

WILKINSON ) BARKER ) KNAUER ) LLP

1800 M STREET, NW  
SUITE 800N  
WASHINGTON, DC 20036  
TEL 202.783.4141  
FAX 202.783.5851  
WWW.WBKLAU.COM  
M. ANNE SWANSON  
202.383.3342  
ASWANSON@WBKLAU.COM

**VIA E-FILING**

September 25, 2017

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

Re: *Ligado Networks, IB Docket Nos. 11-109, 12-340; SAT-MOD-20151231-00090; SAT-MOD-20151231-00091; SES-MOD-20151231-00981; SAT-MOD-20101118-00239; SAT-MOD-20120928-00160; SAT-MOD-20120928-00161; SES-MOD-20121001-00872; RM-11681*

Dear Ms. Dortch:

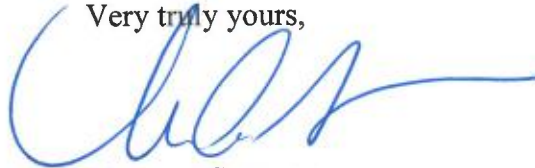
On September 21, 2017, Scott Burgett, Director, GNSS and Software Technology of Garmin International, Inc. ("Garmin"); David Kight, Assistant General Counsel of Garmin; and I met with Donald Stockdale, Chief of the Wireless Telecommunications Bureau, and the individuals copied below.

In the meeting, we provided the attached slide deck and discussed Garmin's latest consumer products and the company's overall operations as a leading supplier of GPS-enabled devices. We also discussed the information that Garmin provided in the written ex parte presentation that it filed in many of the above-referenced dockets/files on July 25, 2017. Based on that filing, the Garmin representatives highlighted the remaining concerns that the company has regarding the effect that proposed operations by Ligado Networks LLC would have on use of the certified aviation devices Garmin sells. In addition, the Garmin representative presented the reasons set forth in that filing as to why they believe that the 1 dB standard remains the appropriate metric for evaluating harmful interference to GPS receivers.

Marlene H. Dortch  
September 25, 2017  
Page 2

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed for inclusion in each of the above-referenced dockets/files. If you have any questions about this filing, please contact me.

Very truly yours,



M. Anne Swanson

Attachment

cc (via email w/o attachment): Donald Stockdale  
Nese Guendelsberger, Senior Deputy Bureau Chief  
Dana Shaffer, Deputy Bureau Chief/Chief of Staff  
Charles Mathias, Associate Bureau Chief  
Aalok Mehta, Senior Policy Advisor



  
**GARMIN®**



# INNOVATION AS A CORNERSTONE

Garmin was founded in 1989 and is committed to designing products that fuel people's passions.

- We are **innovators** creating technology and utility that enriches the lives of our customers
- We are **pioneers** developing new markets for location and communications technology
- We are a **multi-national** company employing over 11,600 associates in over 30 countries
- We are a **multi-faceted** company serving five key market segments of Automotive, Aviation, Fitness, Marine, and Outdoor





## OURMISSION

To be an enduring company by creating superior products for automotive, aviation, marine, outdoor, and sports that are an essential part of our customers' lives.





# NORTH AMERICAN OPERATIONS

Garmin has 17 offices and more than 4,400 associates in North America.

The headquarters facility in Olathe, Kansas supports:

- Administration and marketing
- Aviation manufacturing
- Product support and repair
- Warehouse and distribution
- Primary R&D Center

Certifications:

- ISO 9001:2008
- AS 9100 Rev.C. Aerospace
- TS 16949:2009 – Automotive
- ISO 14001:2004 – Environmental Management



A photograph of a modern building with a large glass facade and a prominent white triangular section at the top. The word "GARMIN" is displayed in black capital letters on the white section, with a small blue triangle logo above the letter "I". The building is surrounded by greenery and a paved area in the foreground.

## EMEA OPERATIONS

Garmin has a large Europe, Middle East and Africa (EMEA) presence with a primary distribution and support center in the UK.

- 24 European offices and more than 1,300 associates
- Distribution, sales and support in every European country
- ISO 9001 certified

Research & Development facilities located in:

- Cluj, Romania
- Stockholm, Sweden
- Würzburg, Germany





# APAC OPERATIONS

Garmin currently has 13 offices and more than 5,700 associates in the Asia-Pacific region.

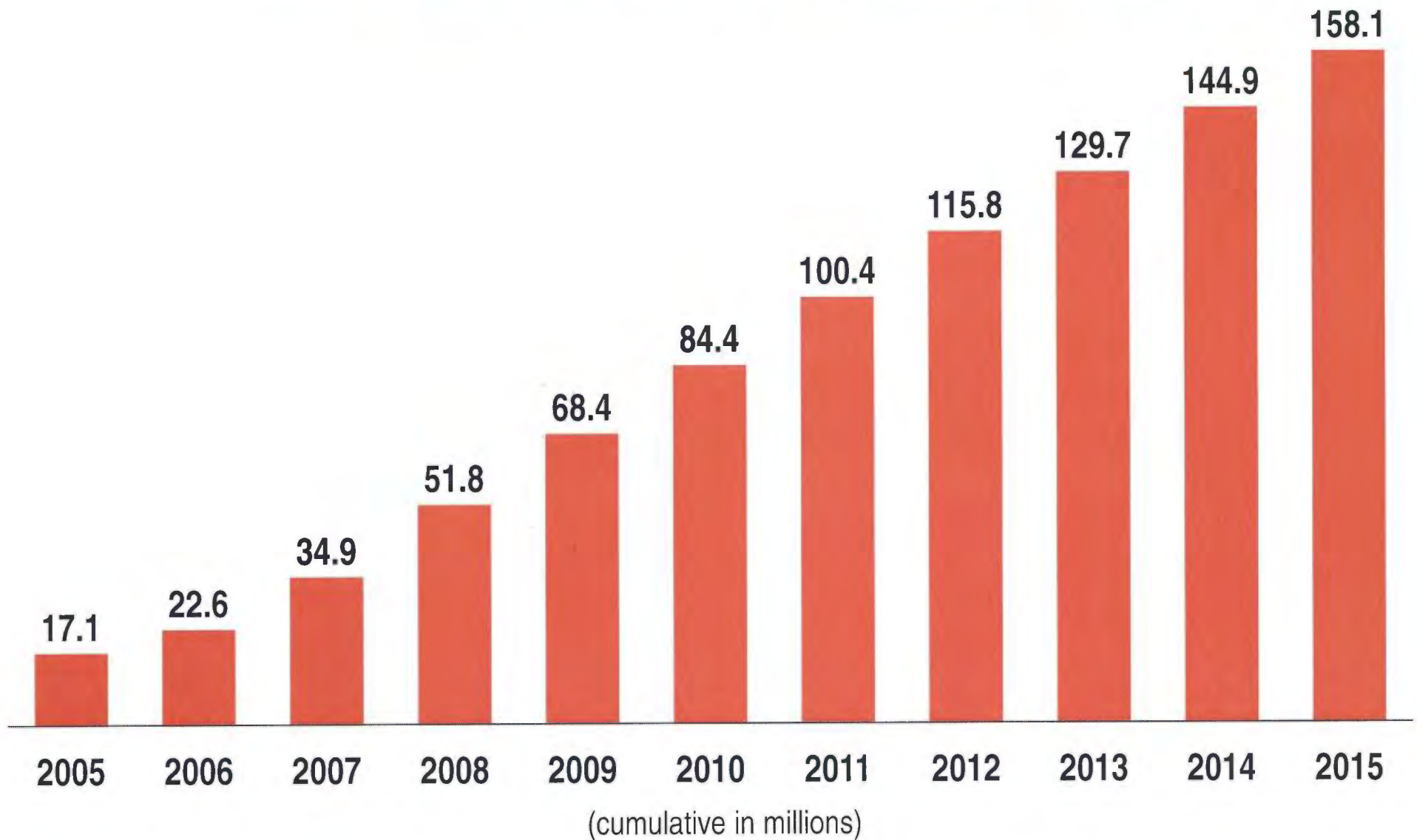
Primary facilities are in Taiwan and include:

- Manufacturing and Production
- Quality Assurance
- Regional product development with language support
- Cartography development
- Sales, distribution, and support for the Pacific Rim





# A Large, Loyal Customer Base



Garmin has sold **more than 158 million** devices worldwide since 1989.  
**Over 16 million** were sold worldwide in 2015.





MARKETS WE SERVE







# AUTOMOTIVE



# AUTOMOTIVE

As the world leader in GPS navigation, we design and deliver driving solutions for a wide range of customers. Our products feature valuable tools including situational awareness of traffic, exits, lane-departures, spoken directions, school zones, back-up cameras and much more. These features help our customers have a safer and more confident driving experience.

## Personal navigation devices for:



Cars



Motorcycles



Trucks



Caravan/RVs

## Additional Markets:

- OEM hardware, software and infotainment solutions
- Dashboard and Action cameras
- Mobile navigation applications





# OUTDOOR





# OUTDOOR

Our outdoor products are known for their ruggedness, reliability, and intuitively simple operation. Our customers can rely on the security of always knowing where they are, where they've been and where they're going. On the wrist or in the hand, our outdoor products are an invaluable companion.

## Wrist-worn and mounted devices for:



Hunting



Hiking/Camping



Dog Training



Geocaching



Golfing

## Category Highlights:

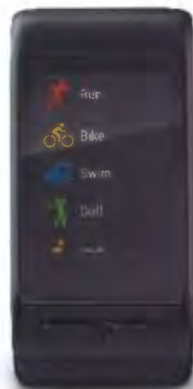
- Outdoor GPS watches
- Golf devices
- Dog tracking & training devices







# FITNESS



# FITNESS

Garmin creates high-quality, state-of-the-art products that motivate our customers and help them to achieve their fitness goals.

Whether simply returning to a healthy lifestyle or championing the highest level of competition, Garmin fitness devices provide innovation and inspiration to help athletes at all levels to succeed.

## Wrist-worn and mounted devices for:



Wellness



Swimming



Running



Cycling



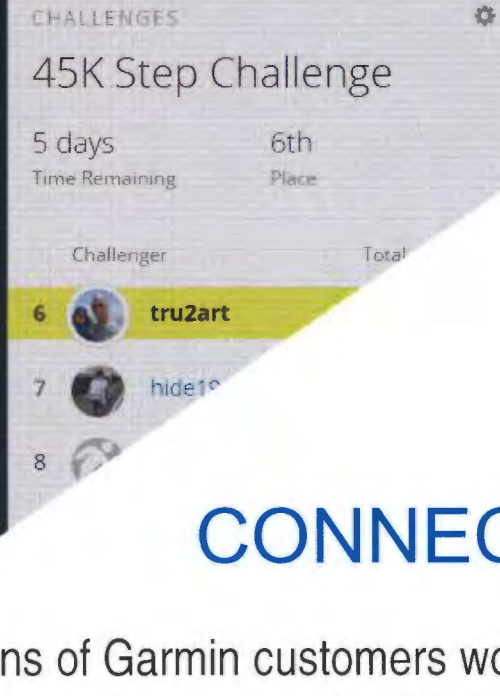
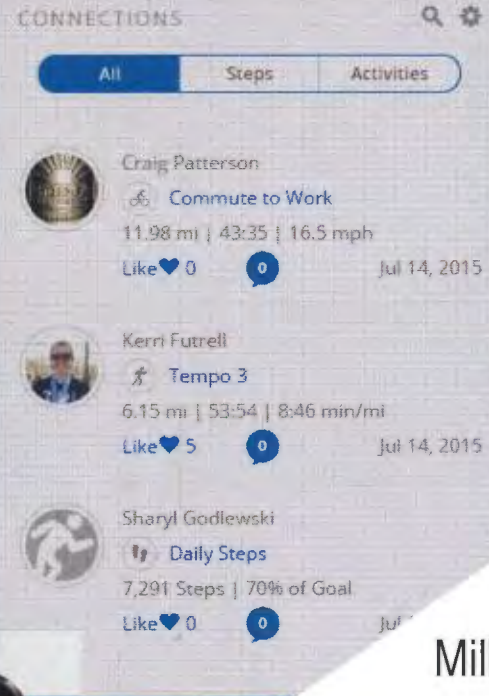
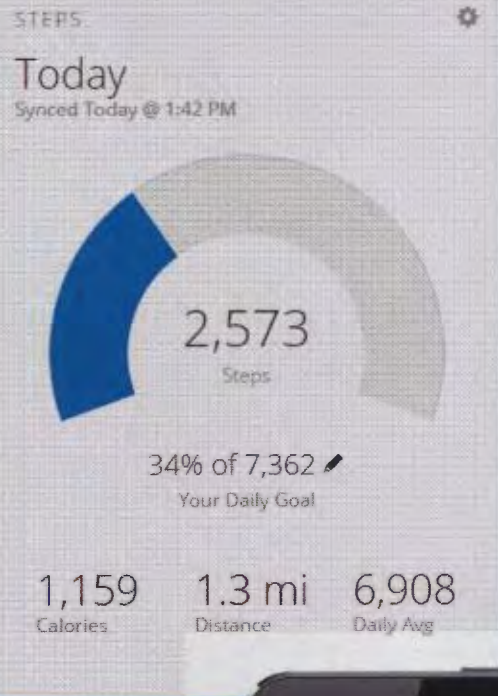
Multi-Sport

## Category Highlights:

- Heart rate monitoring
- Speed/cadence sensors
- Smart light and radar sensors for cyclists
- Track, store and share activities on Garmin Connect







## CONNECT

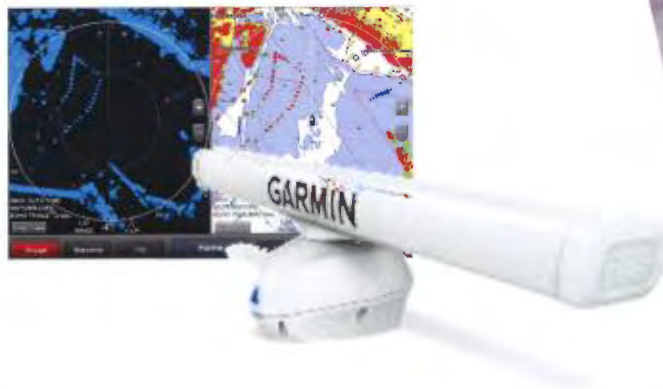
Millions of Garmin customers worldwide come together as a community with Garmin Connect™

- Garmin users track, store, explore and share their fitness activities online
- Create family and friend competitions
- Set goals and receive awards
- A motivational tool
- Accountability through visibility
- Billions of miles of activity have been logged by Garmin users





MARINE







# MARINE

Our marine products feature advanced technology that integrates performance, safety, quality, value and ease of use so our mariners can embark on every voyage with confidence.

Precise guidance on the water and mapping contours below the water are just some of the technologies pioneered by our marine team.

**OEM, aftermarket, portable and wearable devices for:**



**Boating**



**Sailing**



**Fishing**

## **Category Highlights:**

- GPS, Chartplotters, Fishfinders and Sounders
- Marine cartography, Sonar, satellite weather, radar, transducers, autopilot, sailing instruments and networking capabilities
- Multi-function and touch screen displays with an intuitive interface





# AVIATION

From wrist-worn to  
complete flight deck  
upgrades and more





# AVIATION

Our market-leading aviation technology continues to move the industry forward. From the most advanced and sophisticated integrated flight decks to wearable navigators for your wrist and everything in between, Garmin innovation is modernizing the way we fly. Our focus and passion is at work everyday to reduce complexity, enhance efficiency, underscore safety, shorten learning curves, and vastly simplify cockpit management in all phases of flight.

**Aircraft Manufacturers, Aftermarket Upgrades, Government & Military and Portable Avionics for:**



General  
Aviation



Business  
Aviation



Helicopters



Experimental  
Aircraft

## Category Highlights:

- Navigation, communication, flight control, hazard avoidance, situational awareness, Integrated Display Systems
- Expansive suite of ADS-B solutions



The image is a collage of three photographs showing workers in a manufacturing environment. The leftmost photo shows a man with glasses and a blue shirt soldering a component on a circuit board. The middle photo shows a man in a white polo shirt with a 'GARMIN' logo looking at a device. The rightmost photo shows a woman with glasses and a blue shirt holding a small electronic component. The photos are arranged in a diagonal, overlapping fashion.

## VERTICAL INTEGRATION

We embrace a vertically integrated business model with strategic design, manufacturing, distribution, sales, and support centers around the world to maximize our value to customers





# Criticality of GPS

- GPS is an essential utility for the US economy
- GPS used for aviation, agriculture, timing, public safety, automotive, science – a myriad of applications
- Estimated direct economic benefit of \$67.6 billion/year, indirect benefit of \$122.4 billion/year
- 130,000 jobs attributed directly to GPS manufacturing
- 3.3 million jobs rely on GPS technology
- NextGen projected to generate \$133 billion in benefits through 2030 for the National Aerospace System
- GPS will be critical to burgeoning unmanned aerial vehicle and driverless car industries
- The GPS system requires a “quiet” spectrum neighborhood to function

# GPS System Overview

- Satellites are located in Medium Earth Orbit, more than 12,000 miles above the earth
- Satellites are solar powered, which necessitates low-powered radio transmissions (~50 Watts)
- Receivers must be extremely sensitive in order to receive the low-power GPS signals
- GPS signal power on the ground is less than a millionth of a billionth of a Watt ( $1\text{e-}15$  Watts)





# Navigation vs Communication Systems

- GPS is a navigation system and differs from radio communications systems
- The primary measurement in GPS is the timing of bit transitions in the navigation signal
  - Precise positioning requires sub-ns measurements of bit edges
  - Accurate measurement of bit edges requires wide receiver bandwidth
  - Effective multipath rejection also requires wideband signals
- Spread Spectrum GPS signals are below the thermal noise floor (the level of noise occurring naturally and apart from manmade sources) when received
  - The cumulative effects of in-band interference can increase the noise floor and degrade performance



AT

# GARMIN

OUR SUCCESS WILL BE DETERMINED BY  
OUR ABILITY TO CREATE SUPERIOR  
PRODUCTS THAT ARE AN ESSENTIAL PART  
OF OUR CUSTOMERS' LIVES

To that end we will innovate,  
we will explore uncharted waters,  
we will challenge the conventional,  
we will serve without ceasing.

