Date: February 16, 2016

Subject: Request for Confidential Treatment

File Number: 0095-EX-PL-2016

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 an Experimental Radio Service License (Experimental License) 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 information that has been redacted from the Experimental License and Exhibits A and B. Google does not seek to withhold from public inspection information in the Experimental License and associated exhibits 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 contain confidential and proprietary information regarding the proposed tests/experiments:

> Consistent with the standards set forth in Section 5.63 of the Federal Communications Commission's (Commission's) Rules, 47 C.F.R. § 5.63, Google Inc. (Google) requests authorization to conduct demonstrations of [REDACTED] experimental transmitters in the Kansas City area. The experimental authorization is sought for a period of 24 months. Google outlines below its need for the requested authorization and the reasons why it should be granted expeditiously.

The experimental authorization is needed to advance testing in the 3.5 GHz band, which the Commission has designated for broader commercial use.[1] In particular, the experimental authorization will allow Google to continue its experimentation with [REDACTED] in Kansas City [REDACTED], under conditions that are consistent with the Commission's Part 96 rules.[2] As discussed further below, the parameters of the experimental authorization will protect incumbent operators from harmful interference. Indeed, there have been no reports of interference from Google's ongoing experimental operations in other locations under call sign WH2XNF (File Nos. 0722-EX-PL-2014 and 0004-EX-ML-2015).

Google requests authorization to operate on the frequencies between 3400 and 3700 MHz, which includes the 3550-3700 MHz band that has been opened for innovative small-cell spectrum sharing by Citizens Broadband Radio Service (CBRS) devices. Google requests authorization to operate on frequencies down to 3400 MHz so that [REDACTED], and so that Google has access to sufficient spectrum for experimentation after avoiding interference to 3650-3700 MHz Part 90 incumbent operators.[3]

The proposed experimentation will allow Google to perform propagation, [REDACTED] testing [REDACTED] in Kansas City. Data obtained from these tests will be [REDACTED]. Specifically, together with testing in other locations under call sign WH2XNF, the proposed testing will assist in enabling: (1) [REDACTED]; (2) [REDACTED]; and (3) [REDACTED]. [REDACTED]. [REDACTED].

Planned Operations

Google anticipates performing the following tests under the requested experimental authorization. As described in the next section, the proposed experimental operations in the 3.5 GHz band will be conducted without harmful interference to other authorized users.

- **Propagation Testing:** Google will use both a simple continuous wave (CW) tone and a broadband signal to understand the effects of clutter loss, differential fading, multipath, and other propagation phenomena. Google will equip a mobile receiving station [REDACTED]. Google may also position [REDACTED]. Google will generally operate only [REDACTED] while conducting propagation tests.
- **[REDACTED]:** Google will test [REDACTED]. Google will use [REDACTED].
- **[REDACTED]:** Google will [REDACTED]. [REDACTED].

[1] *See In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band,* Report and Order and Second Notice of Proposed Rulemaking, 30 FCC Rcd. 3959.
[2] *See* 47 C.F.R. Part 96.
[3] The Commission has authorized experimental operations in these same bands for AT&T and a number of other licensees. *See, e.g.,* File No. 0128-EX-PL-2015 (call sign WH2XRW) for AT&T's authorization to conduct tests in the 3100-3650 MHz band.

- **[REDACTED]:** Google will investigate [REDACTED].

In order to perform these tests, Google seeks authorization to operate [REDACTED] experimental transmitters. Specifically, Google seeks authorization for [REDACTED] eNodeBs (also referred to as access points or base stations) and [REDACTED] end user devices (EUDs) that will communicate with the eNodeBs ([REDACTED] EUDs per [REDACTED] eNodeB on average). [REDACTED] within the radius of operation identified in Exhibit B. It is unlikely that [REDACTED], or the full number of authorized devices, will ever transmit simultaneously. Should Google seek to deploy eNodeBs [REDACTED], this will be done only if such base stations can be placed in circumstances that [REDACTED].

Interference Analysis

The frequency range 3400-3700 MHz covers multiple allocated bands and a variety of incumbent systems and services. As described below, Google will deploy and operate its equipment under this experimental authorization in a manner that will avoid interference to incumbent operations.

Transmit Power and Out-of-Band Emission Considerations

Google requests authorization to operate at the maximum conducted CBSD power spectral density (PSD) limit of 40 dBm per 10 MHz recommended by the Wireless Innovation Forum in its Petition for Reconsideration in GN Docket No. 12-354.[4] [REDACTED] that are capable of aggregating as many as eight 10-MHz channels. Google therefore requests a maximum total conducted power limit of 49 dBm (40 dBm + 10log(8)). The maximum radiated PSD recommended by the Wireless Innovation Forum is 49 dBm per 10 MHz, which equates to a maximum radiated EIRP of 58 dBm when aggregated over 80 MHz.[5] Google requests permission to operate its experimental broadband networks at this maximum radiated power level. [REDACTED].[6] [REDACTED].

Additionally, Google requests authority to conduct narrowband propagation testing in the 3550-3575 MHz segment using a maximum conducted power level of 47 dBm and a maximum radiated power of 77 dBm (assuming the use of a high-gain, narrow beamwidth 30 dBi antenna). [REDACTED]. The band 3550-3575 MHz is unused in the Kansas City test area.[7] Google's propagation testing will be conducted using conducted using narrowband CW transmissions that will meet or exceed the out-of-band emissions limits in Section 96.41(e) of

[4] *See* Wireless Innovation Forum, Petition for Reconsideration, GN Docket No. 12-354 (filed July 22, 2015).
[5] See *id* at 5-9.
[6] [REDACTED].
[7] There are no site-licensed, non-federal incumbent operators in the 3550-3575 MHz band within 100 km of the proposed test area. There is one nationwide licensee in the 3340-3600 MHz band (call sign WQHK852). Google attempted to contact this licensee on January 20, 2016, using the email addresses on file in the ULS, but so far has received no response. Google had similar results when coordinating its existing experimental authorization (WH2XNF).

the Commission's Rules, 47 C.F.R. § 96.41(e). Google notes that extensive propagation testing has been conducted in this band under its existing experimental authorization (WH2XNF) in the densely populated areas of Arlington, Virginia, and Mountain View, California, with no reports of interference.

In summary, Google requests authorization to operate at the following power limits:

- Broadband network testing (3400-3700 MHz)
  - Conducted power limits
    - 40 dBm per 10 MHz power spectral density
    - 49 dBm total power (assumes eight 10-MHz aggregate channels)
  - Radiated power limits
    - 49 dBm per 10 MHz radiated power spectral density
    - 58 dBm total radiated power (assumes eight 10-MHz aggregate channels)
- Narrowband propagation testing (3550-3575 MHz)
  - Conducted power limit of 47 dBm
  - Radiated power limit of 77 dBm

Below, Google explains its plans for protection of the following users:

Frequencies	**Users**
Below 3500 MHz	Military radar systems
3300-3500 MHz	Amateur radio
3500-3700 MHz	Military radar systems
3650-3700 MHz	Part 90, Subpart Z operators
3600-3700 MHz	Grandfathered FSS operators
Above 3700 MHz	FSS operators

Protection of Federal Operations Below 3500 MHz

Below 3500 MHz, the U.S. military operates radar systems on ships and at several land-based military installations around the country. The Kansas City test area is more than 1000 km from the nearest coastline, so interference to shipborne radars is exceedingly unlikely. The nearest land-based facility is the Fort Riley Military Reservation, which is approximately 140 km to the west of the proposed test area (see Figure 1).

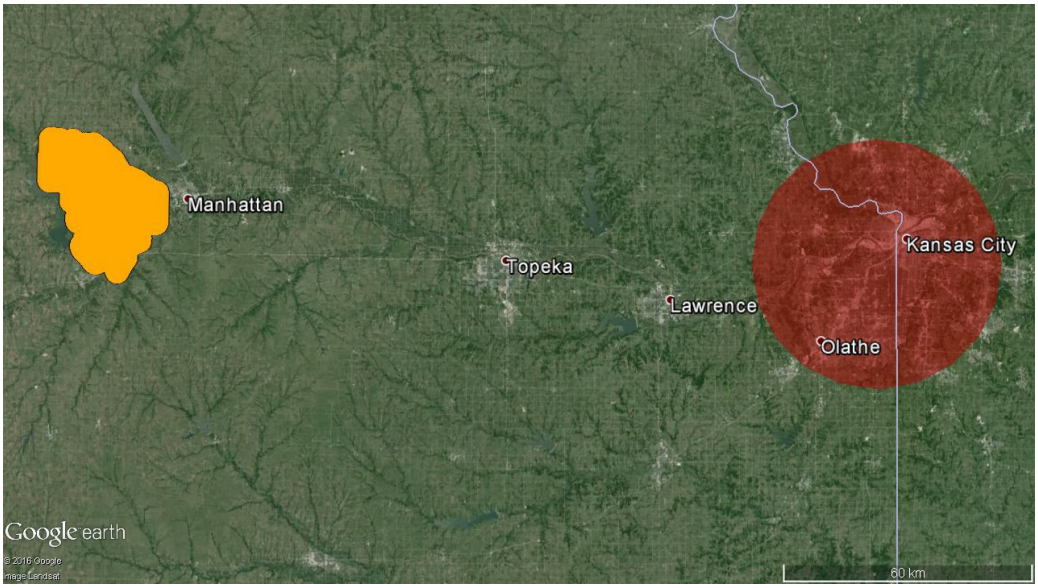

Figure 1: Fort Riley exclusion zone (left, in gold) and the Kansas City test area (right, in red)

Interference to Fort Riley due to the operation of broadband wireless equipment in the Kansas City test area should not exceed the ambient thermal noise level. The propagation loss between the westernmost point in the proposed test area and the easternmost point in the Fort Riley exclusion zone is 169.3 dB based on the Longley-Rice propagation model. The received power spectral density from a single transmitter operating at maximum power spectral density of 49 dBm per 10 MHz would be -190.3 dBm/Hz (49 dBm −10log(10 MHz) − 169.3 dB), which is 16.3 dB below nominal ambient thermal noise level of -174 dBm/Hz. It is very unlikely that this low signal level will cause harmful interference. In addition, most operations will be a considerable distance inside the western edge of the proposed test area. The propagation loss to Fort Riley from the center of the proposed test area is 193 dB, so the received interference levels at the eastern edge of the Fort Riley exclusion zone from a single transmitter would be approximately -214 dBm, corresponding to 40 dB (1/10,000) below ambient thermal noise. Furthermore, significant Google operations may take place indoors, where building loss will contribute to additional attenuation.

Protection of Amateur Radio Operations in the 3300-3500 MHz Band

The amateur radio service has a secondary allocation in the 3300-3500 MHz band (3.4 GHz band). Based on Google's spectrum monitoring elsewhere in the United States, amateur operation in this band appears to be infrequent and generally point-to-point.[8] However, Google will coordinate with the amateur radio community to ensure that Google's operations do not interfere with any amateurs who may be utilizing the 3.4 GHz band. For example, Google will inform the

[8] No amateur activity has been detected over two years of continuous monitoring in Virginia Beach, Virginia, and intermittent monitoring in Arlington, Virginia, and Mountain View, California.

American Radio Relay League and local Kansas City amateur radio clubs prior to beginning operations, and furnish a point-of-contact for the reporting of any suspected interference.

Protection of Federal Operations in the 3500-3700 MHz Band

In the 3500-3700 MHz band, the primary federal incumbent operations are the U.S. Navy's air traffic control radar systems on ships and at three land-based R&D sites. The Kansas City test area is more than 1000 km from the nearest coastline, more than 930 km from the nearest coastal exclusion zone established by the Commission to protect co-channel radars[9], and more than 1000 km from the nearest land-based R&D site (Pascagoula, Mississippi), so no interference to Navy radar systems is expected.

Protection of Part 90 Incumbents in the 3650-3700 MHz Band

To protect existing Part 90 operations in the 3650-3700 MHz band, Google will coordinate its proposed experimental transmissions in this band with all Part 90 licensees in the Commission's ULS database that are within 25 km of a Google transmitter location. Because there are many Part 90 systems operating in this band segment, and because Google plans to coordinate with adjacent-band FSS sites, Google will generally avoid using the 3650-3700 MHz band except when necessary to meet testing objectives, [REDACTED].

Protection of FSS Operators in the 3600-3700 MHz Band

The Commission has identified in-band FSS operations in the 3600-3700 MHz band that require protection under Part 96.[10] For the 3650-3700 MHz range, Part 90 currently requires coordination with any in-band FSS operators within a 150 km coordination contour.[11] Because Kansas City is more than 700 km from the nearest in-band FSS site (an earth station near Nashville, Tennessee, under call sign E960050), coordination with in-band FSS operators is not necessary.

Protection of FSS Operators in the 3700-4200 MHz Band

As noted above, Google does not plan to conduct significant operations above 3650 MHz. When Google does operate above 3650 MHz, however, it will coordinate such operations with adjacent-band FSS operators. Pending the Commission's adoption of detailed rules, Google will use the following, very conservative assumptions and parameters to determine when coordination is necessary:

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[9] *See* 47 C.F.R. §§ 96.15(a)(1), 96.15(a)(3), 96.15(b); *see also* Letter from Paige Atkins, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354, at Enclosure 2 (proposing exclusion zones to protect ground-based radars operating adjacent to the 3550-3700 MHz band).
[10] *See 3.5 GHz Band - Protected Fixed Satellite Service (FSS) Earth Stations*, available at http://www.fcc.gov/cbrs-protected-fss-sites.
[11] 47 C.F.R. § 90.1331.

- Experimental Equipment OOBE: -13 dBm/MHz
- FSS system temperature: 142.8 K[12]
- Propagation Model: ITU-R P.452[13]
- FSS Interference Criterion: I/N = 1%[14]

Whenever these assumptions result in a predicted interference level of greater than 1% of the FSS noise level, Google will coordinate with the potentially affected adjacent-band FSS operators before beginning any operations in the 3650-3700 MHz band segment. For testing below 3650 MHz (i.e., more than 50 MHz away from the adjacent FSS band), spectral separation alone protects adjacent-band FSS operations. The extremely strict coordination criteria set forth above are for the limited purpose of conducting experiments under the requested experimental authorization, and it is Google's position that they would not be appropriate as a general coexistence framework for the band going forward.[15]

Conclusion

The proposed experimental operations in Kansas City accordingly will be conducted without harmful interference to other authorized users. For the foregoing reasons, Google requests approval of this application.

[12] *See In the Matter of Wireless Operations in the 3650-3700 MHz Band, et al.,* Report and Order and Memorandum Opinion and Order, 20 FCC Rcd. 6502 at Appendix D (A Methodology For Locating Fixed Stations Within The FSS Earth Station Protection Zone).
[13] *See* Reply Comments of the Satellite Industry Association, In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, at 5 (Aug. 18, 2014) (SIA Reply Comments).
[14] *See* ITU-R Recommendation S.1432 (Apportionment of the allowable error performance degradations to fixed-satellite service (FSS) hypothetical reference digital paths arising from time invariant inference for systems operating below 30 GHz); SIA Reply Comments at 5.
[15] See, e.g., Reply Comments of Google Inc., GN Docket No. 12-354, at 20-28 (filed July 15. 2015); Reply Comments of Google Inc., GN Docket No. 12-354, at 6-18 (filed Aug. 14. 2015); Response of Google Inc. to Petitions for Reconsideration, GN Docket No. 12-354, at 2-7 (filed Oct. 19. 2015).

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	Stephanie Selmer
Contact Details	Associate Corporate Counsel 25 Massachusetts Avenue NW, Ninth Floor Washington, DC 20001

Technical Contact Details

Name of Contact	Dr. Andrew Clegg
Contact Details	1875 Explorer Street, Tenth Floor Reston, VA 20190 Phone: (202) 370-5644 Email: aclegg@google.com

Kansas City: Transmitter Equipment and Station Details

Radio Information

Equipment	[REDACTED]
Quantity	[REDACTED]
Area of Operation	Operation not to exceed 30 km from the following geographic centerpoint: • 39° 02’ 45” N, 94° 39’ 37” W

Frequency	**High (MHz)**	**Low (MHz)**
[REDACTED]	3700	3400

Amplifier Information

Equipment	[REDACTED]
Quantity	[REDACTED]
Area of Operation	Operation not to exceed 30 km from the following geographic centerpoint: • 39° 02’ 45” N, 94° 39’ 37” W

Antenna Details

Antennas	[REDACTED]
Type	Both directional and omnidirectional antennas will be used
Quantity	[REDACTED]
Gain	30 dBi max; -4 dBi min
Beam Width at Half-Power Point	Various (5° to 360° Horizontal; 5° to 180° Vertical)
Orientation in Horizontal Plane	Various (0° to 360°)
Orientation in Vertical Plane	10° to -30°

Radio	**Modulation**	**Emission Designator**	**Bandwidth**	**Maximum Power Out**	**Maximum EIRP/ERP**
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	50 W[16]	EIRP = 47 dBW (50 kW)[16] ERP = 44.9 dBW (31 kW)6[16] (with 30 dBi antenna)
[REDACTED]	Digital	10M0W7D 20M0W7D 40M0W7D 60M0W7D	10 MHz 20 MHz	10 W 20 W 40 W	***For 10 W conducted:*** EIRP =

[16] High power operation limited to propagation testing in the 3550-3575 MHz band segment.

		80M0W7D	40 MHz 60 MHz 80 MHz	60 W 80 W	19 dBW (80 W); ERP = 16.9 dBW (49 W) ***For 20 W conducted:*** EIRP = 22 dBW (160 W); ERP = 19.9 dBW (98 W) ***For 40 W conducted:*** EIRP = 25 dBW (320 W); ERP = 22.9 dBW (196 W) ***For 60 W conducted:*** EIRP = 26.8 dBW (480 W); ERP = 24.6 dBW (294 W) ***For 80 W conducted:*** EIRP = 28 dBW (640 W); ERP = 25.9 dBW (392 W) (all with 9 dBi antenna)
[REDACTED]	Digital	10M0F9W 20M0F9W 40M0F9W 60M0F9W 80M0F9W	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	
[REDACTED]	Digital	10M0G7D 20M0G7D 40M0G7D 60M0G7D 80M0G7D	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	
[REDACTED]	Digital	10M0GXW 20M0GXW 40M0GXW 60M0GXW 80M0GXW	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	
[REDACTED]	Digital	2M00P0N	2 MHz	4 W	EIRP = 22 dBW (160 W) ERP = 19.9 dBW (98 W)
[REDACTED]	Digital	5M00Q7N 10M0Q7N 20M0Q7N	5 MHz 10 MHz 20 MHz	4 W	

					(with 16 dBi antenna)

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

Exhibits A and B were submitted to the Commission in support of the Experimental License. The Exhibits were filed with the Office of Engineering and Technology on February 16, 2016. For additional information, please see File No. 0095-EX-PL-2016.

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 exhibits supporting the Experimental License discuss tests/experiments that include trade secret information. The Commission has clarified that confidential treatment should be afforded to trade secrets.[17] 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.

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 Experimental License 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.

[17] *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).

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 any third parties involved in the testing process execute robust nondisclosure agreements.

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 will only be disclosed to third parties pursuant to the restrictive safeguards described above.

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 Experimental License 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)(l), 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,

Stephanie Selmer

EXHIBIT A - NARRATIVE STATEMENT

Consistent with the standards set forth in Section 5.63 of the Federal Communications Commission's (Commission's) Rules, 47 C.F.R. § 5.63, Google Inc. (Google) requests authorization to conduct demonstrations of [REDACTED] experimental transmitters in the Kansas City area. The experimental authorization is sought for a period of 24 months. Google outlines below its need for the requested authorization and the reasons why it should be granted expeditiously.

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[REDACTED] while conducting propagation tests.

- **[REDACTED]:** Google will test [REDACTED]. Google will use [REDACTED].
- **[REDACTED]:** Google will [REDACTED]. [REDACTED].
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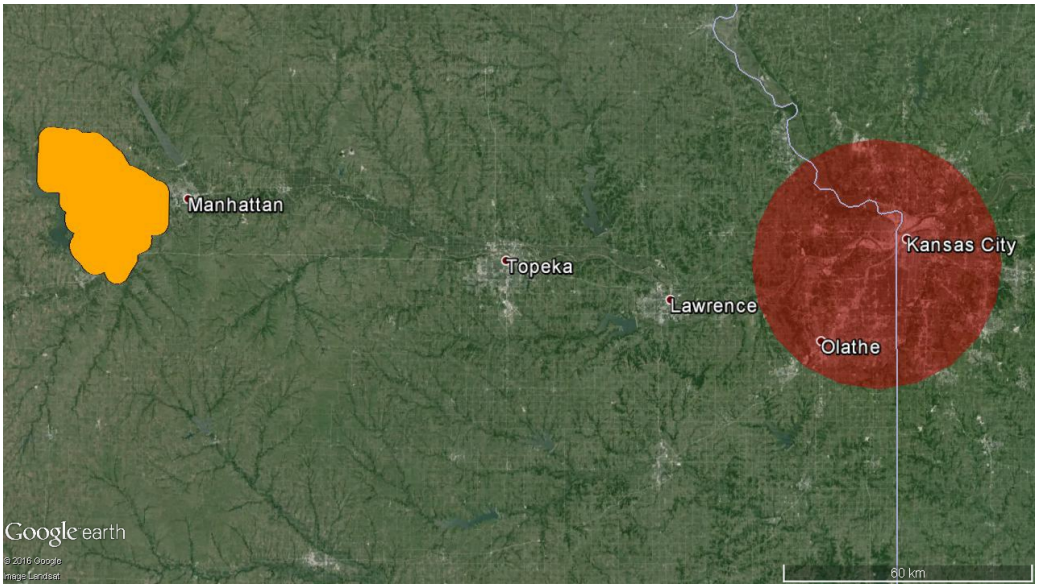

Figure 1: Fort Riley exclusion zone (left, in gold) and the Kansas City test area (right, in red)

Interference to Fort Riley due to the operation of broadband wireless equipment in the Kansas City test area should not exceed the ambient thermal noise level. The propagation loss between the westernmost point in the proposed test area and the easternmost point in the Fort Riley exclusion zone is 169.3 dB based on the Longley-Rice propagation model. The received power spectral density from a single transmitter operating at maximum power spectral density of 49 dBm per 10 MHz would be -190.3 dBm/Hz (49 dBm − 10log(10 MHz) − 169.3 dB), which is 16.3 dB below nominal ambient thermal noise level of -174 dBm/Hz. It is very unlikely that this low signal level will cause harmful interference. In addition, most operations will be a considerable distance inside the western edge of the proposed test area. The propagation loss to Fort Riley from the center of the proposed test area is 193 dB, so the received interference levels at the eastern edge of the Fort Riley exclusion zone from a single transmitter would be approximately -214 dBm, corresponding to 40 dB (1/10,000) below ambient thermal noise. Furthermore, significant Google operations may take place indoors, where building loss will contribute to additional attenuation.

Protection of Amateur Radio Operations in the 3300-3500 MHz Band

The amateur radio service has a secondary allocation in the 3300-3500 MHz band (3.4 GHz band). Based on Google's spectrum monitoring elsewhere in the United States, amateur operation in this band appears to be infrequent and generally point-to-point.[8] However, Google will coordinate with the amateur radio community to ensure that Google's operations do not interfere with any amateurs who may be utilizing the 3.4 GHz band. For example, Google will inform the American Radio Relay League and local Kansas City amateur radio clubs prior to

[8] No amateur activity has been detected over two years of continuous monitoring in Virginia Beach, Virginia, and intermittent monitoring in Arlington, Virginia, and Mountain View, California.

beginning operations, and furnish a point-of-contact for the reporting of any suspected interference.

Protection of Federal Operations in the 3500-3700 MHz Band

In the 3500-3700 MHz band, the primary federal incumbent operations are the U.S. Navy's air traffic control radar systems on ships and at three land-based R&D sites. The Kansas City test area is more than 1000 km from the nearest coastline, more than 930 km from the nearest coastal exclusion zone established by the Commission to protect co-channel radars[9], and more than 1000 km from the nearest land-based R&D site (Pascagoula, Mississippi), so no interference to Navy radar systems is expected.

Protection of Part 90 Incumbents in the 3650-3700 MHz Band

To protect existing Part 90 operations in the 3650-3700 MHz band, Google will coordinate its proposed experimental transmissions in this band with all Part 90 licensees in the Commission's ULS database that are within 25 km of a Google transmitter location. Because there are many Part 90 systems operating in this band segment, and because Google plans to coordinate with adjacent-band FSS sites, Google will generally avoid using the 3650-3700 MHz band except when necessary to meet testing objectives, [REDACTED].

Protection of FSS Operators in the 3600-3700 MHz Band

The Commission has identified in-band FSS operations in the 3600-3700 MHz band that require protection under Part 96.[10] For the 3650-3700 MHz range, Part 90 currently requires coordination with any in-band FSS operators within a 150 km coordination contour.[11] Because Kansas City is more than 700 km from the nearest in-band FSS site (an earth station near Nashville, Tennessee, under call sign E960050), coordination with in-band FSS operators is not necessary.

Protection of FSS Operators in the 3700-4200 MHz Band

As noted above, Google does not plan to conduct significant operations above 3650 MHz. When Google does operate above 3650 MHz, however, it will coordinate such operations with adjacent-band FSS operators. Pending the Commission's adoption of detailed rules, Google will use the following, very conservative assumptions and parameters to determine when coordination is necessary:

- Experimental Equipment OOBE: -13 dBm/MHz

[9] *See* 47 C.F.R. §§ 96.15(a)(1), 96.15(a)(3), 96.15(b); *see also* Letter from Paige Atkins, Associate Administrator, Office of Spectrum Management, National Telecommunications and Information Administration, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-354, at Enclosure 2 (proposing exclusion zones to protect ground-based radars operating adjacent to the 3550-3700 MHz band).
[10] *See 3.5 GHz Band - Protected Fixed Satellite Service (FSS) Earth Stations*, available at http://www.fcc.gov/cbrs-protected-fss-sites.
[11] 47 C.F.R. § 90.1331.

- FSS system temperature: 142.8 K[12]
- Propagation Model: ITU-R P.452[13]
- FSS Interference Criterion: I/N = 1%[14]

Whenever these assumptions result in a predicted interference level of greater than 1% of the FSS noise level, Google will coordinate with the potentially affected adjacent-band FSS operators before beginning any operations in the 3650-3700 MHz band segment. For testing below 3650 MHz (i.e., more than 50 MHz away from the adjacent FSS band), spectral separation alone protects adjacent-band FSS operations. The extremely strict coordination criteria set forth above are for the limited purpose of conducting experiments under the requested experimental authorization, and it is Google's position that they would not be appropriate as a general coexistence framework for the band going forward.[15]

Conclusion

The proposed experimental operations in Kansas City accordingly will be conducted without harmful interference to other authorized users. For the foregoing reasons, Google requests approval of this application.

[12] *See In the Matter of Wireless Operations in the 3650-3700 MHz Band, et al.,* Report and Order and Memorandum Opinion and Order, 20 FCC Rcd. 6502 at Appendix D (A Methodology For Locating Fixed Stations Within The FSS Earth Station Protection Zone).
[13] *See* Reply Comments of the Satellite Industry Association, In the Matter of Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Docket No. 12-354, at 5 (Aug. 18, 2014) (SIA Reply Comments).
[14] *See* ITU-R Recommendation S.1432 (Apportionment of the allowable error performance degradations to fixed-satellite service (FSS) hypothetical reference digital paths arising from time invariant inference for systems operating below 30 GHz); SIA Reply Comments at 5.
[15] See, e.g., Reply Comments of Google Inc., GN Docket No. 12-354, at 20-28 (filed July 15. 2015); Reply Comments of Google Inc., GN Docket No. 12-354, at 6-18 (filed Aug. 14. 2015); Response of Google Inc. to Petitions for Reconsideration, GN Docket No. 12-354, at 2-7 (filed Oct. 19. 2015).

EXHIBIT B - TECHNICAL INFORMATION

Applicant Name: Google Inc.
Applicant FRN: 0016069502

Legal Contact Details

Name of Contact	Stephanie Selmer
Contact Details	Associate Corporate Counsel 25 Massachusetts Avenue NW, Ninth Floor Washington, DC 20001

Technical Contact Details

Name of Contact	Dr. Andrew Clegg
Contact Details	1875 Explorer Street, Tenth Floor Reston, VA 20190 Phone: (202) 370-5644 Email: aclegg@google.com

Kansas City: Transmitter Equipment and Station Details

Radio Information

Equipment	[REDACTED]
Quantity	[REDACTED]
Area of Operation	Operation not to exceed 30 km from the following geographic centerpoint: • 39° 02’ 45” N, 94° 39’ 37” W

Frequency	**High (MHz)**	**Low (MHz)**
[REDACTED]	3700	3400

Amplifier Information

Equipment	[REDACTED]
Quantity	[REDACTED]

Area of Operation	Operation not to exceed 30 km from the following geographic centerpoint: • 39° 02’ 45” N, 94° 39’ 37” W

Antenna Details

Antennas	[REDACTED]
Type	Both directional and omnidirectional antennas will be used
Quantity	[REDACTED]
Gain	30 dBi max; -4 dBi min
Beam Width at Half-Power Point	Various (5° to 360° Horizontal; 5° to 180° Vertical)
Orientation in Horizontal Plane	Various (0° to 360°)
Orientation in Vertical Plane	10° to -30°

Radio	**Modulation**	**Emission Designator**	**Bandwidth**	**Maximum Power Out**	**Maximum EIRP/ERP**
[REDACTED]	Continuous waveform	10H0N0N	10 Hz	50 W[1]	EIRP = 47 dBW (50 kW)[1] ERP = 44.9 dBW (31 kW)[1] (with 30 dBi antenna)
[REDACTED]	Digital	10M0W7D 20M0W7D 40M0W7D 60M0W7D 80M0W7D	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	***For 10 W conducted:*** EIRP = 19 dBW (80 W); ERP = 16.9 dBW (49 W) ***For 20 W conducted:***
[REDACTED]	Digital	10M0F9W 20M0F9W 40M0F9W 60M0F9W 80M0F9W	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	

[1] High power operation limited to propagation testing in the 3550-3575 MHz band segment.

[REDACTED]	Digital	10M0G7D 20M0G7D 40M0G7D 60M0G7D 80M0G7D	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	EIRP = 22 dBW (160 W); ERP = 19.9 dBW (98 W) ***For 40 W conducted:*** EIRP = 25 dBW (320 W); ERP = 22.9 dBW (196 W) ***For 60 W conducted:*** EIRP = 26.8 dBW (480 W); ERP = 24.6 dBW (294 W) ***For 80 W conducted:*** EIRP = 28 dBW (640 W); ERP = 25.9 dBW (392 W) (all with 9 dBi antenna)
[REDACTED]	Digital	10M0GXW 20M0GXW 40M0GXW 60M0GXW 80M0GXW	10 MHz 20 MHz 40 MHz 60 MHz 80 MHz	10 W 20 W 40 W 60 W 80 W	
[REDACTED]	Digital	2M00P0N	2 MHz	4 W	EIRP = 22 dBW (160 W) ERP = 19.9 dBW (98 W)
[REDACTED]	Digital	5M00Q7N 10M0Q7N 20M0Q7N	5 MHz 10 MHz 20 MHz	4 W	

					(with 16 dBi antenna)