

February 15, 2013

VIA ECFS

Marlene H. Dortch, Esq.  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, SW  
Washington, DC 20554

Re: Notification of *Ex Parte* Communication  
IB Docket No. 11-109; FCC File No. SAT-MOD-20101118-00239

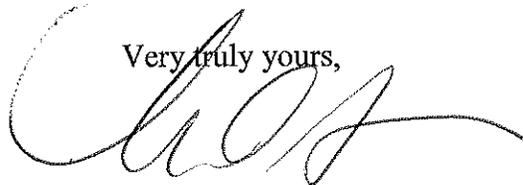
Dear Ms. Dortch:

On February 13, 2013, Scott Burgett, Director, GNSS and Software Technology for Garmin International, Inc. (“Garmin”), and I met with Commissioner Ajit Pai and Courtney Reinhard, Commissioner Pai’s Legal Advisor, Wireless.

At the meeting, Mr. Burgett announced the formation of a new group – the GPS Innovation Alliance (“Alliance”) – that will represent and advocate on behalf of members of the commercial Global Positioning System (“GPS”) community, both manufacturers of GPS devices and users of those devices. He discussed the ubiquity of GPS and importance of GPS to industry, individuals, and government users and urged the FCC, in its planning, to consider the need to ensure that GPS is in compatible spectrum “neighborhoods.” He explained that while the Alliance will continue to be engaged in the above-referenced pending proceedings, as appropriate, it will look for means to provide the FCC and others with the tools and data necessary to ensure that the importance of GPS is fully acknowledged in future proceedings and initiatives. The attached material was provided in the meeting.

As required by Section 1.1206(b), as modified by the policies applicable to electronic filings, one electronic copy of this letter is being submitted for the above-referenced docket.

Very truly yours,



M. Anne Swanson

Attachments

cc w/attach. (via email):  
The Honorable Ajit Pai  
Courtney Reinhard, Esquire

# The Importance of GPS to the US Economy Spectrum Issues Going Forward

GPS Innovation Alliance  
February 2013



**GPS Innovation  
Alliance**

[www.gpsalliance.org](http://www.gpsalliance.org)

# GPS is a Critical Government Asset Supporting Many Mission Critical Tasks

- The Department of Defense has invested over \$34 billion in the GPS satellite constellation, with ongoing investment of \$1.7 billion per year
  - Over 1 million GPS receivers are in use by our armed forces, from sophisticated weapons systems to “off the shelf” commercial devices
- Other federal government agencies have invested at least \$9 billion in GPS based technology to improve efficiency
- Federal Government agencies estimate that GPS technologies and GPS based systems produce billions of dollars in efficiency benefits per year, and these benefits will increase dramatically in the future

# Example of Critical Government Use – Public Safety and Disaster Preparedness

- 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.
- A Google commissioned research study reported that use of GPS-based technologies in the United Kingdom reduced travel times for ambulances responding to heart attack incidents by 18 percent. Each minute of response time saved improved the survival rate of heart attack victims by 7-10 percent. Based on these findings, the report estimated that the use of GPS-dependent navigation technologies annually saved 152 lives among UK heart attack victims.
- The federal government operates the GPS-based SARSAT system to detect and locate mariners, aviators, and recreational enthusiasts in distress almost anywhere in the world. Since 1982, SARSAT has contributed to more than 28,000 worldwide rescues.
- More than 23,000 environmental sensor platforms across the planet depend on GPS for accurate geo-referencing and data time stamping, and the NEXRAD weather radars and sea surface radar altimeters require GPS-based time synchronization. NEXRAD is critical to issuing timely severe storm and flood warnings, and local weather forecasts.

# GPS is a Critical Enabler of US Jobs

- Recent Google sponsored research found that the U.S. geospatial industry generated approximately \$73 Billion in revenues in 2011 and directly provided at least 500,000 high-wage jobs
  - The industry is composed of geo-data providers, location-enabled device manufacturers, geoapp developers, and a growing network of geospatial experts and educators which use location based information based on GPS and related technologies
- Commercial and industrial segments that make intensive use of GPS, such as construction and agriculture, employ over 3 million people
- The Google report estimated that geospatial services are used on a daily basis by roughly 5.3M U.S. workers today (over 4% of the U.S. workforce)
- Geospatial services drive \$1.6 trillion in revenue and \$1.4 trillion of cost savings, representing 15 to 20 times the size of the geospatial services industry itself

# GPS Produces Substantial Consumer Benefits

- 500 million GPS receivers are in use in the US, with 100 million more receivers being added every year
- Google sponsored research estimates that use of GPS and the mapping and navigation technologies which depend on them have reduced travel time by over 1.1 billion hours per year worldwide by getting people to their destinations more efficiently.
- More efficient travel reduced global fuel consumption by nearly 1 billion gallons. Savings in the US amount to approximately 300 million gallons, saving US consumers \$5 billion
- FCC estimates that “location based services” via smart phones and portable devices will deliver \$700 billion in economic value to consumers and businesses over the next decade

# GPS is Critical to Air Travel and Supporting Infrastructure

- In 2009, civil aviation contributed \$1.3 trillion annually to the national economy and generated more than 10 million jobs, with earnings of \$397 billion. The General Aviation sector alone adds at least \$150 billion to the U.S. economy annually, supports over 1.2 million jobs, and provides crucial air services to every community in the United States.
- GPS is Integrated into more than 190,000 General Aviation aircraft, and for majority of these aircraft, GPS is the primary means of navigation. GPS is used in almost 80 percent of air carriers' planes, nearly all military planes and in most foreign aircraft that enter U.S. airspace.
- GPS is the only instrument approach possible at many locations, with more than 900 of the roughly 3,000 airports and heliports in the United States and its territories having only GPS-based approaches.
- GPS is the centerpiece of the NextGen system. The FAA estimates the cumulative benefits of NextGen to be \$23 billion through 2018; and by 2030, the cumulative benefits grow to \$123 billion and reduce CO2 emissions by 64 million tons.
- GPS safety enhancements are expected to prevent the loss of approximately 800 lives over the next 10 years, with an estimated public safety benefit of about \$5 billion

# GPS Dramatically Improves the Efficiency of Agriculture and Construction

- High-precision GPS receivers are widely used in agriculture – enabling farmers to manage land, water, seed, fertilizer, pesticides and labor. This significantly minimizes costs and waste, greatly increases efficiency and crop yields, and responsibly manages important environmental concerns.
  - The United States Department of Agriculture (USDA) estimated 2012 U.S. net farm income to exceed \$122 billion, with farm equity rising to nearly \$2.3 trillion. More than 922 million acres are devoted to U.S. agriculture, which employs 2.6 million workers, and high-precision GPS is responsible for important crop production gains.
  - A 2011 study found that during the 2007-2010 crop years, high-precision GPS agriculture practices accounted for \$19.9 billion in crop production gains through higher yields and lower input costs.
- GPS technology has become critical to improving the productivity, efficiency and safety of the \$537 billion United States construction sector. GPS technology is used in all phases of construction, including surveying and mapping, locating buried and overhead utilities, facilitating heavy machinery precision grading and excavation, and enhancing material application.
  - A 2011 study found annual labor efficiencies of \$32 billion, capital efficiencies of \$10.6 billion and more efficient use of inputs saving input expenses \$2 billion

# Spectrum Decisions Affecting GPS Must be Made with Extreme Caution

Given the ubiquity of GPS and GPS dependent infrastructure, it is not surprising that the recent Google sponsored research report concluded that **“vigilance is required to protect GPS spectra and other core investments.”**

# Use of the MSS/L Band for Nationwide Mobile Broadband Service Represents a Fundamental Change to a “Quiet Spectrum Neighborhood”

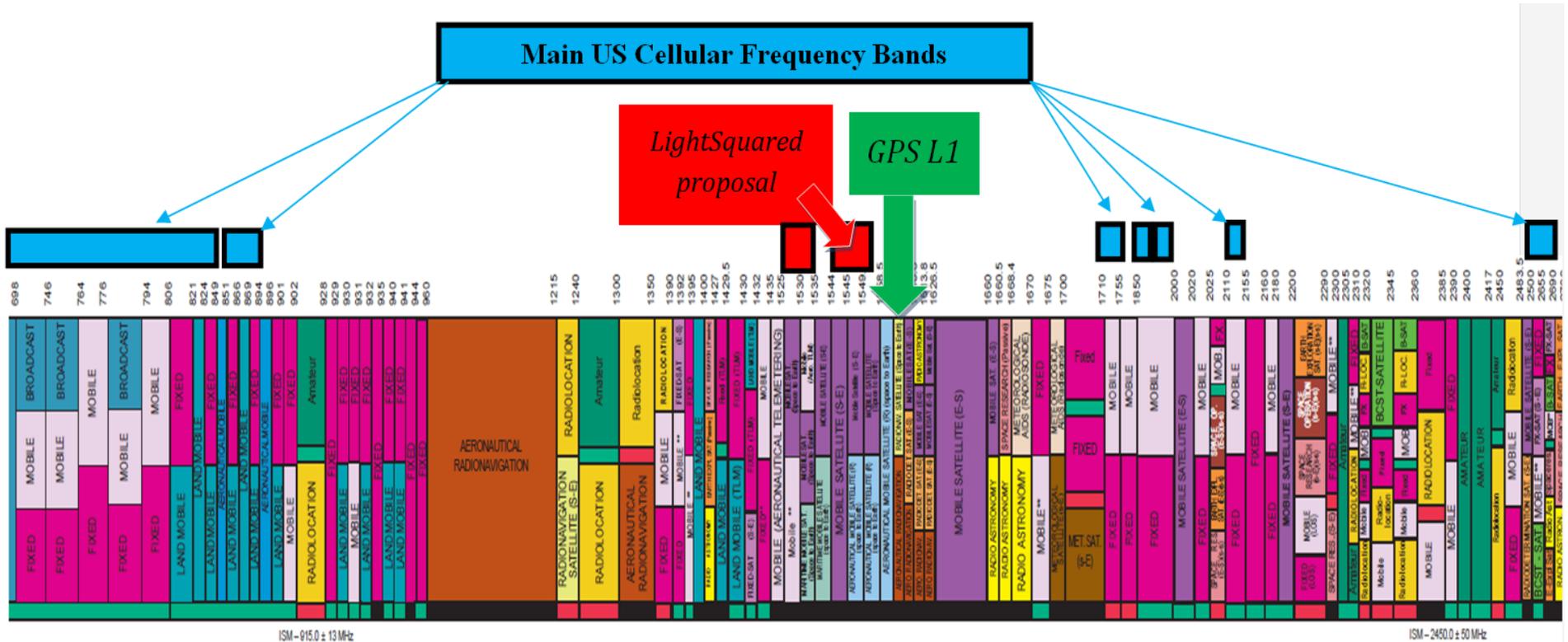
- The Mobile Satellite Service MSS L-Band currently licensed to LightSquared and Inmarsat is directly adjacent to the GPS “L1” band
- This radiofrequency band has long been reserved for earth to satellite communications due to its unique physical characteristics
  - At these frequencies, radio signals 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 terrestrial operations to fill in coverage gaps in satellite service
- Such coverage gaps are geographically limited – Sirius XM has authority to conduct fill-in terrestrial operations for satellite radio service. The terrestrial portion of this mature, highly utilized service covers 1% of the Continental US
- No terrestrial deployment in L-Band has ever occurred
- GPS developed in this quiet spectrum environment and GPS receivers have been designed to take advantage of it, leading to tremendous innovation

## Unique Interference Concerns Due To Proximity of MSS Spectrum to GPS

The L1 GPS signal's received power on earth is  $10^{-16}W$ . A 1500W transmission from a nearby ground transmitter in the immediately neighboring frequency will be **billions of times more powerful** at the GPS receiver's antenna. Result is "overload" of sensitive GPS receivers.



# No other proposed 3G or 4G broadband wireless service has created GPS interference concerns because there is far greater spectrum separation



**Fig 1.** Frequency allocations in the 300MHz – 3GHz Spectrum, indicating GPS L1, Major Cellular Bands and LightSquared proposal  
Adapted from *National Telecommunications and Information Administration U.S. Frequency Allocations Chart*

# Issues and Concerns in Upcoming Spectrum Management Decisions

- The GPS Innovation Alliance is committed to constructive participation in upcoming FCC proceedings
- These proceedings must involve a thorough examination of the costs and benefits of changes in the spectrum environment near GPS, without uncritical assumptions
- Policy makers should not simply assume that high powered terrestrial mobile broadband is the “highest and best” use of all spectrum
  - Three of the most successful and efficient spectrum uses are satellite based – GPS, satellite radio, and satellite television
  - Future applications (e.g. autonomous “Google cars”) require the truly ubiquitous coverage only satellite can provide
- The FCC should take a long term spectrum management approach that supports satellite based innovation by consolidating compatible uses

# Appendix - Membership of the Coalition to Save Our GPS

- 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), FedEx, 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



# Putting the U.S. Geospatial Services Industry On the Map

December 2012

THE BOSTON CONSULTING GROUP

# Definition of geospatial services and the focus of this economic study

## Geospatial services



Allow consumers, businesses, governments, and other organizations to make decisions based on geographic data

- The primary ingredients of geospatial services are electronic maps and satellite imagery describing our physical and human environment



## Geospatial services industry



Group of companies and organizations providing the tools and technologies for end users to benefit from location-based information.

- There are three primary types of users of geospatial services: businesses, consumers, and government and non-government organizations

The main focus of this study, which was commissioned by Google, is three-fold:

- 1 **Assess the size:** Tally the jobs and revenues of the U.S. geospatial services sector
- 2 **Trace the impact:** Establish the benefits that U.S. businesses and consumers derive from this new industry sector
- 3 **Identify trends:** Highlight the evolution of this new sector, including interdependencies with public policy and both private and public investment

## **Main study findings: The impact of geospatial services on the U.S. economy is 15x-20x the size of the geospatial industry**

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The U.S. geospatial industry generated approximately **\$73B in revenues** in 2011 and comprises at least **500,000 high-wage jobs**

- The industry is composed of geo-data providers, location-enabled device manufacturers, geo-app developers, and a growing network of geospatial experts and educators
- By employees, this is roughly equivalent to the airline industry; by revenues it is approximately \$10B more than the U.S. paper industry

More importantly, geospatial services deliver efficiency gains in the rest of the U.S. economy that are valued at many times the size of the sector itself, creating a lasting source of competitive advantage for the U.S.

- Geospatial services **drive \$1.6T in revenue** and **\$1.4T of cost savings**, representing 15 to 20 times the size of the geospatial services industry itself
- Geospatial services are used on a daily basis by roughly **5.3M U.S. workers today** (over 4% of the U.S. workforce)

In addition, U.S. consumers place a direct value on geospatial services at **\$37B annually**—a recognition of the many ways geo-applications and location-enabled devices are central to our daily lives

# The U.S. geospatial services industry is composed of three primary sectors

The **geospatial services industry** provides the tools, technologies, and services for consumers, businesses, governments, and other organizations to use location-based information

## Geo-expert industries



- Turns location-based information into insights for commercial and government organizations
- Trains and educates geospatial professionals

Total	
Revenues (\$B)	Jobs (K)

2.6	125
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## Geo-applications & devices



- Develops and manufactures devices and software for creating, visualizing, sharing, and analyzing geographic information

54	175
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## Location-based geo-data



- Collects, manages, and distributes spatial information and imagery
- Provides navigational aides and other location-finding services

17	200
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<b>\$72.8B</b>	<b>500K</b>
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1. Revenue estimate is for 2011 and includes on commercial sectors, while jobs total includes both commercial and non-commercial (government) positions. Source: BCG analysis

# Consumers are big beneficiaries of geospatial services

Consumers rely on geospatial services primarily for direction-finding and searching for local businesses

## Maps and navigation



Moving from place to place in the most optimal way creates efficiencies in every-day life

### Example:

- Vacationers navigate to interesting sightseeing locations using a tourism smartphone app
- Business people find their way to hotels in unknown places while travelling for work

## Local business search



Locating businesses nearby can improve decision making for citizens and drive sales at stores

### Example:

- Citizens find new places to eat after searching for recommendations on Yelp!

# Businesses rely heavily on geospatial services for both planning and operations

**Businesses** rely on geospatial services to create new efficiencies in their core operations, find ways to better target their customers, create leaner operations, and make smarter strategic decisions

## Logistics & operations



Optimizing transportation, warehousing, facilities management, and operations

### Example:

- Transportation company increasing utilization rates and load-factors of truck fleet
- Manufacturer minimizing supply-chain costs and efficiently managing inventory

## Sales & marketing



Targeting of customers based on location to increase sales and marketing yields and reduce costs

### Example:

- Chain retailer designing an app that lets customers locate nearest storefront
- Salespeople dividing territories to balance potential and create an equitable sales plan

## Strategic decision making



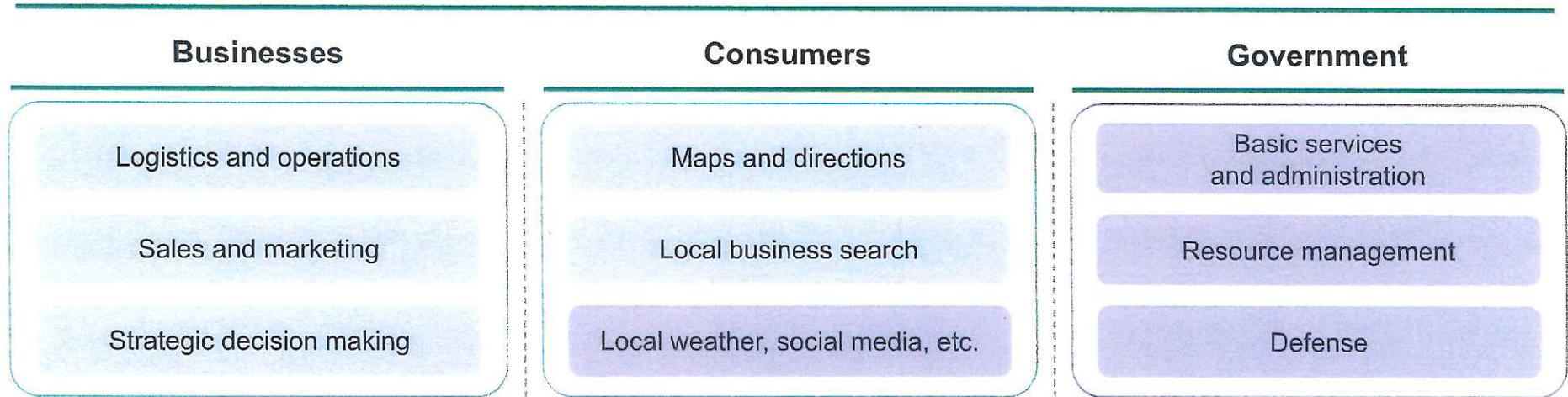
Leveraging geo-data to drive core business decisions to most effectively deploy resources

### Example:

- Agribusiness company determining optimum fertilizer application from the air
- Retailer choosing the next set of store sites based on where its target customers live

# BCGs U.S.-wide survey of business leaders identified more than \$1T in perceived value for geospatial services

## Geospatial services user-base



## Estimated impact of geospatial services

### \$1.6T of revenue heavily influenced

- U.S. company revenues that are influenced by geospatial services

### \$1.4T of cost savings attributed

- U.S. company cost savings that are attributed to use of geo-services

### 5.3M jobs rely on geospatial services

- Number of U.S. employees who use geospatial services to do their jobs

### \$37B consumer value created

- The price U.S. consumers are willing to pay for access to geo-services

*Focus of study on commercial sector and consumers*



Out of scope

# Survey highlights: Powerful qualitative evidence for the importance of geospatial services

Of the 1,000 business leaders surveyed from every U.S. industry and geography

Distribution of U.S. survey respondents

51%

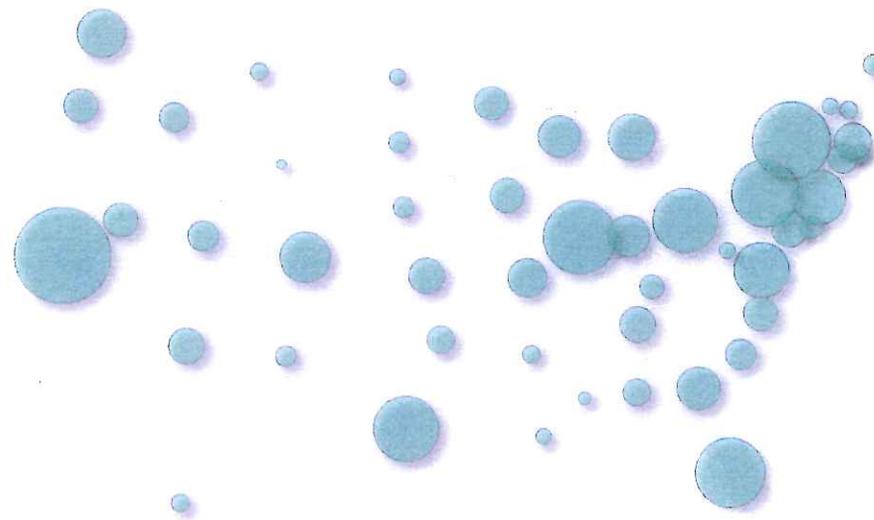
Use web-based mapping services in their business

40%

Believe geo-services is an important component of American competitive advantage

36%

Use geo-enabled devices in business operations



60 (Florida)  
14 (North Carolina)

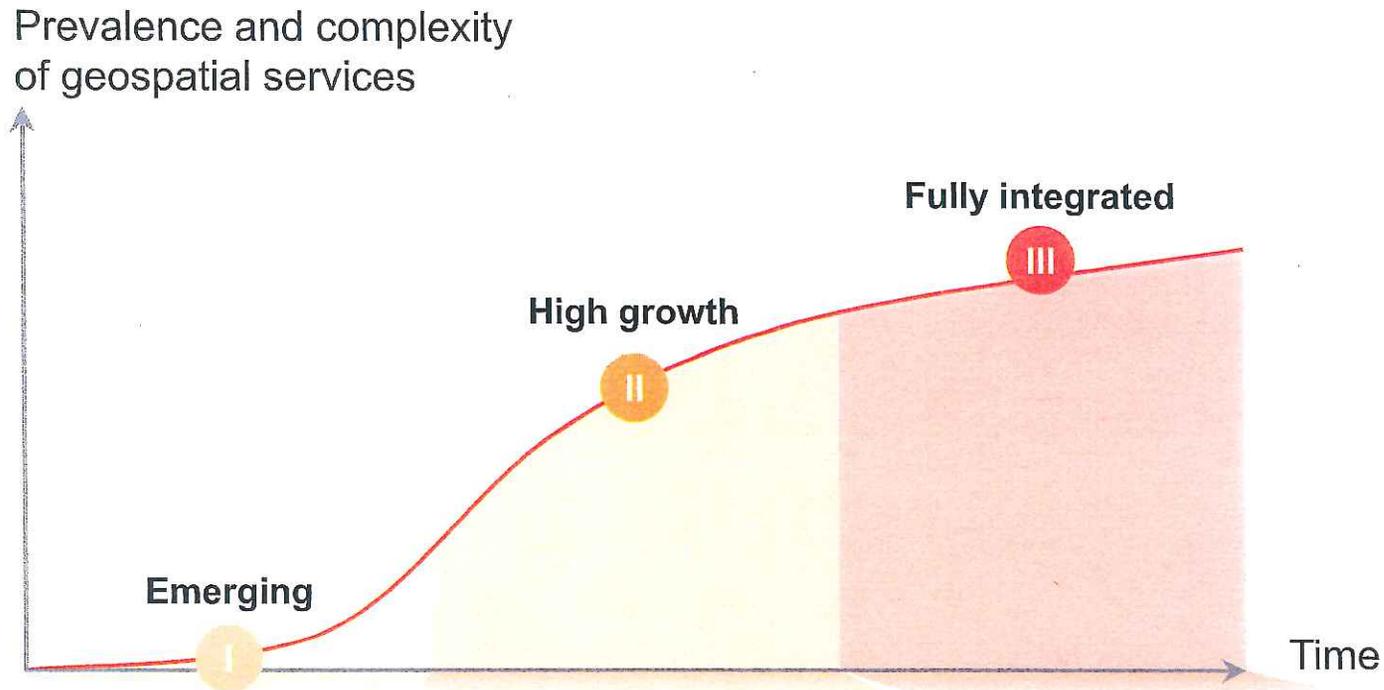
32%

Say local search plays a role in attracting customers

19%

Believe government support for open exchange of geospatial information is driving the efficiency of American business

# BCG believes that geospatial services in the U.S. are in a high-growth phase, headed toward market maturity



- Main customers are defense, regional governments, and large enterprises
- Geospatial services are expensive, data availability is poor, access points rare
- Uptake by small and medium-sized businesses and direct to consumer very limited

- Commercial satellite imagery and open GPS signals create surge in spatial data
- Location-aware mobile devices create an explosion of users and use-cases
- Rapid adoption in business drives competitive advantage among firms

- Geospatial services are seamlessly integrated into core business processes of both large and moderate-sized firms
- Citizens, consumers, and workers consider geospatial services an essential part of every-day life

*Anticipated future development*

Source: BCG research

# BCGs findings indicate that a strong U.S. geospatial services industry requires continued support on several fronts

Key success factor	Issue	Policy highlights
 <b>Government investment and policy support of geo-data collection</b>	<ul style="list-style-type: none"><li>• Satellites feed the rest of the industry with map and location data</li><li>• Government support for these collection efforts is significant</li></ul>	<ul style="list-style-type: none"><li>• Gaps are opening up in the global earth monitoring network</li><li>• Vigilance is required to protect GPS spectra and other core investments</li></ul>
 <b>Clear open data policies and effective geo-infrastructure</b>	<ul style="list-style-type: none"><li>• Open data policies allow investments to flow to users</li><li>• Geospatial data needs to have a common structure to be shared</li></ul>	<ul style="list-style-type: none"><li>• International and regional groups are making progress in building the case for common standards<sup>1</sup></li></ul>
 <b>Strong support for geospatial education, training, and innovation</b>	<ul style="list-style-type: none"><li>• U.S. anticipates talent shortfalls in many of the core geospatial professions over the next 5 to 10 yrs</li><li>• Education efforts and improved awareness are key to closing the gap</li></ul>	<ul style="list-style-type: none"><li>• Efforts are underway to elevate the profile of the geospatial profession, including links to U.S. math and science agenda</li></ul>

1. Examples of organizations working in this space include the UN Committee of Experts on Global Geospatial Information Management (GGIM), the Global Spatial Data Infrastructure Association (GSDI), the U.S. Federal Geographic Data Committee (FGDC), and the EU Spatial Data Infrastructure Network (eSDI-NET)

## Methodology

# Methodology overview

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## **We sized the U.S. geospatial services industry (jobs, revenue)**

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**Expert scan:** Conducted dozens of expert interviews both inside and outside BCG to understand the structure and dynamics of the industry

**Bottom up:** Canvassed several global and U.S.-scale firmographics databases to build a bottom-up view of revenues and jobs, leveraging custom taxonomy

**Top down:** Identified several high-importance industry subsectors and conducted top-down estimates of revenues and jobs

## **and we estimated the wider impact of the industry (revenue, costs)**

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### **BCG designed and fielded a U.S.-wide survey to assess wider impacts**

- 1,000 business managers at a wide range of seniority-levels
- Spanning all U.S. industries and geographies
- Even split between "enterprise-level" firms (500 or more employees) and small and medium-sized businesses

### **Detailed survey instrument including multiple, independent measures**