Google Inc.
Application for Extension and Modification of Special Temporary Authority
File No. 0433-EX-STA-2012
May 25, 2012

Attachment 1
Explanation of Proposed Testing

The purpose and test plan remain consistent with Google's original request for STA. Testing of the prototype device is intended to reveal real world engineering issues and reliability of networks. The device utilizes a standard Wi-Fi module, and the testing is not directed at evaluating the radio frequency characteristics of the module (which are known), but rather at the throughput and stability of available Wi-Fi networks that will support the device, as well as the functionality of the device. Experimentation to date has included, and will continue to include, functional testing of all subsystems, including Wi-Fi and Bluetooth radio. Users will continue to connect their device to their home Wi-Fi networks and to publicly available Wi-Fi networks.

Tests to ensure that emissions in the 2.4 GHz Wi-Fi/Bluetooth band meet requirements for spectral purity and power levels already are being conducted, and Google engineers expect to run tests to verify compliance with the Part 15 conducted limits in June. Under the existing STA, the prototype device has been tested extensively in a variety of settings, and no harmful interference has been detected or reported by testers or other parties.

Because the final hardware configuration for the device has not yet been determined, rigorous compliance testing has not yet been performed on the device. However, Google engineers have run preliminary electromagnetic interference (EMI) tests of the prototype device in an EMI chamber. The tests were run numerous times, with the antennas moved up and down, oriented horizontally and vertically, and at all positions around the device while the device was operated in different modes to attempt to determine the particular circumstances resulting in maximum signal radiation. (To date, only radiated testing has been performed, as the AC power adapter that will be supplied with the final device is not yet available.) Results for various frequency bands, for both horizontal and vertical antenna orientations, and encompassing readings at a variety of antenna heights and positions around the device, show that the device's emissions generally have been well below FCC limits, and have led to ongoing hardware and software improvements. The results of further testing will aid in determining what additional design changes may be needed to improve the device in advance of authorization and public release.

As a result of initial testing, it has become apparent that product development can be accelerated by increasing the number of devices and the geographic area within which the devices may be tested. Although the broadest benefits could be obtained by expanding the scope of the STA for each of the four geographic areas covered by the STA, Google seeks to modify the STA only with respect to one of those areas. The modification will enable Google to conduct a product development trial at an increased scale. Specifically, Google requests that the radius around its Mountain View, CA office be modified from the existing STA for WF9XKU to encompass 200 miles (322 km), and that the number of devices associated with that area be increased to 700. The other locations and associated device counts remain unchanged. The resulting locations and numbers of devices sought by this extension and modification request thus are:

- Mountain View, CA: 37.421265 N, 122.085314 W, 322 km radius, 700 devices.

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- Los Angeles, CA: 33.995388 N, 118.477035 W, 121 km radius, 10 devices.
- Cambridge, MA: 42.362754 N, 71.088023 W, 121 km radius, 2 devices.
- New York, NY: 40.741872 N, 74.004579 W, 121 km radius, 10 devices.

The expanded Mountain View test area is intended to allow testers to connect to new networks in different regions to test for Bluetooth and Wi-Fi interoperability, functionality, and compatibility with various types of hardware and networks, which can vary on a regional basis, as well as to facilitate different modes of use (use of applications and services likely will vary during business or other travel as compared to standard home or office use) and a variety of environmental and use factors that will, or have the potential to, affect performance, including altitude (which affects cooling rates, for example), humidity, air quality, and frequency of use. The expanded number of devices also will allow Google to examine the increased load effects of streaming content and particular use applications on functionality and latency.

Google has implemented internal procedures to monitor and maintain control of the devices to be tested and promptly respond to any reports of harmful interference. All devices will continue to be registered to Google employees, and to be used solely by Google employees (except that Google requests authority to permit up to five devices at any given time to be used by third parties under the supervision of Google employees). Google will continue to maintain a record of each device so that devices may be recalled at any time during testing and upon completion of testing. Device location can be tracked using Wi-Fi geolocation (typically accurate to about 75 meters), and Google has the ability to remotely disable any or all test devices should it become necessary. Moreover, GPS tracking of the devices remains in testing and development, and is expected to become functional during the STA period.

Finally, we note that this request is consistent with the Commission's policy of supporting flexible approaches to experimental authorizations in order to promote innovation and technology, and in particular with the FCC's proposed market trial rules. *See Promoting Expanded Opportunities for Radio Experimentation and Market Trials under Part 5 of the Commission's Rules and Streamlining Other Related Rules*, Notice of Proposed Rulemaking, 25 FCC Rcd. 16544 (2010).