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June 27, 2013

BY HAND DELIVERY

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

FILED/ACCEPTED

JUN 27 2013

Federal Communications Commission
Office of the Secretary

Re: Applications of AT&T Inc., Cellco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC For Consent To Assign Licenses and Grant Long-Term *De Facto* Transfer Spectrum Leasing Arrangements (WT Docket No. 13-56): **Cellco Partnership d/b/a Verizon Wireless Response to General Information Request**

Dear Ms. Dortch:

This submission is in response to the June 13, 2013 General Information Request (“Information Request”) from the Federal Communications Commission. Enclosed please find:

- A document with narrative responses to the Information Request (“Narrative Response”) that contain information that meets the requirements for treatment as “Confidential” under the Protective Order in this docket.
- Documents, Bates numbers VZW-000001 -- VZW-000268, that contain information that meets the requirements for treatment as “Highly Confidential” under the Second Protective Order in this docket. Verizon Wireless is also submitting separately one set of the documents in hard copy and one set on CD-ROM to Scott Patrick, Wireless Telecommunications Bureau.
- A CD-ROM, Bates number VZW-000269, containing an electronic file in .csv format with information that is responsive to Inquiry 3 of the Information Request and meets the requirements for treatment as “Confidential” under the Protective Order in this docket. Verizon Wireless is also submitting separately a copy of the CD-ROM to Scott Patrick, Wireless Telecommunications Bureau.

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- A CD-ROM, Bates number VZW-000270, containing an electronic file in .csv format with information that is responsive to Inquiry 3 of the Information Request and meets the requirements for treatment as “Highly Confidential” under the Second Protective Order in this docket. Verizon Wireless is also submitting separately a copy of the CD-ROM to Scott Patrick, Wireless Telecommunications Bureau.

Because this submission contains information that is “Highly Confidential,” Verizon Wireless is filing an unredacted copy of the materials listed above pursuant to the procedures established in the Second Protective Order. Because the submission also contains information that is “Confidential,” Verizon Wireless is simultaneously filing pursuant to the procedures established in the Protective Order a copy of the items listed above that excludes material that contains “Highly Confidential” information. Verizon Wireless will also file a version of the Narrative Response redacted for public inspection in the FCC’s Electronic Comment Filing System. To avoid confusion, copies of this cover letter, bearing the appropriate confidentiality legend, will accompany each submission, although the content of the cover letter will be identical for each submission.

Verizon Wireless has made diligent efforts to ensure that none of the documents it is submitting herewith is privileged under the attorney-client privilege or attorney work product doctrine. To the extent that any privileged documents may have been inadvertently produced, such production does not constitute a waiver of any applicable privilege. Verizon Wireless requests that any privileged documents inadvertently produced be returned to Verizon Wireless as soon as such inadvertent production is discovered by any party, and reserves all rights to seek return of any such documents.

Should any questions arise concerning this submission, please contact the undersigned.

Sincerely,

/s/ Adam D. Krinsky
Adam D. Krinsky
J. Wade Lindsay
Counsel to Verizon Wireless

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of:)
)
Applications of AT&T Inc., Cellco)
Partnership d/b/a Verizon Wireless,)
Grain Spectrum, LLC, and Grain)
Spectrum II, LLC For Consent to Assign)
Licenses and Grant Long-Term *De Facto*)
Transfer Spectrum Leasing Arrangements)

WT Docket No. 13-56

FILED/ACCEPTED

JUN 27 2013

Federal Communications Commission
Office of the Secretary

**RESPONSE OF CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS
TO GENERAL INFORMATION REQUEST**

Cellco Partnership d/b/a Verizon Wireless (“Verizon Wireless”) hereby provides its narrative responses and other information to the FCC’s request for information dated June 13, 2013 (“Information Request”).¹ Verizon Wireless is also providing electronic media in the form of compact discs containing documents and spreadsheets that are responsive to the request (the “Document Production”).

To produce documents that are responsive to the Information Request, Verizon Wireless queried the employees it identified as most likely to have such documents. These individuals reviewed their files and provided copies of documents which were then reviewed to determine whether they are responsive to the Information Request.

¹ *Applications of AT&T Inc., Cellco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC, and Grain Spectrum II, LLC for Consent to Assign Licenses and Grant Long-Term De Facto Transfer Spectrum Leasing Arrangements, WT Dkt No. 13-56, General Information Request Regarding the AT&T/Verizon Wireless/Grain Transaction, Questions for Verizon Wireless (June 13, 2013).*

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REQUESTS AND RESPONSES

1. ***On page 1 of the Public Interest Statement, the Applicants assert that the spectrum transfers that would occur if the Proposed Transaction were approved would achieve “public interest benefits by putting spectrum to use to benefit consumers and help AT&T and Verizon Wireless provide high-quality, high speed wireless broadband.” For each relevant market, provide:***
 - a. ***A detailed description of how the Company would use the spectrum that it would acquire under the Proposed Transaction to provide high-quality, high-speed wireless broadband to consumers, on a standalone basis and in conjunction with any other of the Company’s spectrum holdings.***

Verizon Wireless has been deploying its 4G LTE network using its nationwide Upper 700 MHz C Block spectrum. This network is currently available across the country to 287 million people and covers 95 percent of the company’s 3G network footprint. Verizon Wireless plans to cover the remaining five percent later this year. As capacity needs increase, Verizon Wireless will use its AWS spectrum to supplement its Upper 700 MHz C Block spectrum, thereby increasing the capacity of its LTE network. This transaction will allow the company to obtain additional AWS spectrum in six metropolitan areas and surrounding areas that will further supplement its existing Upper 700 MHz C Block and AWS spectrum. Specifically, in each of these areas (Albuquerque, Dallas,² Fresno, Los Angeles, Phoenix, and Portland), the proposed transaction will add 10 MHz of AWS spectrum to its existing AWS spectrum, providing Verizon Wireless with 30 MHz of AWS spectrum in most of the relevant markets. This additional spectrum will supply additional network capacity to meet customers’ continued increase in demand for wireless broadband services using LTE.

² As explained in the applications for approval of this transaction, Verizon Wireless is leasing the Dallas market from Grain Spectrum II, LLC, rather than acquiring it from AT&T. *Applications of AT&T Inc., Cellco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC, and Grain Spectrum II, LLC for Consent to Assign Licenses and Grant Long-Term De Facto Transfer Spectrum Leasing Arrangements*, WT Dkt No. 13-56, Public Interest Statement, filed Feb. 6, 2013.

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Verizon Wireless' deployment of the AWS spectrum it currently holds and will obtain through this transaction requires two parallel and integrated efforts: infrastructure investment in new antennas and other equipment to equip cell sites to use AWS frequencies, and development and sale of AWS-capable mobile devices. By the end of 2013, Verizon Wireless expects to have activated AWS on **[BEGIN CONFIDENTIAL]**

[END CONFIDENTIAL].

Network Deployment. Verizon Wireless plans to use its AWS spectrum (including the AWS spectrum it is acquiring through this transaction) in both macro cell and small cell deployments. Verizon Wireless will use its AWS spectrum in macro cell deployments starting with the cells with the highest LTE data traffic and then extending further into the network. Verizon Wireless also will deploy small cells that can use AWS spectrum to provide additional capacity in areas with very high traffic density.

In markets where its AWS spectrum is contiguous, Verizon Wireless will deploy network cell site equipment that can operate on both blocks of AWS spectrum. In markets with non-contiguous AWS spectrum, Verizon Wireless initially will deploy network cell site equipment on one of the two non-contiguous AWS blocks. Verizon Wireless is working with its vendors to develop and test network cell site equipment that can operate on two non-contiguous AWS blocks and will deploy this new network cell site equipment **[BEGIN CONFIDENTIAL]**

[END CONFIDENTIAL]. The older network cell site equipment that is replaced is capable of covering contiguous spectrum blocks and may be reused at other cell sites in markets where contiguous AWS spectrum exists.

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Verizon Wireless must complete a number of steps before it can activate AWS on any particular cell site. First, Verizon Wireless identifies which LTE cell sites are the most congested and prioritizes its AWS deployment on these cell sites. Once these sites are identified, Verizon Wireless also must determine the modifications required at each cell site to enable the use of the AWS spectrum and authorizations needed from the tower owner and/or a zoning authority. If authorizations are required, Verizon Wireless must obtain those authorizations prior to making changes to the cell site. Verizon Wireless also must determine whether any incumbent point-to-point fixed microwave or BRS licensees must be relocated out of the AWS spectrum. If so, Verizon Wireless must relocate these incumbents prior to beginning operations. After receiving authorization and clearing the relevant AWS spectrum block, Verizon Wireless will install new AWS equipment, including a new base band unit, radios and filters, and antennas, on the identified cell sites. Once installation is complete, Verizon Wireless will turn on the equipment and perform testing (including drive testing) to ensure the new equipment is performing optimally. After this testing is complete, Verizon Wireless will activate the equipment for commercial use, enabling customers with AWS-capable devices to use the AWS spectrum.

AWS Devices. While Verizon Wireless is enhancing its LTE network infrastructure to include site equipment that is capable of operating on AWS spectrum, it is also introducing multi-band LTE devices (e.g., smartphones, wireless hotspots, data modems) that are capable of using both the Upper 700 MHz C Block spectrum and the AWS spectrum. Verizon Wireless began selling AWS-capable LTE devices in 2012 in order to seed the market before any AWS service is introduced in any of its AWS markets. Verizon Wireless currently offers the following AWS-capable devices: BlackBerry Q10, Samsung GS4, Nokia Lumia 928, Samsung Galaxy

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Tab-2 10.1 (i915), Samsung Galaxy Note 10.1 (i925), Novatel 5510L Jetpack, Pantech MHS291L Jetpack, and the Pantech UML295 USB Modem. These devices are available nationwide.

Because a base of customers already will be using AWS-capable LTE devices, consumers will receive immediate benefits from Verizon Wireless' AWS deployment.

Currently, there are **[BEGIN CONFIDENTIAL]** **[END CONFIDENTIAL]** AWS-capable LTE devices in the hands of Verizon Wireless customers. Verizon Wireless anticipates that this number will increase to **[BEGIN CONFIDENTIAL]** **[END CONFIDENTIAL]** AWS-capable LTE devices by year end 2013.

Verizon Wireless plans to activate the AWS capability in these LTE devices via an over-the-air software update in **[BEGIN CONFIDENTIAL]** **[END CONFIDENTIAL]**. After this activation, AWS-capable LTE devices will use Interband Traffic Balancing (“ITB”) to determine which frequency the device will use for each data session. ITB allows Verizon Wireless to manage the traffic levels on its LTE network by moving multi-band LTE device data traffic from a more congested band to a less congested band. Verizon Wireless thereby will be able to use the Upper 700 MHz C Block and AWS frequency bands in the most efficient manner and provide a better user experience—both in terms of latency and speed of data transfers—to customers.

[BEGIN CONFIDENTIAL] **[END CONFIDENTIAL]**, Verizon Wireless plans to use Carrier Aggregation to improve further both the user experience and spectrum efficiency. Carrier Aggregation allows two different frequency blocks to be used *simultaneously* on the uplink and/or the downlink to create a wider bandwidth data pathway. Carrier Aggregation, therefore, facilitates better throughput, resulting in a significantly improved

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user experience through what appears to be higher speed data transfers. Verizon Wireless will use these techniques to aggregate its existing AWS spectrum and the spectrum it will acquire in this transaction with its existing Upper 700 MHz C Block spectrum.

b. The Company's timeline for deploying the spectrum that it would acquire in the Proposed Transaction and for any AWS-1 spectrum it currently holds, including any timing differences resulting from non-contiguous versus contiguous spectrum holdings.

In this transaction, Verizon Wireless is proposing to acquire or lease all or parts of seven AWS spectrum licenses that cover six different metropolitan areas and surrounding areas. Some of these areas cover a single CMA while others comprise multiple CMAs. Verizon Wireless generally plans network infrastructure deployment on an integrated basis across geographic areas that are larger than CMAs, which can be as small as a single county. For this reason, Verizon Wireless provides the information below based on the six metropolitan areas and surrounding areas that are encompassed by the AWS licenses it is acquiring or leasing rather than based on CMAs, except where it has information specific to a CMA. Detailed data on the company's spectrum holdings and technology deployments on a county and CMA basis is being separately provided in spreadsheets that supply the information requested by Question 3.

Albuquerque, NM. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Albuquerque area and 10 MHz of E Block AWS spectrum in portions of that area. As part of this transaction, Verizon Wireless plans to acquire 10 MHz of C Block AWS spectrum in this market (BEA156 – CMA086 and parts of CMA320, CMA553, CMA555, and CMA556).

Verizon Wireless will deploy this spectrum on a site-by-site basis as soon as it is cleared and as capacity needs warrant, as detailed in response to Request 1.a. Verizon Wireless plans to deploy its existing B Block spectrum and the C Block spectrum that it is acquiring as part of this

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transaction simultaneously in 2013. As noted above in response to Request 1.a., Verizon Wireless currently cannot use non-contiguous AWS B and C Block and E Block spectrum on existing network equipment. Verizon is working with its infrastructure vendors to provide support for non-contiguous AWS blocks on common network equipment. Verizon Wireless expects equipment capable of operating on non-contiguous AWS spectrum will be available [BEGIN CONFIDENTIAL] [END CONFIDENTIAL]. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] in Albuquerque.

Dallas, TX. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum and, in CMA233, 20 MHz of A Block AWS spectrum as well. As part of this transaction, Verizon Wireless will gain access to 10 MHz of C Block AWS spectrum through a lease in this market (BEA127 – CMA009, CMA194, CMA206, CMA233, CMA237, CMA240, CMA292, CMA332, CMA603, CMA604, CMA605, CMA656, CMA657, CMA658, CMA660, CMA661, CMA662, CMA666). Verizon Wireless will deploy this spectrum on a site-by-site basis as soon as it is cleared and as capacity needs warrant, as detailed in response to Request 1.a. Verizon Wireless plans to deploy this spectrum simultaneously with the planned deployment of its existing AWS spectrum in 2013. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] in the Dallas area.

Fresno, CA. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Fresno market. As part of this transaction, Verizon Wireless plans to acquire 10 MHz of E Block AWS spectrum in this market (REA005 – CMA074, part of CMA339, CMA347). As

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noted above in response to Request 1.a., Verizon Wireless currently cannot use non-contiguous AWS B and E Block spectrum on current common network equipment. Verizon is working with its infrastructure vendors to provide support for non-contiguous AWS blocks on common network equipment. Verizon Wireless expects equipment capable of operating on non-contiguous AWS spectrum will be available [BEGIN CONFIDENTIAL] [END CONFIDENTIAL]. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] in the Fresno area.

Los Angeles, CA. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Los Angeles market. As part of this transaction, Verizon Wireless plans to acquire 10 MHz of A Block AWS spectrum in this market (CMA002). Verizon Wireless will deploy this spectrum on a site-by-site basis as soon as it is cleared and as capacity needs warrant, as detailed in response to Request 1.a. Verizon Wireless plans to deploy this spectrum simultaneously with the planned deployment of its existing AWS spectrum in 2013. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] in Los Angeles.

Phoenix, AZ. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Phoenix market. As part of this transaction, Verizon Wireless plans to acquire 10 MHz of D Block AWS spectrum in this market (REA005 – CMA026, part of CMA323, CMA557). As noted above in response to Request 1.a., Verizon Wireless currently cannot use non-contiguous AWS B and D Block spectrum on existing network equipment. Verizon is working with its infrastructure vendors to provide support for non-contiguous AWS blocks on common network equipment. Verizon Wireless expects equipment capable of operating on non-contiguous AWS

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spectrum will be available [BEGIN CONFIDENTIAL] [END
CONFIDENTIAL]. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL] in the Phoenix area. Verizon Wireless also is acquiring 10 MHz of AWS A Block spectrum in Yuma, AZ (CMA321), which it considers part of the Phoenix market area for network deployment purposes. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Yuma market. [BEGIN CONFIDENTIAL]

[END CONFIDENTIAL]. Once the locations of the cell sites are approved, it will take several months to complete real-estate work and cell site modifications.

Portland, OR. Verizon Wireless currently holds 20 MHz of B Block AWS spectrum in the Portland market. As part of this transaction, Verizon Wireless plans to acquire 10 MHz of E Block AWS spectrum in this market (REA006 – CMA030, part of CMA607, CMA609, and part of CMA611) and 10 MHz of A Block AWS spectrum in Skamania, WA (CMA699), which it is treating as part of the Portland market area. As noted above in response to Request 1.a., Verizon Wireless currently cannot use non-contiguous AWS B and E Block spectrum on existing network equipment. Verizon is working with its infrastructure vendors to provide support for non-contiguous AWS blocks on common network equipment. Verizon Wireless expects equipment capable of operating on non-contiguous AWS spectrum will be available [BEGIN CONFIDENTIAL] [END CONFIDENTIAL]. Verizon Wireless plans to deploy AWS to [BEGIN CONFIDENTIAL]

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[END CONFIDENTIAL] in the Portland

area.

c. A detailed description of the Company's current and planned deployment of LTE and strategy for spectrum rationalization.

Over the last several years, Verizon Wireless has chosen to rationalize its spectrum holdings by using its cellular and PCS spectrum for voice and 3G data services and its Upper 700 MHz C Block and AWS spectrum to deploy LTE services. The proposed transaction is a part of a series of recent transactions in which Verizon Wireless has acted to rationalize its spectrum holdings. Specifically, in April 2012, Verizon Wireless announced an “open sale” process to sell its Lower 700 MHz spectrum licenses. This process, together with prior efforts, resulted in the sale of 44 other Lower 700 MHz A, B, and C Block licenses. At the same time, Verizon Wireless has been acquiring spectrum to complete its AWS footprint. This transaction, along with the sale to Grain, will complete the sale of all of the company's remaining 700 MHz Lower B Block licenses. Verizon Wireless will continue to hold its remaining 700 MHz Lower A Block licenses, which it expects to deploy as necessary to meet spectrum needs, subject in some cases to action by the Commission to clear television Channel 51 stations that currently preclude Lower A Block operations in some areas. These efforts will allow Verizon Wireless to effectively and efficiently deploy LTE throughout the country with capacity to help address consumers' growing demand for next-generation services.

Verizon Wireless chose this strategy because it determined that AWS is the most cost-effective and spectrally efficient way for Verizon Wireless to supplement its Upper 700 MHz C Block spectrum in order to provide capacity for growth in customers' use of LTE. Other spectrum holdings are either currently not available or not optimal for this purpose, as is AWS.

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Specifically, Verizon Wireless' cellular and PCS licenses are deployed nationwide to provide CDMA EvDO Rev. A and 1x services. These bands currently carry [BEGIN

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[END CONFIDENTIAL] of Verizon Wireless'

total data and SMS traffic and all of its voice traffic. In addition, while Verizon Wireless holds some Lower 700 MHz spectrum, this spectrum is more challenging to integrate into multi-band devices. Carrier Aggregation techniques also are harder to utilize with the Lower and Upper 700 MHz bands than with the Upper 700 MHz and AWS bands. Verizon Wireless therefore decided to focus on the use of AWS as the most optimal spectrum for adding capacity to its existing Upper 700 MHz LTE deployment.

An additional aspect of the company's spectrum rationalization plan is to swap existing non-contiguous spectrum blocks for other spectrum blocks that are adjacent to other existing holdings. As detailed below in response to Request 2.b., this spectrum rationalization provides spectral efficiency benefits to Verizon Wireless, its customers, and the public.

Verizon Wireless already has deployed LTE devices that use the Upper 700 MHz C Block. Most of these devices also support voice services using Verizon Wireless' cellular spectrum and 3G data services using its cellular and PCS spectrum. As detailed above in response to Request 1.a., Verizon Wireless also has deployed LTE devices that are capable of using both the Upper 700 MHz C Block and the AWS spectrum. Verizon Wireless plans to introduce Voice over LTE ("VoLTE") in the near future, which will allow LTE-only devices to support voice. The response to 1.a. provides for additional information about the Company's planned deployment of AWS spectrum into its LTE network.

d. A discussion of the Company's plans to provide high-quality, high-speed wireless broadband service prior to the Proposed Transaction. Provide any supporting material used to prepare the response.

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Prior to entering into the proposed transaction, Verizon Wireless had been deploying its LTE network using its Upper 700 MHz C Block spectrum and planned to use its AWS spectrum to supplement this network as capacity needs demanded. This plan remains the same today. Specifically, prior to the proposed transaction, Verizon Wireless planned to meet growing capacity demand on its 4G LTE network by rolling out its AWS spectrum beginning in late 2013. After entering into the proposed transaction, Verizon Wireless still plans to begin deploying its AWS spectrum in certain markets in late 2013 based on capacity constraints.

The only change that the proposed transaction will make to the company's AWS deployment plans is that newly-acquired spectrum that is adjacent to existing AWS spectrum will be launched simultaneously with existing AWS spectrum, provided it is cleared. If the newly-acquired spectrum is not adjacent to our existing AWS spectrum, it will be used to add capacity when the next generation of hardware that is capable of operating on two non-contiguous blocks is developed and tested [BEGIN CONFIDENTIAL] [END CONFIDENTIAL]. See Response to Request 1.b. for additional information.

- e. All plans, analyses, and reports discussing, both prior to and after the consummation of the Proposed Transaction, (i.) the Company's plans to deploy its AWS-1 and Lower 700 MHz B lock spectrum and (ii.) the efforts of other AWS-1 and Lower 700 MHz B Block licensees in deploying their spectrum.*

Verizon Wireless has provided documents responsive to this request in the Document Production.

- 2. On page 2 of the Public Interest Statement, the Applicants contend that "[t]he assignments will allow AT&T and Verizon Wireless each to further rationalize their spectrum holdings and obtain contiguous spectrum in many markets, enabling more spectrally efficient deployments." Explain and describe in detail, including the period of time envisioned, how the Proposed Transaction would allow Verizon Wireless to rationalize its spectrum holdings and deploy them more efficiently than it would without the Proposed Transaction. In addition, provide the following information:*

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See Response to Request 1.c. for a description of Verizon Wireless' spectrum rationalization plan. The proposed transaction will enable Verizon Wireless to acquire spectrum that it will deploy in its LTE network, as envisioned by this plan. The proposed transaction also will provide Verizon Wireless with contiguous spectrum in some markets, which as the Commission noted in the SpectrumCo Order,³ is a form of rationalization that benefits the public interest.

a. Identify each relevant market where, as a result of the Proposed Transaction, the Company would acquire spectrum contiguous to its existing AWS-1 spectrum holdings.

As a result of the proposed transaction, Verizon Wireless would acquire (or gain access to through a spectrum lease) AWS spectrum that is contiguous to its existing AWS spectrum in the following markets:

CMA002 – Los Angeles-Long Beach/Anaheim, CA
CMA009 – Dallas-Ft Worth, TX
CMA086 – Albuquerque, NM
CMA194 – Waco, TX
CMA206 – Longview-Marshall, TX
CMA233 – Wichita Falls, TX
CMA237 – Tyler, TX
CMA240 – Texarkana, AR-TX
CMA292 – Sherman-Denison, TX
CMA320 – Arizona 3 - Navajo
CMA321 – Arizona 4 - Yuma
CMA332 – Arkansas 9 - Polk
CMA553 – New Mexico 1 - San Juan
CMA555 – New Mexico 3 - Catron
CMA556 – New Mexico 4 - Santa Fe
CMA603 – Oklahoma 8 – Jackson
CMA604 – Oklahoma 9 - Garvin
CMA605 – Oklahoma 10 - Haskell
CMA656 – Texas 5 - Hardeman

³ *Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC and Cox TMI, LLC, Memorandum Opinion and Order and Declaratory Ruling, 27 FCC Rcd 10698, 10739 ¶ 107 (2012) (“SpectrumCo Order”).*

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CMA657 – Texas 6 - Jack
CMA658 – Texas 7 - Fannin
CMA660 – Texas 9 - Runnels
CMA661 – Texas 10 - Navarro
CMA662 – Texas 11 - Cherokee
CMA666 – Texas 15 - Concho
CMA699 – Washington 7-Skamania

- b. *Explain and describe in detail how contiguous spectrum enables more spectrally efficient deployments, including but not limited to, any analyses comparing the spectral efficiency, user performance, and capacity characteristics of a 10+10 megahertz LTE deployment with a 20+20 megahertz LTE deployment. Provide any supporting engineering data and documents relied on in preparing the response.***

Increases in contiguous spectrum (e.g., from 10x10 MHz to 20x20 MHz) provide spectral efficiency improvements because a smaller percentage of the bandwidth is consumed by overhead. In other words, part of each spectrum block must be used for control of data sessions (e.g., to instruct the device to change output power, change the modulation scheme, or handoff to a different cell site or cell sector). By aggregating spectrum into contiguous blocks, the signaling for both blocks can be accomplished using the same spectrum. As a result, a higher percentage of the available bandwidth can be used for end-user data traffic. Although overhead is necessary to manage data sessions, it reduces spectral efficiency and should be minimized where possible. Verizon Wireless uses international standards for calculating overhead. Overhead can be estimated based on 3GPP/LTE standard documentation including PHY layer; MAC layer TS36.321, and RRC layer TS36.331.⁴ Using those documents, the overhead for 10x10 MHz and

⁴ 3GPP TS 36.211, Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) – Physical Channels and Modulation. 3GPP TS 36.212, Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) – Multiplexing and channel coding. 3GPP TS 36.213, Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) – Physical layer procedures. 3GPP TS 36.321, Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) – Medium Access Control (MAC) protocol specification. 3GPP

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20x20 MHz of contiguous spectrum is calculated to be 2.7 percent and 1.3 percent respectively for the downlink and 9.2 percent and 6.6 percent respectively for the uplink. In both the downlink and the uplink, a lower percentage of the bandwidth is consumed by overhead for 20x20 MHz of contiguous spectrum compared to 10x10 MHz of contiguous spectrum. The reduction in percentage of bandwidth consumed by overhead with contiguous spectrum creates an improvement in spectral efficiency. For example, using the percentages from above, the spectrum consumed by overhead can be calculated for two non-contiguous 10x10 MHz spectrum blocks and one contiguous 20x20 MHz spectrum block. For the downlink 1.1MHz and 0.54 MHz is consumed by overhead for two 10x10 MHz spectrum blocks and one 20x20 MHz spectrum block respectively. For the uplink 1.84 MHz and 1.32 MHz is consumed by overhead for two 10x10 MHz spectrum blocks and one 20x20 MHz spectrum block respectively. Clearly overhead consumes less spectrum for contiguous spectrum compared to non-contiguous.

Contiguous spectrum results in other efficiencies as well. For example, under light to moderate loading conditions contiguous spectrum results in trunking efficiency gains. Trunking efficiency gains are realized because the contiguous blocks can be utilized by all customers, which increases the probability that the available bandwidth is fully utilized. For example, if a customer is doing a download with non-contiguous spectrum, he can only use one block of spectrum for the download and the other block is not utilized. With contiguous spectrum, the customer is able to use both blocks of spectrum, allowing the download to be completed faster if all or part of the other block was not being used by other customers. Completing the download

TS 36.331, Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN) – Radio Resource Control (RRC) protocol specification.

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faster will make additional capacity available sooner for other customers, allowing for an increase in spectral efficiency.

Contiguous spectrum also improves the user experience. The peak data rates will be a little over twice as fast on a contiguous 20x20 MHz spectrum block compared to two non-contiguous 10x10 MHz spectrum blocks. The average data rates will also be faster on the contiguous spectrum. Other user experience metrics such as latency, data connection failures, and dropped connections will likely be slightly better for contiguous spectrum compared to non-contiguous spectrum

- 3. Provide a list, in csv format, as of the date of this Request, in each relevant market, for each county within each state of each spectrum license that can be used in the provision of mobile wireless services that the Company holds, has a joint venture or other business arrangements with regard to, leases from another person, has another interest in, manages, has contracted to acquire, or is in negotiations to acquire. For each license, identify the: (a) FIPS Code; (b) county; (c) state; (d) market name; (e) market number (in the case of CMA, MSA, MTA, or BTA); (f) spectrum type; (g) spectrum block; (h) amount of spectrum; (i) holds; (ii) has a joint venture or other business arrangement with regard to; (iii) leases to or from another person; (iv) has an interest in; (v) manages; (vi) has contracted to acquire; (vii) is in negotiations to acquire; or (viii) plans to sell.***

Verizon Wireless has provided two files that include the information requested by this Request. The first, named “Verizon Q3 to 13-56 Info Req - Current and Pending_CONFIDENTIAL.csv” and being filed as Confidential, contains the data for spectrum currently held by Verizon Wireless and for which there is an assignment and/or lease application currently on file with the FCC. The second, named “Verizon Q3 to 13-56 Info Req - In Negotiation_HIGHLY_CONFIDENTIAL.csv” and being filed as Highly Confidential, contains data on spectrum in which Verizon Wireless is in negotiations to acquire or sell. In Column J of

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the csv files, “i” is used to indicate spectrum wholly owned by Verizon Wireless and “ii” is used to indicate spectrum held by a partnership that is managed and controlled by Verizon Wireless.

Respectfully submitted,

/s/ John T. Scott, III

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Of Counsel

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Dated: June 27, 2013

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**Bates Numbers VZW-000001 – VZW000270 are redacted as
Highly Confidential and Confidential Information**