Date: October 13, 2014

Subject: Public and Redacted Version of Request for Confidential Treatment and Complementary Exhibits

FCC File No.: 0923-EX-ST-2014

To Whom It May Concern:

Google Inc. (Google), pursuant to 5 U.S.C. § 552 and Sections 0.457 and 0.459 of the Commission's Rules, 47 C.F.R. §§ 0.457, 0.459, hereby requests that certain information complementary to its above-referenced application for Special Temporary Authority (STA Application) be treated as confidential and not subject to public inspection. The designated information constitutes confidential and proprietary information that, if subject to public disclosure, would cause significant commercial, economic, and competitive harm. As described below, Google's request satisfies the standards for grant of such requests set forth in Sections 0.457 and 0.459 of the Commission's Rules.

In accordance with Section 0.459(b) and in support of this request, Google provides the following information:

1. Identification of the Information for Which Confidential Treatment is Sought:

Google's request for confidential treatment is limited to the following information that has been redacted from the STA Application and complementary exhibits. Google does not seek to withhold from public inspection information in the STA Application necessary for interference mitigation, including applicant name, contact information, test location, frequency, output power, effective radiated power, emission characteristics and modulation.

Exhibit A - Special Temporary Authority Justification:

Google requests confidential treatment of the following underlined text from Exhibit A that contains confidential and proprietary information regarding the proposed tests/experiments:

> Consistent with the standards set forth in Section 5.61 of the Federal Communications Commission's (FCC's or Commission's) Rules, 47 C.F.R. § 5.61, Google Inc. (Google) requests Special Temporary Authority (STA) to conduct demonstrations of experimental transmitters. The STA is sought for a period of 180 days beginning on November 13, 2014. Google outlines below its need for the requested STA and the reasons that the STA should be granted expeditiously.

Google requests the STA to [REDACTED].

The tests will use point-to-point communications between between three sites located in the Bay Area. The locations are as follows:

- Location 1: 37°20’40’’ N, 122°12’56’’ W
- Location 2: 37°25’3’’ N, 122°4’39’’ W
- Location 3: 37°25’33’’ N, 122°04’20’’ W

The equipment used will include three types of radios: one that operates in the frequencies between 5775 MHz-5825 MHz (5.8 GHz); one that operates at 24.2 GHz; and one that operates in the 71-76 GHz and 81-86 GHz millimeter wave bands.[1] Google will transmit 5.8 GHz and 24.2 GHz signals from Location 1 to Locations 2 and 3. Google will transmit millimeter wave band signals between Locations 1 and 2 and between Locations 1 and 3. [REDACTED].

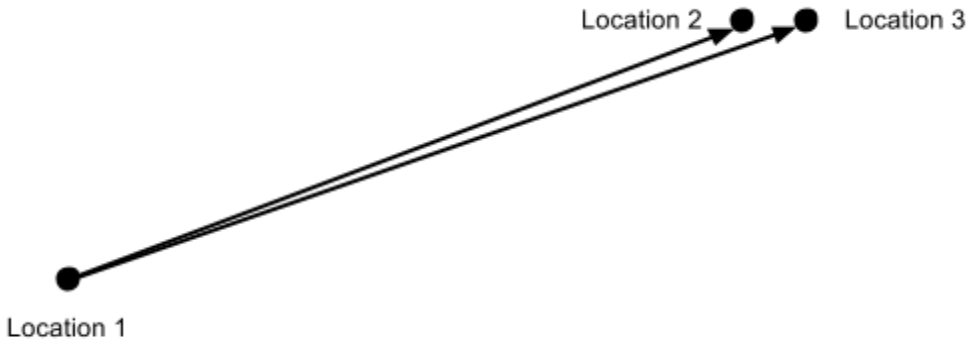

Figure 1: 5.8 GHz and 24.2 GHz transmissions[2]

[1] As explained below, Google believes the proposed operations in the millimeter wave bands comply with the FCC’s technical rules for those bands and do not require additional authorization. Should the Commission determine that an STA is required for the proposed testing in the millimeter wave bands, one is requested.

[2] Drawing is for illustrative purposes and is not to scale.

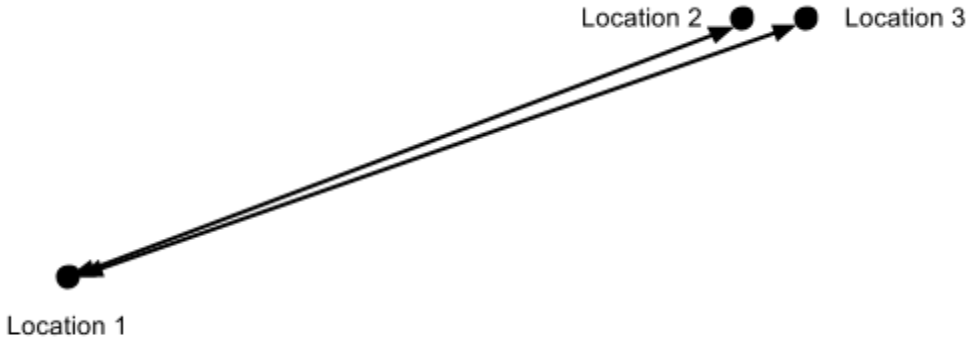

Figure 2: Millimeter wave transmissions[3]

The maximum conducted power and maximum EIRP for each radio that will be used in the tests is set forth below:

Radio[4]	**Maximum Transmit Power**	**Maximum EIRP**
5.8 GHz Radio	0.1 W	+22 dBW
24.2 GHz Radio	0.1 W	+31 dBW
71-76 GHz and 81-86 GHz Radio (as modified by amplifier)	0.1 W	+42 dBW

Grant of this STA will not adversely impact any authorized user of RF spectrum for the reasons stated below.

5.8 GHz operation: Google's proposed 5.8 GHz test will not cause harmful interference to any other authorized user of spectrum. The conducted power of Google's operation is just one-tenth of the 1 Watt limit allowed for unlicensed devices in this band.[5] Although the proposed operation exceeds the field strength limitations set forth in 47 C.F.R. §15.249, the transmission complies with the power spectral density requirements set forth in 47 C.F.R. §15.407(a)(3). The following attributes of the testing will further mitigate any potential interference concerns:

[3] Drawing is for illustrative purposes and is not to scale.

[4] While Google may test radios in the frequencies ranging between 5775 MHz and 5825 MHz, 72500 and 72550 MHz, and 82500 MHz and 82550, the actual bandwidth of the signals employed is extremely narrow, and the proposed operation will occupy no more than 10 Hz at any given time. *See* Exhibit B in support of this application for further details.

[5] 47 C.F.R. §15.247(b)(3); 47 C.F.R. §15.407(a)(3).

(1) The transmitter will be [REDACTED]. The other principal operations in this band are Part 15 unlicensed devices, Part 18 ISM devices, and amateur radio operators.[6] [REDACTED], the closest possible operations would be at least 300 meters away, [REDACTED]. Once Google's signal travels 300 meters, the signal in the line-of-sight (LOS) path will have attenuated by -66 dB. The signal power received by an omnidirectional antenna placed at 300 meters from the transmitter, if the receiver is centered with the correct polarization in the beam of the line of sight link and there are no intervening obstructions, would be at most -46 dBm. This signal power is well below the signal strengths from typical Wi-Fi transmitters in the 5 GHz band and is not expected to cause harmful interference. By comparison, interference from commercial Wi-Fi equipment can be as much as -10 dBm in an urban environment. For receivers not in the line of sight path, or located on the ground and obscured by buildings or foliage, the strength of Google's signal will be significantly less than those predicted by the ideal free space calculation set forth above.

(2) Google will employ highly directional, narrow bandwidth transmissions. The full beamwidth of the antenna proposed for use is only 6.2 degrees. Other users of the 5.8 GHz band are unlikely to be transmitting directly in the beamwidth, and as a result, their communications are unlikely to be affected.

24.2 GHz operation: Google's proposed testing in the 24 GHz band similarly will avoid harmful interference to other users of the band. There are three classes of non-federal users in the 24.05-24.25 GHz band: Part 18 ISM users, Part 90 private land mobile radio users, and Part 97 amateur radio users. Based on a query of the FCC's universal licensing system, there are no active, licensed Part 90 or Part 97 users in either San Mateo or Santa Clara County in the spectrum between 24.05 GHz and 24.25 GHz. Operations in other counties are unlikely to experience interference: The transmitter will be located in the southern part of San Mateo County, close to the Santa Clara County border. San Mateo County extends west to the Pacific Ocean, and Santa Clara County extends east to the San Francisco Bay.

Google's proposed operations likewise will avoid interference with Part 18 users, who do not need a license to operate their equipment. Although Google's test will exceed the field strength limitations set forth in 47 C.F.R. §15.249 for fixed, point-to-point operations in the 24.2 GHz band, the transmissions will employ extremely directional, narrow bandwidth transmissions. Indeed, the full beamwidth of the antenna proposed for operation at 24.2 GHz is only *1.4 degrees*, making it extremely unlikely that unaffiliated transmissions will pass through the main beam of the antenna. And as with the 5.8 GHz transmissions, all of the 24.2 GHz transmitters [REDACTED].

[6] *See* 47 C.F.R. § 2.106 (FCC Table of Frequency Allocations).

Google is prepared to coordinate with the National Telecommunications and Information Administration (NTIA) to ensure that testing does not interfere with any earth exploration satellites services (EESS) in this band.[7]

Millimeter wave band operation: Google's proposal complies with the technical specifications set forth in Part 101 for commercial millimeter wave operations in the 71-76 GHz and 81-86 GHz band and Google believes no experimental authorization is necessary. Nevertheless, because [REDACTED], Google requests Special Temporary Authority to conduct its test operations in the band to the extent that the Commission determines such experimental authority is necessary. Prior to commencing test operations, Google will register its proposed links with an authorized third-party database manager for these bands.

The proposed experimental operations in each band accordingly will be conducted without harmful interference to other authorized users. For these reasons, Google requests approval of this application.

Exhibit B - Technical Information:

Google requests confidential treatment of the following underlined text from Exhibit B that contain confidential and proprietary information regarding the proposed tests/experiments:

Applicant Name: Google Inc.
Applicant FRN: 0016069502

Legal Contact Details

Name of Contact	Aparna Sridhar
Contact Details	Counsel 25 Massachusetts Avenue NW, Ninth Floor Washington DC 20001

Technical Contact Details

Name of Contact	Chris White
Contact Details	1600 Amphitheatre Parkway Mountain View, CA 94043 Phone: (650) 521-3750 Email: cjwhite@google.com

[7] *See* 47 C.F.R. § 2.106 (FCC Table of Frequency Allocations).

5 GHz Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terminals	[REDACTED]
Location	37°20’40’’ N, 122°12’56’’ W

Frequency Range	**High (MHz)**	**Low (MHz)**
[REDACTED]	5775.0000	5825.0000

Radio	**Modulation**	**Emission Designator**	**Bandwidth of Modulation**	**Maximum Power Out**	**Maximum EIRP**
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.1 W	+19 dBW

Antenna Information

Antenna	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	29 dBi
Beam Width at Half-Power Point	6.2 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

24.2 GHz Transmitter Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terminals	[REDACTED]
Location	37°20’40’’ N, 122°12’56’’ W

Frequency Range	High (MHz)	Low (MHz)
[REDACTED]	24200.1200	24199.8800

Radio	Modulation	Emission Designator	Bandwidth of Modulation	Maximum Power Out	Maximum EIRP
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.1 W	31 dBW

Antenna Information

Antenna	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	41 dBi
Beam Width at Half-Power Point	1.4 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

71-76/81-86 GHz Transmitter Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terrestrial Terminals	[REDACTED]
Locations	● Location 1: 37°20’40’’ N, 122°12’56’’ W ● Location 2: 37°25’3’’ N, 122°4’39’’ W ● Location 3: 37°25’33’’ N, 122°04’20’’ W

Frequency Range	High (MHz)	Low (MHz)
[REDACTED]	72550.0000	72500.0000
[REDACTED]	82550.0000	82500.0000

Amplifier Information

Equipment Manuf / PN	[REDACTED]
Quantity	[REDACTED]
Locations	● Location 1: 37°20'40'' N, 122°12'56'' W ● Location 2: 37°25'3'' N, 122°4'39'' W ● Location 3: 37°25'33'' N, 122°04'20'' W

Equipment Manuf / PN	[REDACTED]
Quantity	[REDACTED]
Locations	● Location 1: 37°20'40'' N, 122°12'56'' W ● Location 2: 37°25'3'' N, 122°4'39'' W ● Location 3: 37°25'33'' N, 122°04'20'' W

Radio	**Modulation**	**Emission Designator**	**Bandwidth of Modulation**	**Maximum Power Out**	**Maximum EIRP**
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.100 W	41 dBW
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.100W	42 dBW

Antenna Details

Antenna 1 (to be used at Location 1)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi if used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

Antenna 2 (to be used at Location 2)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi i used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	236 degrees (SW)
Orientation in Vertical Plane	+2 degrees

Antenna 3 (to be used at Location 3)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi if used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	234.5 degrees (SW)
Orientation in Vertical Plane	+2 degrees

2. Identification of the Commission proceeding in which the information was submitted or a description of the circumstances giving rise to the submission.

The above-referenced Exhibits were submitted to the Commission in support of the STA Application. These Exhibits were filed with the Office of Engineering and Technology on October 13, 2014. For additional information, please see File No. 0923-EX-ST-2014.

3. Explanation of the degree to which the information is commercial or financial or contains a trade secret or is privileged.

The information requested to be kept confidential has significant commercial value. The details of the STA Application tests/experiments may include trade secret information. The Commission has clarified that confidential treatment should be afforded to trade

secrets.[8] Google's tests/experiments and proprietary wireless applications using particular radio frequency equipment represent a "secret commercially valuable plan" within the meaning of a trade secret as recognized by the Commission.

In addition, agreements entered into between Google and the parties that provided equipment for testing or will provide analysis of test results require that confidential information of the parties be held in strict confidence, and that such information not be disclosed to any third party (with limited exceptions not applicable to this request). The manufacturer name and model number constitutes confidential trade secrets, technical information, and business information under the agreements.

4. Explanation of the degree to which the information concerns a service that is competitive.

The services and technologies that are the subject of this STA Application have not yet been fully developed but are expected to lead to material developments in markets subject to competition from multiple U.S. and non-U.S. third parties.

5. Explanation of how disclosure of the information could result in substantial competitive harm.

The technology under development is highly sensitive and confidential in nature. The release of such information would provide valuable insight into Google's technology innovations and potential business plans and strategies. Public disclosure would jeopardize the value of the technology under examination by enabling others to utilize Google's information to develop similar products in a similar time frame.

6. Identification of any measures taken by the requesting party to prevent unauthorized disclosure.

Google has taken steps to keep confidential the information set forth in the confidential exhibits by limiting the number of people involved in the tests/experiments to only those on a "need to know" basis, and by requiring all third parties involved in the testing process to execute robust nondisclosure agreements.

[8] *Examination of Current Policy Concerning the Treatment of Confidential Information Submitted to the Commission*, Report and Order, GC Docket No. 96-55, at para. 3, (released Aug. 4, 1998) (defining "trade secrets" for purpose of Commission rules on confidential treatment).

7. Identification of whether the information is available to the public and the extent of any previous disclosures of the information to any third parties.

The information contained in the confidential exhibits is not available to the public, and has only been disclosed to third parties pursuant to restrictive safeguards.

Google voluntarily provides the information to the Commission at this time with the expectation that it will be treated confidentially in accordance with the Commission's rules. *See Critical Mass Energy Project v. Nuclear Regulatory Comm'n*, 975 F.2d 871, 879 (D.C. Cir. 1992) (commercial information provided on a voluntary basis "is 'confidential' for the purpose of Freedom of Information Act (FOIA) Exemption 4 if it is of a kind that would customarily not be released to the public by the person from whom it was obtained.")

8. Justification of the requested period of confidentiality.

Google expects that confidential treatment will be necessary for the length of the proposed experiment and thereafter in order to protect its evolving business and technology strategies.

9. Any other information that would be useful in assessing whether this request should be submitted.

The information subject to this request for confidentiality should not be made available for public disclosure at any time. There is nothing material that public review of this information would add to the Commission's analysis of Google's request for an experimental authorization.

Moreover, public disclosure of the sensitive information in the confidential exhibits to the STA Application after the Commission has ruled on the Request for Confidentiality is not necessary for the Commission to fulfill its regulatory responsibilities.

Consistent with 47 C.F.R. § 0.459(d)(I), Google requests notification if release of the information subject to this request is requested pursuant to the FOIA or otherwise, so that Google may have an opportunity to oppose grant of any such request.

Sincerely yours,

Aparna Sridhar

Aparna Sridhar

EXHIBIT A – SPECIAL TEMPORARY AUTHORITY JUSTIFICATION

Consistent with the standards set forth in Section 5.61 of the Federal Communications Commission's (FCC's or Commission's) Rules, 47 C.F.R. § 5.61, Google Inc. (Google) requests Special Temporary Authority (STA) to conduct demonstrations of experimental transmitters. The STA is sought for a period of 180 days beginning on November 13, 2014. Google outlines below its need for the requested STA and the reasons that the STA should be granted expeditiously.

Google requests the STA to [REDACTED].

The tests will use point-to-point communications between between three sites located in the Bay Area. The locations are as follows:

- Location 1: 37°20'40'' N, 122°12'56'' W
- Location 2: 37°25'3'' N, 122°4'39'' W
- Location 3: 37°25'33'' N, 122°04'20'' W

The equipment used will include three types of radios: one that operates in the frequencies between 5775 MHz-5825 MHz (5.8 GHz); one that operates at 24.2 GHz; and one that operates in the 71-76 GHz and 81-86 GHz millimeter wave bands.[1] Google will transmit 5.8 GHz and 24.2 GHz signals from Location 1 to Locations 2 and 3. Google will transmit millimeter wave band signals between Locations 1 and 2 and between Locations 1 and 3. [REDACTED].

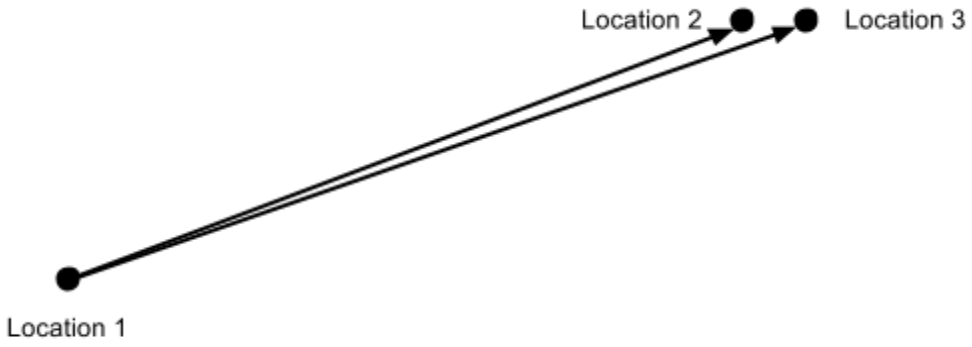

Figure 1: 5.8 GHz and 24.2 GHz transmissions[2]

[1] As explained below, Google believes the proposed operations in the millimeter wave bands comply with the FCC's technical rules for those bands and do not require additional authorization. Should the Commission determine that an STA is required for the proposed testing in the millimeter wave bands, one is requested.

[2] Drawing is for illustrative purposes and is not to scale.

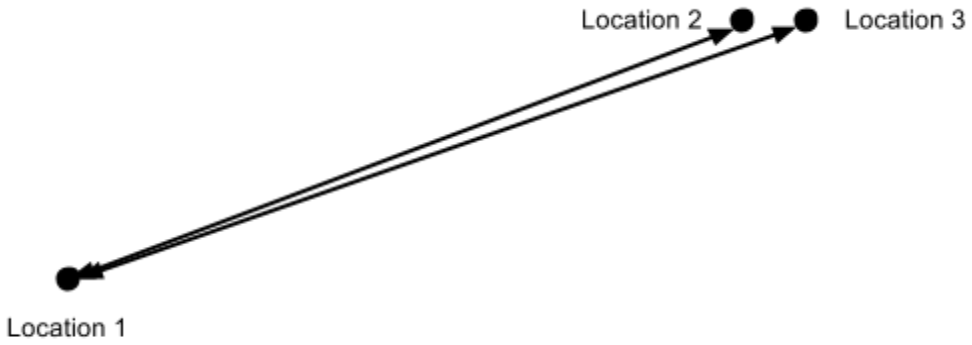

Figure 2: Millimeter wave transmissions[3]

The maximum conducted power and maximum EIRP for each radio that will be used in the tests is set forth below:

Radio[4]	**Maximum Transmit Power**	**Maximum EIRP**
5.8 GHz Radio	0.1 W	+22 dBW
24.2 GHz Radio	0.1 W	+31 dBW
71-76 GHz and 81-86 GHz Radio (as modified by amplifier)	0.1 W	+42 dBW

Grant of this STA will not adversely impact any authorized user of RF spectrum for the reasons stated below.

5.8 GHz operation: Google's proposed 5.8 GHz test will not cause harmful interference to any other authorized user of spectrum. The conducted power of Google's operation is just one-tenth of the 1 Watt limit allowed for unlicensed devices in this band.[5] Although the proposed operation exceeds the field strength limitations set forth in 47 C.F.R. §15.249, the transmission complies with the power spectral density requirements set forth in 47 C.F.R. §15.407(a)(3). The following attributes of the testing will further mitigate any potential interference concerns:

[3] Drawing is for illustrative purposes and is not to scale.
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[5] 47 C.F.R. §15.247(b)(3); 47 C.F.R. §15.407(a)(3).

(1) The transmitter will be [REDACTED]. The other principal operations in this band are Part 15 unlicensed devices, Part 18 ISM devices, and amateur radio operators.[6] [REDACTED], the closest possible operations would be at least 300 meters away, [REDACTED]. Once Google's signal travels 300 meters, the signal in the line-of-sight (LOS) path will have attenuated by -66 dB. The signal power received by an omnidirectional antenna placed at 300 meters from the transmitter, if the receiver is centered with the correct polarization in the beam of the line of sight link and there are no intervening obstructions, would be at most -46 dBm. This signal power is well below the signal strengths from typical Wi-Fi transmitters in the 5 GHz band and is not expected to cause harmful interference. By comparison, interference from commercial Wi-Fi equipment can be as much as -10 dBm in an urban environment. For receivers not in the line of sight path, or located on the ground and obscured by buildings or foliage, the strength of Google's signal will be significantly less than those predicted by the ideal free space calculation set forth above.

(2) Google will employ highly directional, narrow bandwidth transmissions. The full beamwidth of the antenna proposed for use is only 6.2 degrees. Other users of the 5.8 GHz band are unlikely to be transmitting directly in the beamwidth, and as a result, their communications are unlikely to be affected.

24.2 GHz operation: Google's proposed testing in the 24 GHz band similarly will avoid harmful interference to other users of the band. There are three classes of non-federal users in the 24.05-24.25 GHz band: Part 18 ISM users, Part 90 private land mobile radio users, and Part 97 amateur radio users. Based on a query of the FCC's universal licensing system, there are no active, licensed Part 90 or Part 97 users in either San Mateo or Santa Clara County in the spectrum between 24.05 GHz and 24.25 GHz. Operations in other counties are unlikely to experience interference: The transmitter will be located in the southern part of San Mateo County, close to the Santa Clara County border. San Mateo County extends west to the Pacific Ocean, and Santa Clara County extends east to the San Francisco Bay.

Google's proposed operations likewise will avoid interference with Part 18 users, who do not need a license to operate their equipment. Although Google's test will exceed the field strength limitations set forth in 47 C.F.R. §15.249 for fixed, point-to-point operations in the 24.2 GHz band, the transmissions will employ extremely directional, narrow bandwidth transmissions. Indeed, the full beamwidth of the antenna proposed for operation at 24.2 GHz is only *1.4 degrees*, making it extremely unlikely that unaffiliated transmissions will pass through the main beam of the antenna. And as with the 5.8 GHz transmissions, all of the 24.2 GHz transmitters [REDACTED].

Google is prepared to coordinate with the National Telecommunications and Information Administration (NTIA) to ensure that testing does not interfere with any earth exploration satellites services (EESS) in this band.[7]

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[6] *See* 47 C.F.R. § 2.106 (FCC Table of Frequency Allocations).
[7] *See* 47 C.F.R. § 2.106 (FCC Table of Frequency Allocations).

Millimeter wave band operation: Google's proposal complies with the technical specifications set forth in Part 101 for commercial millimeter wave operations in the 71-76 GHz and 81-86 GHz band and Google believes no experimental authorization is necessary. Nevertheless, because [REDACTED], Google requests Special Temporary Authority to conduct its test operations in the band to the extent that the Commission determines such experimental authority is necessary. Prior to commencing test operations, Google will register its proposed links with an authorized third-party database manager for these bands.

The proposed experimental operations in each band accordingly will be conducted without harmful interference to other authorized users. For these reasons, Google requests approval of this application.

EXHIBIT B - TECHNICAL INFORMATION

Applicant Name: Google Inc.
Applicant FRN: 0016069502

Legal Contact Details

Name of Contact	Aparna Sridhar
Contact Details	Counsel 25 Massachusetts Avenue NW, Ninth Floor Washington DC 20001

Technical Contact Details

Name of Contact	Chris White
Contact Details	1600 Amphitheatre Parkway Mountain View, CA 94043 Phone: (650) 521-3750 Email: cjwhite@google.com

5 GHz Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terminals	[REDACTED]
Location	37°20’40’’ N, 122°12’56’’ W

Frequency Range	**High (MHz)**	**Low (MHz)**
[REDACTED]	5775.0000	5825.0000

Radio	Modulation	Emission Designator	Bandwidth of Modulation	Maximum Power Out	Maximum EIRP
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.1 W	+19 dBW

Antenna Information

Antenna	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	29 dBi
Beam Width at Half-Power Point	6.2 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

24.2 GHz Transmitter Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terminals	[REDACTED]
Location	37°20’40’’ N, 122°12’56’’ W

Frequency Range	High (MHz)	Low (MHz)
[REDACTED]	24200.1200	24199.8800

Radio	Modulation	Emission Designator	Bandwidth of Modulation	Maximum Power Out	Maximum EIRP
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.1 W	31 dBW

Antenna Information

Antenna	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	41 dBi
Beam Width at Half-Power Point	1.4 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

71-76/81-86 GHz Transmitter Equipment and Station Details

Radio Equipment

Equipment Manuf / PN	[REDACTED]
Number of Terrestrial Terminals	[REDACTED]
Locations	● Location 1: 37°20’40’’ N, 122°12’56’’ W ● Location 2: 37°25’3’’ N, 122°4’39’’ W ● Location 3: 37°25’33’’ N, 122°04’20’’ W

Frequency Range	**High (MHz)**	**Low (MHz)**
[REDACTED]	72550.0000	72500.0000
[REDACTED]	82550.0000	82500.0000

Amplifier Information

Equipment Manuf / PN	[REDACTED]
Quantity	[REDACTED]
Locations	● Location 1: 37°20’40’’ N, 122°12’56’’ W ● Location 2: 37°25’3’’ N, 122°4’39’’ W ● Location 3: 37°25’33’’ N, 122°04’20’’ W

Equipment Manuf / PN	[REDACTED]
Quantity	[REDACTED]
Locations	• Location 1: 37°20’40’’ N, 122°12’56’’ W • Location 2: 37°25’3’’ N, 122°4’39’’ W • Location 3: 37°25’33’’ N, 122°04’20’’ W

Radio	**Modulation**	**Emission Designator**	**Bandwidth of Modulation**	**Maximum Power Out**	**Maximum EIRP**
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.100 W	41 dBW
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	0.100W	42 dBW

Antenna Details

Antenna 1 (to be used at Location 1)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi if used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	56 degrees (NE)
Orientation in Vertical Plane	-2 degrees

Antenna 2 (to be used at Location 2)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi if used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	236 degrees (SW)
Orientation in Vertical Plane	+2 degrees

Antenna 3 (to be used at Location 3)	[REDACTED]
Type	[REDACTED]
Quantity	[REDACTED]
Gain	50 dBi if used in 71-76 GHz band; 52 dBi if used in 81-86 GHz band
Beam Width at Half-Power Point	0.4 degrees
Orientation in Horizontal Plane	234 degrees (SW)
Orientation in Vertical Plane	+2 degrees