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FILED/ACCEPTED

MAR 22 2012

Federal Communications Commission
Office of the Secretary

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March 22, 2012
VIA HAND DELIVERY
Marlene H. Dortch
Secretary
Federal Communications Commission,
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

Re: Cellco Partnership d/b/a Verizon Wireless Response to Information and Document Request

Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo, LLC For Consent To Assign Licenses and Application of Cellco Partnership d/b/a Verizon Wireless and Cox TMI Wireless, LLC For Consent To Assign Licenses, WT Docket No. 12-4

Dear Ms. Dortch:

This submission responds to the March 8, 2012 Information and Document Request (“Information Request”) from the Federal Communications Commission. Enclosed please find:

- A document with narrative responses to the Information Request (“Response”), which also provides information on a request-by-request basis for other media provided in connection with this response;
- An encrypted hard drive containing several folders¹ with the Summation load files associated with the Document Requests in the Information Request, containing items tagged as “Highly Confidential,” “Confidential” and “Public,” per the Protective Order and Second Protective Order adopted in this docket;
- A CD-ROM, Bates number VZW-TPK-FCC-90001, which contains data that meets the requirements for treatment as “Confidential” material under the Protective Order adopted in this docket; and

¹ The folders are labeled “2012-03-22 Document Production,” “2012-03-22 Document Production_2,” and “2012-03-22 Document Production_3,” reflecting how the files were split for transmission from the vendor.

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Response to Information Request

March 22, 2012

Page 2

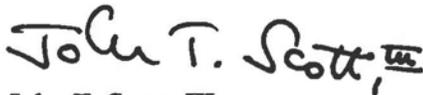
- A DVD-ROM, Bates number VZW-TPK-FCC-90002, which contains data that meets the requirements for treatment as “Highly Confidential” material under the Second Protective Order adopted in this docket.

Because the Response contains information that is “Highly Confidential,” the Company is filing an unredacted copy of the Response with the FCC pursuant to the procedures established in the Second Protective Order, and will also file a redacted version of that document on the FCC’s Electronic Comment Filing System. To avoid confusion, copies of this letter will also be filed with the appropriate confidentiality legend, although the content of both letters will be identical.

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 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 the return of any such documents.

Should any questions arise concerning the Response or the electronic media provided in connection with this filing, please contact the undersigned.

Sincerely,

A handwritten signature in black ink that reads "John T. Scott, III". The signature is written in a cursive style with a small "III" at the end.

John T. Scott, III

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

In the Matter of:)
)
Application of Cellco Partnership d/b/a) WT Docket No. 12-4
Verizon Wireless and SpectrumCo, LLC)
For Consent To Assign Licenses)
)
Application of Cellco Partnership d/b/a)
Verizon Wireless and Cox TMI Wireless, LLC)
For Consent To Assign Licenses)

**RESPONSE TO INFORMATION AND DISCOVERY REQUEST
BY CELLCO PARTNERSHIP d/b/a VERIZON WIRELESS**

Cellco Partnership d/b/a Verizon Wireless (“Verizon Wireless”) herewith provides its narrative responses and other references to materials submitted to the FCC in connection with the FCC’s request for information dated March 8, 2012 (“Information Request”).¹ Verizon Wireless has also provided electronic media in connection with the Information Request, including a database of documents responsive to the requests that is compatible with the FCC’s document review software (the “Document Production”). This response refers to both the Document Production and specific files created for purposes of responding to the Information Request.

The Document Production consists of materials obtained using two different collection techniques. For requests that sought “all documents,” as opposed to those that sought “plans, analyses and reports,” Verizon Wireless used a searchable database of documents that had been

¹ Information and Discovery Request for Verizon Wireless (attachment to Letter from Rick Kaplan, Chief, Wireless Telecommunications Bureau, FCC, to Michael Samscock, Cellco Partnership, dba Verizon Wireless, WT Docket No. 12-4 (dated March 8, 2012)).

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produced to the Department of Justice (“DOJ”) from a list of custodians identified in connection with the DOJ’s Second Request pursuant to the DOJ’s separate Hart-Scott-Rodino review of this transaction (the “DOJ Database”). Verizon Wireless used relatively broad search terms² to identify a subset of documents that were subsequently reviewed to verify relevance and code as non-confidential, Confidential and subject to the *Protective Order*,³ or Highly Confidential and subject to the *Second Protective Order* in this proceeding.⁴ Because the document request requires production of “families” of documents, those documents deemed relevant were then used to derive a larger universe of materials for production. All relevant documents have been reviewed for both relevance and confidentiality.⁵

Because the “plans, analyses and reports” queries sought a much narrower scope of documents,⁶ Verizon Wireless specifically queried the individuals it identified as most likely to

² The search strings used to generate the documents sets provided to reviewers are attached as Exhibit A.

³ See Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC For Consent To Assign Licenses and Application of Cellco Partnership d/b/a Verizon Wireless and Cox TMI Wireless, LLC For Consent To Assign Licenses, *Protective Order*, WT Docket No. 12-4 (rel. Jan. 17, 2012), available at: http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0117/DA-12-50A1.pdf (last visited Mar. 19, 2012).

⁴ See Application of Cellco Partnership d/b/a Verizon Wireless and SpectrumCo LLC For Consent To Assign Licenses and Application of Cellco Partnership d/b/a Verizon Wireless and Cox TMI Wireless,, *Second Protective Order*, WT Docket No. 12-4 (rel. Jan. 17, 2012), available at: http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db0117/DA-12-51A1.pdf (last visited Mar. 19, 2012).

⁵ Verizon Wireless tagged the entire family of documents derived from any relevant document with the highest confidentiality label associated with any relevant document in the family. While all relevant documents have been human reviewed, documents produced solely because of the family requirement that are not independently relevant to the request may not have been reviewed for confidentiality purposes.

⁶ “Plans, analyses and reports” is limited both in terms of the type of documents—“business plans, strategic plans, written policies, budgets, analyses, reports, presentations (including quantitative presentations), and similar documents, including all appendices and attachments

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have such “plans, analyses and reports” and built a separate document database with the materials provided by such individuals. Verizon Wireless also obtained materials from individuals who are not represented as custodians in the DOJ Database. By including such materials and identifying those individuals as custodians in the metadata, Verizon Wireless is not implying or representing that the entirety of their files has been digitized or added to the DOJ Database, or that a broader search of their materials has been undertaken in connection with the “all documents” requests.

REQUESTS AND RESPONSES

- 1. Provide an organization chart and personnel directory in effect since January 1, 2010, for the Company as a whole and for each of the Company's facilities or divisions involved in any activity relating to any Relevant Wireless Product or any Relevant Wireless Service.***

Verizon Wireless has provided multiple current organization charts for the Company and its facilities and divisions on the enclosed discs identified as “Confidential” data with the filename “Verizon Q1 to 12-4 Info Req—Org Charts_CONFIDENTIAL.pdf.” Verizon Wireless has not identified a Company-wide “personnel directory” in effect since January 1, 2010.

- 2. Provide a list, in csv format, as of the date of this Request, organized by state (including the District of Columbia, and Puerto Rico), and then by county (or municipality in the case of Puerto Rico) of each spectrum license that can be used in the provision of mobile wireless services that Verizon Wireless: (a) holds; (b) manages; (c) contracted to acquire; (d) is in negotiations to acquire; (e) plans to transfer or assign; (f) leases to or from another person or entity; (g) holds a general partnership interest. For each license, identify: (a) the call sign; (b) the county FIPS Code; (c) the county name (and the District of Columbia and each municipality in the case of Puerto Rico); (d) the state; (e) the market name; (f) the market number (e.g., CMA, MTA, and/or BTA); (g) the spectrum band; (h) the spectrum block; (i) the amount of spectrum; (j) the wireless technology format (e.g., CDMA, EV-DO Rev. A, LTE) deployed at present; (k) in the Cellular and PCS***

thereto”—and the audience for whom the documents were used—“the Company's board of directors or the Company's executive management, or any member thereof.” See Information Request, Definitions at 4.

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spectrum, an indication of any future plans to upgrade to LTE; and (1) any measures of past/present/expected spectrum utilization per sector and capacity models or analysis of CDMA lx and EV-DO to LTE migration.

The spectrum license data sought in Requests 2a through 2j are being provided in three separate “.csv” files. The first, on the disc labeled “Confidential Data” and titled “Verizon Q2 to 12-4 Info Req—Current_CONFIDENTIAL.csv” contains all the licenses that Verizon Wireless currently holds, manages, leases to or from another entity, or holds a general partnership interest. The second file, also on the disc labeled “Confidential Data” and titled “Verizon Q2 to 12-4 Info Req—Pending_CONFIDENTIAL.csv” includes all licenses Verizon Wireless has contracted to acquire or plans to transfer or assign. These two files are being treated as Confidential. The third file is Highly Confidential and includes licenses Verizon Wireless is in negotiations to acquire. That file is on a separate disc labeled “Highly Confidential Data” and titled “Verizon Q2 to 12-4 Info Req—Negotiations_HIGHLY_CONFIDENTIAL.csv.” Because the “.csv” format mandated by the Information Request does not support headers, Verizon Wireless cannot individually label the “pages” with the appropriate confidentiality header under the protective order, and has instead provided the necessary caption on the disc labels.

Pursuant to discussions with FCC staff, Verizon Wireless has provided the following narrative response to subparts 2k and 2l. In response to Request 2k, Verizon Wireless has not yet engaged in license-by-license level analysis of “future plans to upgrade to LTE,” as the network is under intense and growing usage. Verizon Wireless notes, however, that it is providing more general documents “discussing CDMA to LTE migration” in response to Request 8. In response to Request 2l, Verizon Wireless is providing measures of spectrum utilization on a per sector basis in response to Request 3. The Company has not developed specific modeling or analysis of migration to LTE on a license-by-license basis. At this point,

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such detailed preparation would be premature given the widespread and intensive use of Verizon Wireless' spectrum for EVDO.

As William H. Stone, Executive Director of Network Strategy for Verizon, stated in his Supplemental Declaration appended to the Joint Opposition, in the near-term refarming to LTE “is not a realistic alternative to address the significant and pervasive network[] constraints we will face over the next few years.” Joint Opposition to Petition to Deny and Comments, Declaration of William H. Stone, Exh. 2, Executive Director of Network Strategy for Verizon (“Supp. Stone Dec.”) at ¶ 47. Data on the EVDO network – which itself is spectrum constrained in various markets – is continuing to grow and will remain at elevated levels for some time. *Id.* at ¶ 13; *see also id.* at ¶ 47. Once EVDO usage begins to decline the company will be able to evaluate and potentially implement refarming in specific geographic areas served by its network, but it will require opening up sufficient frequencies to effectively repurpose the spectrum. Initially, a carrier could free up spectrum on a 1.25x1.25 MHz carrier basis. As Mr. Stone observed, however, “[a] 1.25x1.25 MHz LTE channel can only support peak speeds that are 1/8th of the peak speeds on a 10x10 MHz channel” – and for Verizon Wireless, refarming a 1.25 MHz channel “is not a viable solution due to [this] inconsistency in the customer experience.” *Id.* at ¶ 48. At a minimum, Verizon Wireless will require 5x5 MHz channelization for LTE deployment in refarmed spectrum in order to achieve a significant benefit from deployment. *Id.*

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3. Provide data as specified in the attached spreadsheets and instructions: "Historical Site Level Data" and "Historical and Projected County Level Data."⁷

Verizon Wireless has provided a series of files, described below, in response to this request on the disc titled "Highly Confidential Data." Verizon Wireless has also included below some explanatory notes on the tables.

Historical and Projected County Level Data Table
(Verizon Q3 to 12-4 Info Req—CtyData_HIGHLY_CONFIDENTIAL.csv)

Pursuant to discussions with FCC Staff, Verizon Wireless has made the following adjustments to this table: **[BEGIN HIGHLY CONFIDENTIAL]**

[END

HIGHLY CONFIDENTIAL]

Site Data Table
(Verizon Q3 to 12-4 Info Req--SiteData_HIGHLY_CONFIDENTIAL.txt)

Per instructions for Column I, urban, suburban, rural cell sites were classified as follows:

- Less than 100 pops/sq mi = rural;
- 100-999 pops/sq mi = suburban;
- Greater than or equal to 1,000 pops/sq mi = urban.

⁷ On March 13, 2012, FCC Staff sent Verizon Wireless an "updated data template attachment" for Request 3, which expanded the types of data requested in this table.

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Deployed Carriers Table

(Verizon Q3 to 12-4 Info Req—Deployed Carriers_HIGHLY_CONFIDENTIAL.csv)

Pursuant to discussions with FCC Staff, Verizon Wireless has made the following adjustments to this table: **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]

Traffic Table

(Verizon Q3 to 12-4 Info Req—Traffic_Hist-LTE_Proj_HIGHLY_CONFIDENTIAL.csv)

Pursuant to discussions with FCC Staff, Verizon Wireless has made the following adjustments to this table: **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]

4. *Provide a list of all internal and external reports that the Company produces on a monthly, quarterly, or annual basis. For each such report, provide the time period covered by the report, the full name and title of each recipient, and a brief description of the content and subject matter addressed.*

Pursuant to discussions with FCC staff Verizon Wireless is waiting for staff clarification as to the materials requested and, accordingly, has not provided materials in response to this request at this time.

5. *Provide, as of the date of this Request, maps by bands of the geographic coverage of each relevant network provided by Verizon Wireless, distinguishing by technological format (e.g., CDMA, EV-DO, EV-DO Rev. A, LTE, GSM, EDGE, UMTS, HSPA, or HSPA+). On these coverage maps: (1) depict in separate colors two ranges of signal levels (- 95 to - 85 dBm, and greater than -85 dBm); (2) depict all major and minor roads; and (3) indicate locations of their cell sites (color coded with frequency band). Provide the maps in a georeferenced format, such as a shapefile (for ArcMap) or table (for MapInfo). Provide all assumptions,*

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methodology (e.g., propagation, field measurements), calculations (including link budgets), tools (e.g., predictive and field measurements) and data (e.g., terrain, morphology, buildings) that are used to produce the maps.

Pursuant to discussions with FCC staff, Verizon Wireless is providing 12 coverage maps in shapefiles, [BEGIN HIGHLY CONFIDENTIAL]

[END

HIGHLY CONFIDENTIAL] Locations of cell sites are indicated. The cell site locations are not color-coded by spectrum band. [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL] The files are provided in “Coverage” and “Sites” subdirectories on the disc labeled “Highly Confidential Data” under the directory titled “Verizon Q5 to 12-4 Info Request—Map Data_HIGHLY CONFIDENTIAL.”

State, U.S. and Interstate Highways, can be found in the “US Highways” dataset here:

<http://www.nohrsc.noaa.gov/gisdatasets/>.

Terrain and land use data can be found here:

http://www.mrlc.gov/nlcd06_data.php.

Verizon Wireless produces coverage maps through a national program followed by all 21 Company geographic regions. Network engineers in the Verizon Wireless regions are responsible for maintaining the technical data for each cell site, which is the input to a proprietary software program that produces the coverage data. The coverage data are confirmed at least quarterly through drive tests in each region. Coverage data from the 21 regions are compiled nationally on a quarterly basis.

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6. *Paragraph 6 of the Stone Declaration (VZW - SpectrumCo) makes the following statements regarding Verizon Wireless's projections for data traffic on its network: "From 4Q06 until 4Q11 we have experienced a compounded annual data traffic growth rate of approximately 94% year over year, meaning that data usage has nearly doubled each consecutive year for the past five years. . . . Our LTE usage projections suggest that this trend of doubled data usage every year will continue, and that traffic on our LTE network will surpass data usage on our EV-DO network in early 2013." Paragraph 13 of Stone's Supplemental Declaration (Joint Opposition) provides "historical and projected downloaded busy-hour data," while paragraphs 19-20 provide a high level description of the "Verizon Planning Instrument" that Verizon Wireless has developed as a capacity and spectrum planning tool to monitor and calculate capacity needs on its EV-DO and LTE network.*
- a. *Provide all plans, analyses, and reports discussing actual and projected compounded annual growth rates for all network technologies and services, including any breakdown of subscriber connection growth and the traffic growth per subscriber connection. If not included in such plans, analyses, and reports, discuss in detail the various assumptions and models underlying these plans, analyses, and reports, including assumptions relating to traffic volume, speed and quality of services, and mix of devices and services.*
- b. *Provide all plans, analyses, and reports that Verizon Wireless uses on a daily and periodic basis to estimate traffic requirements, including on sector level basis. If not included in such plans, analyses, and reports, discuss traffic growth assumptions and models underlying these plans, analyses, and reports, including details on the various assumptions used in the Verizon Planning Instrument and whether and how each of these assumptions is factored into the resulting traffic demand forecast for each sector and each cell site. Provide all plans, analyses, and reports on adjustments that Verizon Wireless applies to make corrections to usage predictions.*

In addition to the narrative responses below, Verizon Wireless has provided documents responsive to the subsections of this request in the Document Production tagged with, respectively, "6a" and "6b."

6a. Verizon Wireless develops its network planning forecasts based on four broad categories of information: historical network usage; device purchasing trends and projections; device usage analysis and projections; and migration strategies and radio technology selection. While network planning involves many variables, these four broad categories serve as the primary inputs to

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Verizon Wireless' traffic growth forecasting. The following describes how each of these categories is developed and expands on assumptions and models underlying the network planning forecast process. These forecasts are then used in the Verizon Planning Instrument ("VPI"), described below in response to Request 6b., to further develop traffic demand projections and network capacity planning. The VPI data used to predict future traffic demand on a sector-by-sector basis, including the data used to create the maps for the markets included in Mr. Stone's Supplemental Declaration, are provided on a disc labeled "Highly Confidential Data - VZW-TPK-FCC-90002" containing a file named "Verizon Q6 to 12-4 Info Req--VPIv2d_3_HIGHLY_CONFIDENTIAL.xlsx."

Historical Network Usage. Verizon Wireless tracks and records network usage for voice, data, and SMS, across each technology as relevant (1xRTT, EVDO, and LTE). This historical data is used to plot trend lines, and these trend lines form the initial baseline for the network planning forecast. Much of this information has been provided in response to Request 3.

Device Purchasing Trends and Projections. Verizon Wireless considers historical device purchase data, as well as marketplace trends, to develop projections regarding the number and type of "connected devices" on the network. The device mix directly impacts the predicted demand on the network, as each of these categories uses different amounts of data.

The historical device purchase data is based on internal Verizon Wireless data. The company then projects the mix of devices and device growth for each radio technology. For 1xRTT/EVDO, the company separately projects device growth in the following categories: feature phones, Blackberry/PDAs, iPhones, other smart phones, tablets, and datacards and dongles. For LTE, it considers the following mix categories: feature phones, smart phones, external cards and dongles, M2M devices and other consumer devices. The projections are

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based on a number of factors, including: the number of subscribers nearing the end of their contracts; the likely number of subscribers who will upgrade devices (e.g., from a feature phone to a smart phone); and the likely number of subscribers who will upgrade from an EVDO device to an LTE device. In addition, Verizon Wireless takes into account overall industry trends in devices, often informed by discussions with manufacturers.

Device Usage Analysis and Projections. Verizon Wireless also evaluates average usage of the various categories of devices as a key component in forecasting growth rates. For EVDO devices, the average MB/month is calculated for feature phones, Blackberry/PDAs, iPhones, other smart phones, tablets, and datacards and dongles. LTE devices are analyzed across the following categories: feature phones, smart phones, data cards and dongles, tablets, computers, M2M devices and commercial devices. The company evaluates historical usage data for each category of devices and then projects future per-device usage by applying varied factors – for example, usage predictions are adjusted when the company modifies pricing plans.

Migration Strategies and Radio Technology Selection. The final category relates to the migration of traffic from EVDO to LTE and the impact on traffic growth. Verizon Wireless calculates on an aggregated nationwide basis the amount of data traffic it anticipates will be offloaded to LTE from current EVDO customers who upgrade to 4G LTE devices. There are usage differences between devices in the same category that operate on different technologies. An EVDO smart phone user downloads less data in the same amount of time as compared to a LTE smart phone user – Verizon Wireless predicted, for example, that the average EVDO smart phone user will download [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] of data in December 2012, while the average LTE smart phone user will download [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY

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CONFIDENTIAL] of data in December 2012. Based on internal estimates regarding the future mix of LTE and EVDO subscribers, Verizon Wireless can use this estimated difference to adjust the overall usage trend line. These estimates are based on the past behavior of customers and the likely impact of various upgrade offerings Verizon Wireless plans to make in the future.

Migration from EVDO to LTE is relevant to Verizon Wireless network planning because when the total offload becomes greater than the incremental increase in data usage on the EVDO network, total data traffic on the EVDO network will begin to decline. Similarly, the forecast accounts for the introduction of Voice over LTE (“VOLTE”) as an element of LTE traffic volume, as well as its impact on the 1xRTT network, as the technology becomes commercially viable.

These predictions are factored into the base historical usage trend line to form a blended trend line that projects changes to average device usage in each device category. After calculating a historic trend line and applying the above discussed adjustments, Verizon Wireless evaluates the resulting predictions against other, independent industry predictions of network usage growth. Verizon Wireless then passes the overall usage growth estimates along to be incorporated into its patented VPI tool, described below, which creates market- and sector-specific predictions of traffic growth for network planning purposes.

6b. The approach used to develop Verizon Wireless’ traffic growth projections is discussed in response to Request 6a. Once the company derives a nationwide projection regarding traffic growth as described above, it then uses the VPI to translate those traffic growth projections into individual cell site sector-specific projections, informed by sector-specific historical data. Verizon Wireless developed the VPI several years ago to assist the company in projecting

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capacity needs for its 1xRTT and later its EVDO networks. More recently, the company modified the VPI to optimize network planning for the LTE network.

The VPI’s basic approach to assess LTE network capacity needs begins with **[BEGIN HIGHLY CONFIDENTIAL]**

[END

HIGHLY CONFIDENTIAL] The procedures can be described by dividing the process into the following steps.

Step 1— **[BEGIN HIGHLY CONFIDENTIAL]** **[END**

HIGHLY CONFIDENTIAL] The VPI first analyzes **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL] As Mr. Stone noted in his Supplemental Declaration, the VPI analysis focuses on download volumes, because “[c]onsumers generally download greater volumes of information than they upload, and thus spectrum constraints impact download network performance first.” Supp. Stone Dec. at ¶ 20. The VPI uses busy hour traffic because the busy hour dictates peak capacity required in the network, **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY

CONFIDENTIAL]

Step 2— [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL] Next, the VPI adjusts the initial Step 1 projections to [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL]

Step 3— [BEGIN HIGHLY CONFIDENTIAL]

[END HIGHLY CONFIDENTIAL] The VPI then applies [BEGIN

HIGHLY CONFIDENTIAL]

[END HIGHLY

CONFIDENTIAL]

7. *Provide all plans, analyses, and reports discussing the Company's current and projected capacity and bandwidth requirements for:*
- a. *mobile wireless services, including its current and projected number of subscriber connections by device type (traditional handset, iPhone, other smartphone, tablet, laptop or laptop card, mobile Wi-Fi), its subscribers' current and projected voice and data usage, the corresponding covered population, corresponding pricing assumptions, and assumptions regarding how subscribers with multiple devices affect capacity needs; or*
 - b. *services using LTE fixed wireless equipment to bring broadband service to the home, such as the Cantenna device discussed in Paragraph 11 of the Stone Declaration (VZW-SpectrumCo) or the Fusion service discussed in Paragraph 17 of the Stone Supplemental Declaration (Joint Opposition).*

Include the amount and type of spectrum required by the Company to provide these services, including services that would use the LTE network. Include all plans, analyses, and reports discussing how the projected capacity and bandwidth requirements may be affected by the Proposed Transaction or the Agreements.

Verizon Wireless has provided documents responsive to the subsections of this request in the Document Production tagged with, respectively, “7a” and “7b.”

8. *Provide all plans, analyses, and reports discussing CDMA to LTE migration, including Verizon's plans to use or market devices that support both CDMA (1x and EV-DO) and LTE in bands that currently support only CDMA.*

Verizon Wireless has provided documents responsive to this request in the Document Production tagged with “8.”

9. *Paragraph 24 of the Stone Declaration (VZW - SpectrumCo) states that: "Generally speaking, our earlier projections indicated that we would have sufficient spectrum in most areas served by our network until 2015, but that we would need additional capacity in some cell sites in various markets before that*

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year." In addition, Paragraph 25 of the Stone Declaration (VZW - SpectrumCo) states that ". . . we could need additional spectrum in some markets as early as 2013." Paragraphs 30-38 of the Stone Supplemental Declaration (Joint Opposition) provide additional discussion about projected capacity constraints in a number of markets.

- a. Explain these statements in detail, including identifying all markets in which additional spectrum would be needed prior to 2015, which spectrum bands Verizon Wireless presently is using in those markets, and the requisite timeframes for meeting these spectrum needs. Describe assumptions and methodology.*
- b. Provide all documents that address whether Verizon Wireless already has sufficient spectrum to meet its capacity needs until 2015.*
- c. Provide all documents that address whether Verizon Wireless could become capacity constrained in some areas as early as 2013, including how and where such asserted capacity constraints affect Verizon Wireless's current and projected ability to provide mobile wireless services to its customers, with any relevant pricing assumptions.*
- d. Discuss whether, and if so how, such spectrum needs are affected by the Proposed Transaction between Verizon Wireless and the cable companies. Describe assumptions and methodology. Provide all documents discussing how Verizon Wireless's spectrum needs would be affected by the Proposed Transaction.*

Verizon Wireless has provided narrative responses below to Requests 9a and 9d.

Documents responsive to the remaining subsections of this request have been provided in the Document Production tagged with "9b," "9c" or "9d" respectively.

9a. In assessing spectrum need, Verizon Wireless applies a systematic approach that at its core focuses on two key elements: (1) projecting future peak data traffic, examined on a sector-by-sector basis, and (2) identifying whether network capacity, based on spectrum in use, can meet the projected demand on a sector-by-sector basis. Verizon Wireless' response to Request 6, above, addressed the first of these two elements, describing in detail how the company projects future traffic volumes on an individual sector basis. This response explains the second element: how Verizon Wireless applies these traffic projections to LTE network capacity to assess

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spectrum need. It expands on Mr. Stone’s Supplemental Declaration, which examined capacity constraints and spectrum need in 18 markets at year-end 2011, at year-end 2013, and year-end 2015, using maps to show which specific sectors will be spectrum-constrained at those points in time.

It is worth emphasizing that a review of year-end 2013 and year-end 2015 spectrum constraints is merely illustrative of the growing traffic demands and evolving spectrum need faced by the Company. These milestones merely provide a snapshot of the capacity constraints that the LTE network will face at two distinct points in the next few years. The data support the conclusion that growth will outstrip LTE network capacity in many geographic areas in the near-term and in many other areas in the longer term, absent additional spectrum; and the timeframes for reaching that point depend on the varying characteristics and conditions of the network and trends in customer usage in each area.

Verizon Wireless begins its analysis by determining the busy hour average network traffic level that a mature, fully loaded LTE system can support using a 10x10 MHz channel (the 700 MHz spectrum Upper C Block configuration). Based on the company’s expectations, the LTE network using a 10x10 MHz channel can support a busy hour network average of **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]** per cell site sector, the average aggregate sector throughput that Verizon Wireless and its vendors determined during LTE trials would meet the company’s goals for speed, latency and session initiation and connectivity.

Verizon Wireless next converts the per-second speed requirement into a per-hour traffic volume figure. It does this by multiplying the **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL] requirement by the number of seconds in one hour,

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and then dividing the result by 8 to convert the “megabits per second” figure into a total number of “megabytes per hour” (because there are 8 bits in every byte). Thus, Verizon Wireless multiplies **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]** by 60 (to reflect volume over an entire minute) and then again by 60 (to reflect volume over an entire hour), resulting in **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL]. It then divides that figure by 8 to derive a presumed busy-hour volume of roughly **[BEGIN HIGHLY CONFIDENTIAL]**

[END HIGHLY CONFIDENTIAL] – the presumed capacity per hour that each sector can support on a fully loaded LTE system. As described further in the Supplemental Stone Declaration, Verizon Wireless doubles this figure in markets in the eastern United States, where it expects to be provisioning LTE using both 700 MHz and the 10x10 MHz AWS F Block spectrum it holds by **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]**. *See generally* Supp. Stone Dec. at ¶¶ 31-32. Thus, for those areas, Verizon Wireless assumes capacity of **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]**.

Verizon Wireless then compares that figure against the busy-hour demand figures projected on a sector-by-sector basis in the manner described in response to Request 6, exporting the results into MapInfo. Verizon Wireless ran this analysis and produced maps for 18 markets of varying sizes and densities, providing snapshot views of year-end 2011, year-end 2013, and year-end 2015. In each market, the planning tools showed some sectors will become spectrum-constrained by year-end 2013, with even more widespread and significant service degradation by year-end 2015, even with anticipated network enhancements. Of course, with traffic demand

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growing constantly, additional sectors will become spectrum-constrained both before year-end 2013 and throughout 2014 and 2015 and beyond.

The response to Request 3 contains a table that provides the VPI-derived traffic growth projections throughout the Verizon Wireless LTE network for [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] sectors representing [BEGIN HIGHLY CONFIDENTIAL] [END HIGHLY CONFIDENTIAL] cell sites. The table also identifies the spectrum bands in use in these markets. The data show that throughout the LTE network, traffic growth will outstrip capacity as early as 2013 in some areas, absent additional spectrum. Moreover, more and more sectors will become spectrum-constrained throughout 2014 and 2015 as traffic demand continues to soar.

The data contained in the response to Request 3 and the Supplemental Stone Declaration identify the need for spectrum in today's Verizon Wireless LTE markets, not nationwide. This is because the VPI is a real planning tool used to make traffic growth projections that are largely based on historical data usage on sector-by-sector basis, enabling spectrum need assessments at the hyper-local level. It is logical to assume that markets where LTE will be deployed later in 2012 and 2013 will see usage and demand metrics similar to markets where LTE is already deployed. As Mr. Stone observed, "[i]n market after market, the burgeoning customer demands for data and particularly their use of speed-intensive broadband services is driving up traffic on the network." Supp. Stone Dec. at ¶ 38.

9d. The transactions will as a general matter provide Verizon Wireless access to the AWS B Block spectrum – a 10x10 MHz license like the 700 MHz Upper C Block where the LTE network is currently deployed. As demonstrated in the response to Request 9a. above, Verizon Wireless has engineered its LTE network so that a 10x10 MHz configuration enables capacity

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for **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]** per cell site sector with throughput provided at Verizon Wireless' targeted mobile broadband speeds. The Application, the Joint Opposition, the relevant declarations, and the responses herein, all demonstrate the coming capacity constraints and the growing need for spectrum that these transactions help address.

Verizon Wireless, moreover, will be able to put the acquired spectrum to use efficiently in order to address growing spectrum needs. Verizon Wireless currently holds AWS F Block licenses in the eastern part of the United States. The company has taken significant steps toward deployment of this spectrum, and is planning to deploy the AWS F Block in the LTE network **[BEGIN HIGHLY CONFIDENTIAL]** **[END HIGHLY CONFIDENTIAL]**. Because AWS network equipment and user devices will be tuned across the entire AWS-1 band, the company will be able to put to use the spectrum from SpectrumCo and Cox using the same selection of equipment and devices that it has already identified for the F Block deployment.

Notably, while the spectrum involved in these transactions is necessary to help meet the near-term need for more capacity, Verizon Wireless will continue to need additional spectrum, as the demand for and usage of wireless broadband is fully expected to continue to surge in the years ahead. This is why Verizon Wireless has long supported the Government's target of identifying and licensing 500 MHz of additional spectrum for wireless broadband over the next ten years. Allowing secondary markets to ensure that spectrum is put to its highest and best use is a critical part of achieving the Commission's spectrum policy and broadband goals, and approving these transactions would emphasize the Commission's commitment to advancing these goals.

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10. Paragraph 27 of the Stone Declaration (VZW-SpectrumCo) states that Verizon Wireless's 700 MHz Lower Band spectrum "is not as suitable for our LTE capacity requirements [when compared to AWS], because among other factors, the spectrum cannot be deployed as efficiently (or at all) in many markets because of the presence of existing Channel 51 television broadcast operations." Paragraph 49 of Stone's Supplemental Declaration (Joint Opposition) provides additional discussion about the limitations of the Company's Lower 700 MHz Band spectrum.

- a. Provide all documents, from August 17, 2007 (announcement of Auction 73), to present, discussing the basis for the statements in the Stone Declarations.
- b. Provide a list of all markets that are affected by the presence of existing Channel 51 television broadcast operations and the degree and manner in which the provision of wireless service in each of these markets is affected.
- c. Provide all documents that discuss whether Verizon Wireless's Lower 700 MHz Band spectrum can be deployed efficiently for LTE, including deployment relating to: Lower 700 MHz A Block that is affected by Channel 51 operations; ii. Lower 700 MHz A Block that is not affected directly by Channel 51 operations; or iii. Lower 700 MHz B Block.
- d. Provide all plans, reports, and analyses – from August 17, 2007 (announcement of Auction 73), to present – discussing Verizon Wireless's strategy for its Lower 700 MHz Lower Band spectrum, including: all plans or efforts to deploy its Lower 700 MHz A or B Block spectrum; ii. all plans to sell or lease its Lower 700 MHz spectrum holdings; iii. comparisons of the viability of using Lower 700 MHz band spectrum to deploy LTE versus AWS or Upper 700 MHz Band spectrum, particularly in markets that Verizon Wireless has identified in response to Question 9 as needing additional spectrum; iv. any efforts to facilitate mobile wireless or fixed wireless standards that would include Lower A Block; v. any efforts to negotiate with Channel 51 licensees for relocation; vi. assessments of potential interference (or lack thereof) from Channel 51 operations, including in markets that Verizon Wireless has identified in response to Question 9 as needing additional spectrum; vii. whether, and if so how, Verizon Wireless's strategy for its Lower 700 MHz Band spectrum has changed from the time it acquired the spectrum to the present; or viii. how Verizon Wireless's strategy for its Lower 700 MHz Band spectrum would be affected by the Proposed Transaction.

Verizon Wireless has provided documents responsive to the subsections of this request in the Document Production tagged with, respectively, "10a," "10b," "10c" and "10d."

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- 11. Provide all plans, analyses, and reports discussing Verizon Wireless's deployment of its 700 MHz Upper C Block, including its projections of whether, and if so, where and when it would exhaust capacity on this spectrum.***

Verizon Wireless has provided documents responsive to this request in the Document Production tagged with “11.”

- 12. Paragraph 21 of Stone's Supplemental Declaration (Joint Opposition) states a specific projected capacity for a fully loaded cell site sector using 700 MHz C Block spectrum to provide LTE while still maintaining the speeds Verizon Wireless seeks to provide to all 4 consumers in that sector. Provide all documents in which spectral efficiency is calculated and compared for Verizon Wireless's wireless technologies (including, but not limited to EV-DO and LTE). Include all calculations and assumptions that relate spectral efficiency to hourly cell site capacity.***

Verizon Wireless has provided documents responsive to this request in the Document Production tagged with “12.”

- 13. Paragraph 28 of the Stone Declaration states that Verizon Wireless would need to supplement its existing AWS spectrum in the eastern half of the U.S. and add AWS spectrum in many areas of the western half of the U.S. where it currently holds no AWS spectrum, in order to meet customer demand.***
- a. Provide all plans, analyses, and reports discussing Verizon Wireless's plans for offering any service or technology using its existing AWS spectrum, including when and where it would launch any service or network. In particular, include all plans, reports, or analysis describing steps that Verizon Wireless has taken to deploy networks that use its existing AWS licenses.***
 - b. Provide all plans, analyses, and reports discussing Verizon Wireless's projected use of its current AWS licenses, including how and to what extent the Proposed Transaction would affect these plans, capacity needs, and timeframes.***
 - c. Provide all plans, analyses, and reports discussing whether the acquisition of spectrum from SpectrumCo and Cox would allow more consumers to use dataintensive applications and features on Verizon Wireless's network.***

Verizon Wireless has provided documents responsive to the subsections of this request in the Document Production tagged with “13a,” “13b” and “13c.”

- 14. Paragraph 27 of the Stone Declaration states that Verizon Wireless's cellular and PCS licenses are "fully deployed to provide our nationwide CDMA, EV-DO Rev A and lx services, which currently carry the lion's share of our data and SMS traffic***