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Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: WT Docket No. 12-69

Dear Ms. Dortch:

In a series of recent *ex parte* letters, U.S. Cellular and other holders of Lower 700 MHz A Block spectrum (the "A Block holders") take a new approach in arguing that the Commission should take the unprecedented step of overriding the engineering judgments of the international 3GPP standards-setting process and mandate that all Lower 700 MHz providers use devices that support Band 12.[1] Each of these filings repeats the same simplistic argument. They say a Band 12 mandate would be essentially costless, because AT&T (the largest holder of Lower 700 MHz B and C Block licenses) could obtain a full suite of Band 12-capable devices for about "$1,500,000 in a worst-case situation," whereas A Block holders would have to spend "$180 million to $450 million in development costs" to secure a competitive portfolio of "12-15 devices per year."[2]

The A Block holders' cost comparison is exactly backwards. They completely ignore the largest and most important cost of all – *i.e.*, the fact that a Band 12 mandate would expose millions of existing Lower 700 MHz B and C Block *consumers* to harmful interference that would lead to reduced throughput, dropped connections, and degraded service. These consumer harms alone make a Band 12 mandate contrary to the public interest. But the A Block holders' claims would be wrong even if the Commission could ignore the interference concerns. It is the A Block holders that can easily obtain Band 12 variants of existing devices simply by changing out a few dollars' worth of components, and indeed, U.S. Cellular today offers many cutting-edge LTE devices, including the bestselling Samsung Galaxy S III, at competitive prices.

AT&T, by contrast, is already pushing the envelope on how many bands it can accommodate in its devices. Devices today are tightly engineered to achieve the small form factor that consumers desire, and even the smallest change in components can have substantial impacts on form factor and performance. Today's state-of-the-art chipsets support three bands below 1 GHz, but AT&T already must support Band 17 (700 MHz B and C Blocks), Band 5 (800 MHz), and Band 29 (700 MHz D and E Blocks) just to cover its LTE

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[1] *See* Letter from Grant B. Spellmeyer, U.S. Cellular, to Marlene H. Dortch, FCC (Jan. 24, 2013) ("*US Cellular 1/24/13 Ex Parte*"); Letter from Rebecca Murphy Thompson, Competitive Carriers Ass'n, to Marlene H. Dortch, FCC (Jan. 31, 2013) ("*CCA 1/31/13 Ex Parte*"); Letter from Michele C. Farquhar, Counsel to Vulcan Wireless LLC, to Marlene H. Dortch, FCC (Jan. 31, 2013) ("*Vulcan 1/31/13 Ex Parte*").

[2] *US Cellular 1/24/13 Ex Parte* at 2-3.

requirements, plus it must also support its legacy technologies and international roaming. AT&T made a substantial investment to acquire Lower 700 MHz D and E Block licenses, and should have the flexibility to design devices that make productive use of that spectrum. AT&T has no flexibility to accommodate additional sub-1 GHz bands, like Band 12, that it does not use and which offer no benefit to its customers. To the contrary, forcing AT&T to add Band 12 to its devices would require costly compromises that would degrade device performance, increase battery drain, negatively impact the form factor, and deprive customers of international roaming options. And such device changes would have competitive consequences, because many of AT&T's competitors – including Verizon, Sprint, and T-Mobile – are able to meet their LTE capacity needs with fewer band classes (and thus have greater flexibility in designing their devices).

The A Block Holders Ignore the Most Important Cost to Consumers of a Band 12 Mandate – Interference. The A Block holders' "cost-benefit calculus" completely ignores the most important cost of a Band 12 mandate: increased interference for the millions of consumers that currently rely on devices using the Lower 700 MHz B and C Block (Band 17).

The sources of this interference are well-recognized. The Commission's Lower 700 MHz band plan allocated three paired blocks of uplink/downlink spectrum for mobile broadband services – Blocks A, B, and C. On the uplink side (mobile device-to-base station), the A block is immediately adjacent to Channel 51, a high-powered television broadcast. On the downlink side (base station-to-mobile device), the A Block is immediately adjacent to the E Block, which is allocated and authorized for high-powered mobile video transmissions. Because the A Block uplink and downlink bands are immediately adjacent to the high-powered transmissions from Channel 51 and the E block, respectively, devices that support the A block (*i.e.*, devices with Band 12 support) cannot effectively filter the interference from those high powered broadcasts. All of the participants in the Commission's 700 MHz auction understood the challenges associated with deploying an A Block network, and therefore the A Block holders acquired their spectrum rights at much lower prices than bidders for other Lower 700 MHz spectrum.

These interference concerns led the 3GPP international standards-setting organization to establish Band 17, which includes only the B and C blocks. By excluding the 6 MHz A Block, Band 17 has an effective 6 MHz "guard band" between it and interference from Channel 51 and the E Block. These guard bands permit the filters in Band 17 devices to filter interference from Channel 51 and the E Block. Multiple analysts, including Qualcomm,[3] PCTEST, and 7Layers,[4] have performed testing that confirms the 3GPP's

[3] *See, e.g.*, Comments of Qualcomm Inc., at 34-54 (June 1, 2012) (Qualcomm's "testing indicates that signals from Channel 51 could cause harmful reverse intermodulation interference …. to consumer devices seeking to receive on the B and C Blocks," and that "while a Band 17 filter successfully protects against this reverse intermodulation interference, a Band 12 filter does not"); *id*. at 6-18 ("Qualcomm's analysis shows that without a Band 17 filter, such high power operations on [the E Block] could cause both blocking interference and intermodulation interference in mobile devices used by the customers of Lower B and C Block licensees").

engineering judgment that devices open to the A block are subject to harmful interference. These analysts have shown that Channel 51 and E Block signals are strong enough under real world conditions to cause extensive harmful interference for B and C Block consumers throughout large geographic areas, including major urban areas where mobile broadband usage is most intensive. Indeed, the threat of harmful interference is greater than ever today, because DISH Network, which holds most of the nation's E Block licenses, has recently submitted filings indicating its intention to begin high-powered 40-50 kW E Block transmissions in cities across the country.[5]

The proponents of a Band 12 mandate have submitted their own lab tests and field measurements purporting to show that Band 12 devices would adequately protect B and C Block consumers from interference, but those tests have no practical application to real-world conditions. These tests assume, for example, that customers will use their devices only where LTE signals are relatively strong, and only where there are only one or two people in the entire cell attempting to access data at any given time. In the real world, however, customers use their mobile devices everywhere, including in locations farther from a cell site, indoors, and in other locations where LTE signal levels are lower, and there often will be many customers transmitting and receiving data at any given time. As the multiple other tests and analyses submitted in this proceeding have shown, under these common real-world scenarios, interference from Channel 51 and E Block signals will significantly degrade the performance of Band 12-compatible devices.

The A block holders' Channel 51 field tests are equally flawed. The field tests were conducted by driving around a Channel 51 transmitter and measuring the performance of a

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[4] *See, e.g.*, Jeffrey H. Reed and Nishith D. Tripathi, Analysis of the V-COMM Report Estimating the Impact of Channel 51 and E block Interference on Band 12 and Band 17 User Equipment Receivers, at 6, attached to Letter from David L. Lawson, AT&T, to Marlene H. Dortch, FCC (Oct. 3, 2012) ("Reed-Tripathi Oct. 3 Paper") (describing the testing conducted by PCTest and 7Layers); Jeffrey H. Reed and Nishith D. Tripathi, *Supplemental Analysis: Impact of Channel 51 and E block Interference on Band 12 and Band 17 User Equipment Receivers* ("Reed-Tripathi July 16 Paper"), attached to Reply Comments of AT&T Services Inc. (July 16, 2012) ("AT&T Reply Comments") (describing the testing conducted by PCTest and 7Layers).

[5] DISH's partner, Manifest Wireless, L.L.C., has submitted a number of recent filings pursuant to 47 C.F.R. § 27.50(c)(8) to give the Commission 90 days notice that it intends to commence operations in cities such as Washington/Baltimore, Cleveland, Detroit, Jacksonville, FL, Durham, NC and Tuscaloosa, AL at a signal strength of 40 or 50 kW. *See, e.g.*, Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629190 (Jan. 31, 2013) (Washington/Baltimore); Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629208 (Jan. 31, 2013) (Cleveland); Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629166 (Jan. 31, 2013) (Detroit); Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629191 (Jan. 31, 2013) (Jacksonville, FL); Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629175 (Jan. 31, 2013) (Durham, NC); Notification, *Manifest Wireless L.L.C. Application for Modification*, ULS File No. 0005629205 (Jan. 31, 2013) (Tuscaloosa, AL).

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Band 12 device at various points along the way. But the field measurements were obtained in areas located many miles from the Channel 51 transmitters (often 40 miles or more) where Channel 51 signal levels are below those that tend to cause interference. That is like looking for snow by the equator and concluding from its absence that snow does not exist. The field tests were also conducted between 4 a.m. and 6 a.m. when few if any other users were likely attempting to access the network. Moreover, the field test submission discloses only averages of the field test readings, which means that poor performance caused by interference in the few areas where the tests were conducted closer to the Channel 51 transmitter are masked by the large number of test points in areas where Channel 51 signal levels are necessarily very low.

The A Block Holders' Cost Comparison Is Exactly Backwards. Even if the Commission could ignore the harms to consumers from increased interference, the A Block holders' cost comparison is backwards even on its own limited terms.

First, the A Block holders are grossly overstating what it would cost them to obtain Band 12 devices. Indeed, there is a glaring internal inconsistency at the heart of their argument. They claim that all manufacturers have to do to change a Band 17 device to a Band 12 device is switch out the filter and change some software at what they concede is a "minimal" cost.[6] As CCA explains, "[a]ssuming use of standard and non-custom components, *which are currently available in high volume production*, the price difference between a Band 17 device and a device supporting both Band Class 17 and Band Class 12 is approximately $0.20 to $0.60 per device."[7] This concession is fatal to the A Block holders' entire case. If all that is involved is swapping out a couple of pin-compatible components that are already "available in high volume production," then manufacturers could easily make Band 12 variants of Band 17 devices for the A Block holders at the same "minimal" cost.

U.S. Cellular's suggestion that its cost of developing Band 12 devices would range from $15 million to $30 million per device, depending on the manufacturer, is preposterous, as AT&T has confirmed in discussions with device manufacturers.[8] U.S. Cellular claims that these costs include "R&D, mechanical and electrical engineering, industrial design, prototype development, manufacturing and tooling, etc."[9] This estimate obviously assumes that U.S. Cellular and its manufacturing partner would be starting from scratch and designing a completely new device in each and every case. Device manufacturers, however, routinely make *variants* of existing devices for different band classes; the A Block

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[6] *CCA 1/31/13 Ex Parte* at 4.

[7] *Id*. (emphasis added); *see also US Cellular 1/24/13 Ex Parte* at 3 ("[w]e clarified that 'Band 17 Filters and Duplexers' and 'Band 12 (17 capable) Filters and Duplexers' were all components that were less than $1 each").

[8] *See US Cellular 1/24/13 Ex Parte* at 2-3, and Attachment at 5.

[9] *US Cellular 1/24/13 Ex Parte* at 2.

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holders typically would not need to incur the R&D and development costs themselves.[10] As the A Block holders concede, Qualcomm already offers the necessary chipsets, and thus in the vast majority of cases U.S. Cellular and other A Block holders need only make a small investment to obtain Band 12 variants of devices already under development.

This is exactly what we see in the marketplace. U.S. Cellular – which is still the only A Block licensee that has deployed a Band 12 network – offers ten Band 12 LTE devices to its customers, including five smartphones, two wi-fi hotspots, two data cards, and one tablet, from five different manufacturers.[11] Notably, U.S. Cellular offers Band 12 versions of the Samsung Galaxy S III and Galaxy Note II, as well as the Motorola Electrify M (a variant of Verizon's DROID RAZR M).[12] U.S. Cellular clearly believes that it can continue to obtain competitive LTE devices, because it is expanding its LTE network into 3,800 new localities in 2013 to cover 87 percent of its customer base,[13] and it has begun Voice over LTE trials "'with multiple vendors' in the fourth quarter and will continue testing into 2013."[14]

Indeed, as U.S. Cellular's experience shows, a Lower 700 MHz Band 12 mandate would probably have very little impact on the A Block holders' cost of obtaining devices at all. Although U.S. Cellular *could* have sought Band 12 variants of AT&T's Band 17 devices, U.S. Cellular has in fact chosen to pursue devices that are variants of Verizon's Band 13 (Upper 700 MHz) devices.[15] This should not be surprising. AT&T is a GSM carrier, and therefore its devices are designed to "fall back" to GSM both for voice service and for data service whenever the user is outside of LTE coverage. U.S. Cellular, like Verizon and almost all other A Block holders, is a CDMA carrier that requires CDMA fall back in its devices. As U.S. Cellular's actual marketplace behavior confirms, even if the Commission imposes a Lower 700 MHz Band 12 mandate, A Block holders will probably continue to work with manufacturers to obtain variants of Verizon's CDMA-based Band 13 devices, because Qualcomm's chipsets do not support simultaneous voice and data or VoLTE in Band 17 devices that have been modified to support both Band 12 and CDMA (nor, to

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[10] *See, e.g.*, *CCA 1/31/13 Ex Parte* at 3 ("Band 12 components are pin-compatible with existing hardware, and, as a result, require no design adjustments to the end user equipment or any of its constituent parts.").

[11] *See* U.S. Cellular, Cell Phones (4G LTE), http://www.uscellular.com/uscellular/cell-phones/showPhones.jsp?device-category=device-category-smartphone&features=device-feature-4glte; *see also* Comments of AT&T Services Inc., at 11 (June 1, 2012) ("AT&T Comments"); AT&T Reply Comments at 3-4.

[12] *See id*.

[13] Phil Goldstein, *U.S. Cellular to Expand LTE Coverage to 87% of Its Customers in 2013*, Fierce Wireless, Feb. 14, 2013, *available at* http://www.fiercewireless.com/story/us-cellular-expand-lte-coverage-87-its-customers-2013/2013-02-14.

[14] Phil Goldstein, *U.S. Cellular Testing VoLTE, Will Launch 'At Some Point in the Future*,' Fierce Wireless, Dec. 4, 2012, *available at* http://www.fiercewireless.com/story/us-cellular-testing-volte-will-launch-some-point-future/2012-12-04.

[15] *Cf. US Cellular 1/24/13 Ex Parte* at 3, n.2 (claiming that Band 12/17 device is more "logical" and "cost-effective" than converting a Band 13 device to Band 12).

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AT&T's knowledge, has any A Block holder even asked Qualcomm to develop such support).[16]

By contrast, the A Block holders are significantly understating the cost to AT&T of a Band 12 mandate, even putting interference concerns aside. The A Block holders' claim that forcing AT&T to add Band 12 to its devices (to transform them into "Band 12/17" compatible devices) would be near costless to AT&T and its customers is just plain wrong. The mobile devices used by AT&T are not capacious vessels that can easily accommodate additional components. Nor do the chipsets used in these devices have empty ports available to accept Band 12 components. The reality is that AT&T's devices, to achieve the competitive performance and small form factors that customers desire, are extremely tightly packed and are fully utilizing the ports available in the most cutting edge chipsets available today. As Qualcomm put it in a recent submission to the Commission, "[i]t is fair to say that there is no spare space in today's smartphones."[17]

For these reasons, adding Band 12 to AT&T's devices would require significant trade-offs that would adversely impact AT&T's customers and AT&T's competitive position vis-à-vis other providers that would not be forced to fit an unnecessary band into their devices. To begin with, adding Band 12 to a Band 17 device would require the addition of a Band 12 filter to the device and a switch that can switch between the Band 12 and Band 17 filters. Although the switch and filter themselves do not cost very much, adding them to an already tightly constrained device can be quite costly in terms of performance, form factor, and competitiveness. For example, the addition of a switch to a device will necessarily introduce a certain amount of insertion loss that in turn reduces sensitivity, resulting in slower connections for the end user. Increasing the power to make up for the sensitivity loss would put additional drain on the battery, reducing the battery charge and again putting AT&T at a competitive disadvantage relative to other major competitors. In addition, many devices will simply have no room to add components, which means that AT&T must incur the cost of re-engineering the device and potentially having to settle for a larger device (or performance-impacting size reductions in other components). These sorts of device modifications would place AT&T at a competitive disadvantage vis-à-vis competitors that would not be subject to such requirements, which, in turn, would reduce competition (because it would lessen AT&T's ability to put competitive pressure on all other rivals in the marketplace).

Forcing AT&T to include Band 12 in its devices would also use up one of the most valuable resources in a mobile device – a low-band port on the chipset. AT&T already needs more ports than are available in state-of-the-art chipsets. Unlike most of it

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[16] Devices that rely on LTE, UMTS, and GSM capabilities support simultaneous voice and data automatically, because those functionalities were incorporated into the standards. By contrast, devices that combine LTE with CDMA require additional development involving the use of two radios to approximate the same functionality. *See, e.g.*, AT&T Reply Comments at 15 & Reply Declaration of Michael Prise and Jeffrey Howard (attached to AT&T Reply Comments) at ¶¶ 20-25 (July 16, 2012).

[17] Comments of Qualcomm Inc., *Expanding the Economic and Innovative Opportunities of Spectrum Through Incentive Auctions,* GN Docket No. 12-268, at 13 (Jan. 25, 2013).

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competitors, which have aggregated large amounts of spectrum in single bands, AT&T's spectrum is spread across numerous band classes, and thus AT&T needs to use all of the available ports on its chipsets to provide sufficient coverage and capacity for its customers. State-of-the-art chipsets today support three bands below 1 GHz. AT&T already needs these ports to support its current LTE spectrum portfolio, which includes Band 17 (700 MHz B and C Blocks), Band 5 (800 MHz), and Band 29 (700 MHz D and E Blocks). In addition, AT&T must support both its legacy technologies and international bands for seamless international roaming with AT&T's devices. If AT&T had to use one of the limited number of ports in the chipset to support Band 12 – a Band that AT&T does not even use – then AT&T would have to forgo supporting one of its own spectrum bands (in which AT&T has made very significant investments) or international bands that could be used for roaming. AT&T customers would thus either lose coverage or capacity in certain areas in the U.S. or be forced to settle for fewer international roaming options.

In short, the costs of a Band 12 mandate would far outweigh any benefits. A Band 12 mandate would risk massive consumer harms, because it would (1) subject millions of B and C Block consumers to harmful interference; (2) cause substantial disruption and delay both in terms of AT&T's development of devices and the sudden need for a midstream shift of AT&T's customer base to a completely different band class; and (3) force AT&T to make costly compromises in its devices that would reduce performance and put AT&T at a competitive disadvantage while providing no benefit to its customers. And, as the A Block holders' filings confirm, interoperability has nothing to do with *whether* the A Block holders can obtain cutting-edge LTE devices; those providers clearly can and do obtain competitive Band 12 devices today without an interoperability mandate.

Sincerely,

/s/ Joseph P. Marx
Assistant Vice President, AT&T Services Inc.

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