LightSquared Impact on GPS

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Coalition to Save Our GPS
Background – Prior Rules for MSS/L Band

- The radiofrequency band (the “L Band”) where the Mobile Satellite Service is placed has long been reserved for earth to satellite communications due to unique physical characteristics
  - At these frequencies, radio signals propagate better through the Earth’s atmosphere, improving performance and cost effectiveness of earth satellite communications

- Under pre-existing MSS rules, licensees were allowed to conduct “ancillary” terrestrial operations

- ATC operators were expressly obligated to cure interference caused by terrestrial operations
In November 2010, LightSquared proposed primarily terrestrial operation. The proposal would dramatically expand terrestrial operations in mobile satellite band:

- 40,000 high powered base stations (up to 1500 watts each) are to be built in metropolitan areas throughout the US.
- Terrestrial transmission capacity “will be tens of thousands of times the capacity” of its satellites.

The MSS L-Band is directly adjacent to the GPS “L1” band.
Interference Concerns

The L1 GPS signal's received power on earth is $10^{-16}$W. A 1,500W transmission from a nearby ground transmitter in the immediately neighboring frequency will be $1,000,000,000$ more powerful at the GPS receiver’s antenna. This raises great concern about saturation and ‘jamming’ of the GPS signal.

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<thead>
<tr>
<th>Effect</th>
<th>Distance</th>
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<tbody>
<tr>
<td>Jamming is Detected</td>
<td>13.76 miles (22137 meters)</td>
</tr>
<tr>
<td>10 dB Loss of Sensitivity</td>
<td>9.85 miles (15853 meters)</td>
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<tr>
<td>Loss of Fix in Open Sky</td>
<td>5.60 miles (9018 meters)</td>
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<td>Table 3: GNS 430W Results</td>
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<thead>
<tr>
<th>Effect</th>
<th>Distance</th>
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<tr>
<td>Jamming is Detected</td>
<td>3.57 miles (5756 meters)</td>
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<tr>
<td>Loss of Service in the Urban Canyon</td>
<td>1.79 miles (2884 meters)</td>
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<tr>
<td>Loss of Fix in Open Sky</td>
<td>0.66 miles (1059 meters)</td>
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<td>Table 2: nüvi 265W Results</td>
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Effect on GPS Users

- GPS has been a valuable national utility for 30 years
- Federal Government has invested $35 billion in GPS constellation and systems, continues to invest $1 Billion per year
- Private industry has invested many more billions
- Estimated 500 million GPS receivers in use in the US
- Most if not all GPS uses depend on its ubiquitous footprint
- GPS is embedded in critical government systems and commercial activities and is central to future critical infrastructure upgrades
Critical Civilian GPS Applications

- Intelligent **Transportation Systems** in Highway, Rail and Aviation depend on GPS to improve safety, efficiency and environmental impact.

- **Public Safety, Emergency & Disaster Response** professionals use GPS to reduce response times, map disasters and coordinate relief efforts. GPS is also in e911 systems to automatically determine the location of 911 calls.

- **Utility Networks** depend on GPS for network timing and synchronization, to coordinate rapid responses to outages, as well as for safety inspections, maintenance, asset management, environmental monitoring and worker safety.

- **Earthquake, Volcano, Dam and Bridge** measurement and monitoring systems use GPS to detect tiny movements used in risk analysis and disaster prediction and prevention.

- **Construction & Surveying** applications of GPS enable fewer lane closures, less traffic disruption and faster project completion.

- **Farmers** use GPS to reduce waste in chemical and fuel use.

- **Millions of Consumers** use GPS for navigation and recreation.
The Coalition to Save Our GPS: Our major members include companies and trade associations whose members employ millions throughout the United States

- Aviation: Air Transport Association (ATA), Aircraft Electronics Association (AEA), Aircraft Owners and Pilots Association (AOPA), Aeronautical Repair Station Association (ARSA), General Aviation Manufacturers Association (GAMA), International Air Transport Association (IATA), Mid-Atlantic Aviation Coalition-New Jersey (MAAC-NJ), National Business Aviation Association (NBAA), Regional Airline Association (RAA)

- Agriculture: Farm Equipment Manufacturers Association (FEMA), National Agricultural Aviation Association (NAAA),

- Transportation and Logistics: American Association of State Highway and Transportation Officials (AASHTO), American Car Rental Association: (ACRA), Intelligent Transportation Society of America (ITS America), UPS

- Engineering and Construction: American Congress on Surveying and Mapping (ACSM), American Council of Engineering Companies/Council of Professional Surveyors (ACEC/COPS)

- Manufacturing and Related Businesses: American Rental Association (ARA), Associated Equipment Distributors (AED), Association of Equipment Manufacturers (AEM), Case New Holland, Caterpillar, Deere & Company, National Association of Manufacturers (NAM),

- Energy/Electric Utilities: American Petroleum Institute, Edison Electric Institute (EEI), National Rural Electric Cooperative Association (NRECA),

- GPS and Technology: Avidyne Corporation, Equipped to Survive Foundation, Inc. (ETSFI), Esri, Garmin, Hemisphere GPS, Leica, Networkfleet, OmniSTAR, Orienteering USA, Payment Assurance Technology Association (PATA), PeopleNet, PocketGPSWorld.com Ltd., TomTom, Topcon Positioning Systems, and Trimble