA) has assessed the impact of LightSquared deployment per the request of the Space-Based Position, Navigation and Timing (PNT) Executive Committee**
- **This assessment is based on the following studies of LightSquared:**
 - LightSquared Technical Working Group (TWG) Report
 - Radio Technical Commission for Aeronautics (RTCA) Report
 - National PNT Engineering Forum (NPEF) Report



LightSquared's June 30

Recommendations

- These recommendations were filed by LightSquared in parallel with the TWG report and represented only LightSquared position
- Proposed using lower 10Mhz channel below their “authorized power” and a “standstill” in use of the upper 10 MHz channel
- Also identified need to explore all options for use of the “full complement” of terrestrial frequencies at “appropriate power levels” to provide high-quality LTE broadband service
- In congressional testimony, LightSquared clarified its need to be “on a vector to use upper 10MHz channel within 2-3 years”
- LightSquared’s recommendation would enable operations consistent with their original plan by 2014



FAA Comments on Lightsquared's Recommendations

- Reduced power is same level as previously planned
- Lower channel operations at “reduced power” interfere with certified GPS receivers
- 10 years needed to design, develop, certify and modify civil aviation fleet
- GPS-enabled operational, economic and public safety benefits lost until aircraft are reequipped
- Aviation would return to full dependency on antiquated ground-based navigational aids
- Billions of dollars in FAA and User investments lost
- Delays Next Generation Air Transportation System (NextGen) by 10 years resulting in lost benefits and increased expense



NextGen Impact Areas

- **Loss of existing GPS Efficiency Benefits**
 - Provide baseline for NextGen enhancements
- **Loss of Current GPS safety benefits**
 - Safety Issues Mitigated by GPS
 - FAA Estimate of Potential Averted Fatalities
- **Loss of NextGen Benefits**
- **Aircraft Retrofit Costs**
- **FAA and Aviation Community Lost Investments**
- **International Implications**
- **NextGen Impact Summary and Risks to FAA Mission**



Loss of existing GPS Efficiency Benefits

- Enabling Performance Based Navigation today
- GNSS is available as a primary method of navigation
- Providing efficiency enhancements for over 35,000 instrument flights each day
- Widespread use of Area Navigation to provide direct routes and improve flexibility of operations which reduce delays
- Precise navigation for thousands of instrument approaches provide increased access to airfields in instrument conditions
- FAA estimates GPS provides \$200M in annual efficiency benefits for a ten-year estimate of \$2 billion



Safety Issues Mitigated by GPS

- **Three major aviation safety risks are mitigated through the use of GPS**
 - Approach and Landing accidents
 - During the 1990's as many as 9 approach and landing accidents (4 of which were fatal)
 - Since 1999 there have only been 2 U.S. carriers with such accidents in the U.S with one of those aircraft not equipped with GPS
 - As General Aviation (GA) has made GPS "Glass Cockpits" standardized in new aircraft, fatal approaches and landings at night have been reduced by 30%
 - Controlled Flight into Terrain (CFIT)
 - Most lethal of all accidents
 - On Board Terrain alerts were unstable prior to GPS
 - Enhance Ground Proximity Warning Systems (EGPWS) combine GPS and other technologies to provide look-ahead terrain information to the flight crew
 - GA usage of GPS has provided a 44% reduction in CFIT over the past 5 years
 - Runway Incursions
 - Volpe National Transportation Systems Center concluded a mix of airport surface moving maps (which depends on GPS) could prevent 1/3 of all runway incursions



FAA Estimate of Potential Averted Fatalities

Type Operations	Reduced Fatalities over 10 Years	Nominal 10-year Benefit (\$ billions)
Air Carrier	64	0.4
General Aviation/Part 135	730	4.4
Total	794	4.9

*\$6.2M per life
(no equipment costs included)*

- *These figures are conservative for air transport operation due to commercial traffic increase, aircraft size increase and flying with higher load factors not being included*
- *This does not include assumptions concerning serious injury, minor injury or property loss*



Loss of NextGen Benefits Provided by GPS

- Cumulative benefits of NextGen estimated to be \$23 billion through 2018; and by 2030, grow to \$123 billion and reduce CO₂ emissions by 64 million tons
- Majority of NextGen benefits would be jeopardized
 - Lost benefits include increased safety, FAA cost savings, reduced CO₂ emissions, more efficient flight paths, delay savings
- FAA estimates \$59 billion loss due to NextGen technology and procedure benefit delays
- Implementation delays would result in the production of an additional 30 million tons of CO₂
- Additionally, FAA would be forced to replan \$17 billion in NextGen investments with additional associated development costs



Aircraft Retrofit Costs

Unplanned Retrofits include:

- **5,800 to 7,250 passenger, cargo and regional U.S. operated transport aircraft**
 - Including 2,800 to 4,000 international operators aircraft operated from 105 countries
- **61,000 IFR approved general aviation and air taxi aircraft**
- **Majority of 310,000 pilots without instrument ratings use non-certified GPS units for situational awareness**
 - General purpose and aviation special purpose VFR GPS units would be rendered operationally useless
- **FAA estimates \$6 billion for unplanned aircraft retrofit costs**
- **10 year retrofit timeline is assessed as medium to high risk**



Summary of Estimated Impacts

- Based on input from RTCA as well as National Space-Based Position Navigation and Timing Systems Engineering Forum, proposed LightSquared deployment would result in an estimated aviation community cost of at least \$72 billion*, stemming from:
 - \$ 2 billion loss of existing GPS efficiency benefits
 - \$ 5 billion loss of existing GPS safety benefits
 - \$ 59 billion due to delayed NextGen benefits
 - \$ 6 billion in aircraft retrofit costs
 - Additionally, LightSquared deployment would result in
 - an additional 30 million tons of CO₂ and
 - FAA would be forced to replan \$17 billion in NextGen investments, with associated additional development costs
- * Based on a 10 year replanning and aircraft retro-fit schedule



FAA and Aviation Community Sunk Costs Not Included in the Estimate

- U.S. taxpayers have invested \$3B in FAA implementation of GPS and NextGen through FY11
- Aviation industry investment in GPS equipment is estimated to be \$3 to 4 billion
- Estimate does not include equipage for thousands of DOD, Federal, State and Local government public utility aircraft
- Total FAA and civil aviation community investment loss of \$6 to 7 billion



International Implications

- **President's 2010 *National Space Policy of the United States of America* states that the U.S. must maintain its leadership in the service, provision and use of global navigation satellite systems**
- **LightSquared proposal could affect U.S. leadership in aviation**
- **Air carriers and civil users may lose confidence in GPS in spite of previous Presidential commitments to ICAO**
- **International market for U.S. satellite technology could be damaged**
 - Increasing demand for non-U.S. systems (e.g., Russia's GLONASS system)



FAA High-Precision and GPS Timing Equities

- Based upon existing information, LightSquared's operations at the lower channel would also preclude the following critical capabilities that rely on high precision and GPS timing:
 - Airfield and Flight Procedure surveys
 - Flight test tracking
 - Space Weather monitoring
 - GPS Timing for computing resources and numerous mission critical systems including:
 - Terminal, Enroute and Oceanic automation systems
 - Surveillance systems
 - Voice communications and recoding systems
 - Maintenance support systems



FAA Conclusions

- **FAA cannot conclude that operations using just the lower portion of the spectrum are compatible with civil aircraft receivers without definition of LightSquared's end-state deployment and further study**
- **Proposed LightSquared deployment (both upper and lower channels by 2014) would result in an estimated aviation community cost impact of at least \$72 billion and delay NextGen implementation by approximately 10 years**
- **Proposed LightSquared operations would severely impact the efficiency and modernization of the safest, most efficient aerospace system in the world**

