

WHITE PAPER ON UPPER 700 MHz A BLOCK SPECTRUM



DECEMBER 2013

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Overview

To further ongoing efforts to develop a nationwide wireless communications solution for utilities and other critical infrastructure industry (CII) enterprises, the Utilities Telecom Council (UTC) is pleased to provide this White Paper regarding the Upper 700 MHz A Block. While the CII faces a growing demand for spectrum to meet its communications needs, no new spectrum has been allocated to address this problem. Current allocations utilized by CII are congested, scattered among different spectrum bands, and often shared with other spectrum users. We believe that the Upper 700 MHz A Block represents a way for the CII to meet its wireless communication needs and should be carefully considered while still available.

To meet the needs of the CII community, a spectrum band ideally would satisfy a number of key criteria: (i) it would be exclusively dedicated to CII (although CII could share with other services at its option); (ii) it would be available nationwide so that it supports interoperability and economies of scale in the development of innovative, cost-effective CII communications equipment; (iii) it would be situated below 1 GHz to facilitate signal building penetration as well as network coverage in rural areas; (iv) it would be subject to flexible technical rules and provide sufficient bandwidth for a wide range of technologies and applications; and (v) it would be licensed for exclusive use.

UTC believes that the Upper 700 MHz A Block meets all of these critical requirements and recommends consideration of it to help address the CII's longstanding communications needs. Specifically, the Upper 700 MHz A Block

- Would provide an exclusive home for CII communications;
- Is a nationwide block of spectrum;
- Offers superior propagation characteristics (building penetration and rural coverage) relative to other bands;
- Provides additional bandwidth for many CII communications needs (one megahertz paired, or two megahertz total);
- Is governed by flexible service and technical rules which permit a wide range of technologies and applications (e.g., voice, SCADA, telemetry, and other data applications);
- Is directly adjacent to FirstNet's broadband spectrum and therefore can facilitate CII efforts to partner with FirstNet through sharing and interoperability arrangements; and
- Is available for acquisition from the three licensees that hold the A Block nationwide for a reasonable price, without the need for any FCC rulemaking or allocation proceeding.

For these reasons, UTC has signed on to the attached Statement of Principles for the *"Coalition for Wireless Communications Excellence for the Critical Infrastructure Industry"* and encourages other interested parties to do the same.

In the sections below, UTC provides more detailed information regarding the Upper 700 MHz A Block.

1. Upper 700 MHz A Block Spectrum – Frequencies and Licenses

The Upper 700 MHz A Block spectrum consists of 1 MHz paired (2 MHz total) in the Upper 700 MHz band at 757-758 MHz and 787-788 MHz. As shown in Figure 1 below, the A Block is situated between the C Block (licensed to Verizon Wireless) and FirstNet’s public safety broadband spectrum block (which includes the D Block and the original public safety broadband block). The A Block is licensed in 52 major Economic Areas (MEAs) which combined represent a nationwide block of spectrum, covering all 50 States and U.S. Territories. Currently, there are three license holders in the Upper 700 MHz A Block: Access Spectrum, Beach Point Capital, and Columbia Capital. Access Spectrum holds the Upper 700 MHz A Block spectrum in the Midwest, Mountain West, and southern California, while Beach Point Capital holds the rest of the A Block spectrum on the west coast, east coast (other than Washington, DC), and the Great Lakes region. Columbia Capital holds the A Block spectrum in the Washington, D.C. region. (Please see Figure 2.)

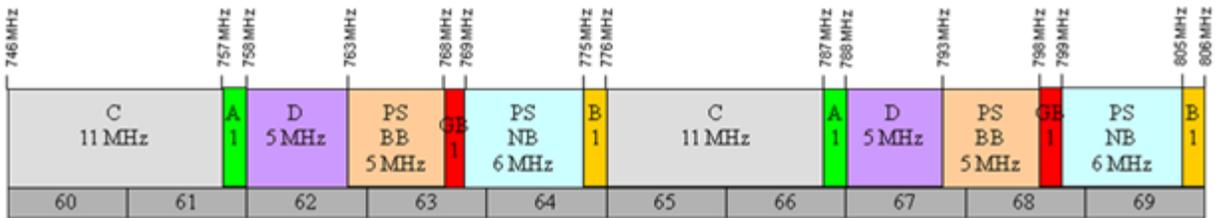


Figure 1: Current Upper 700 MHz Band Configuration

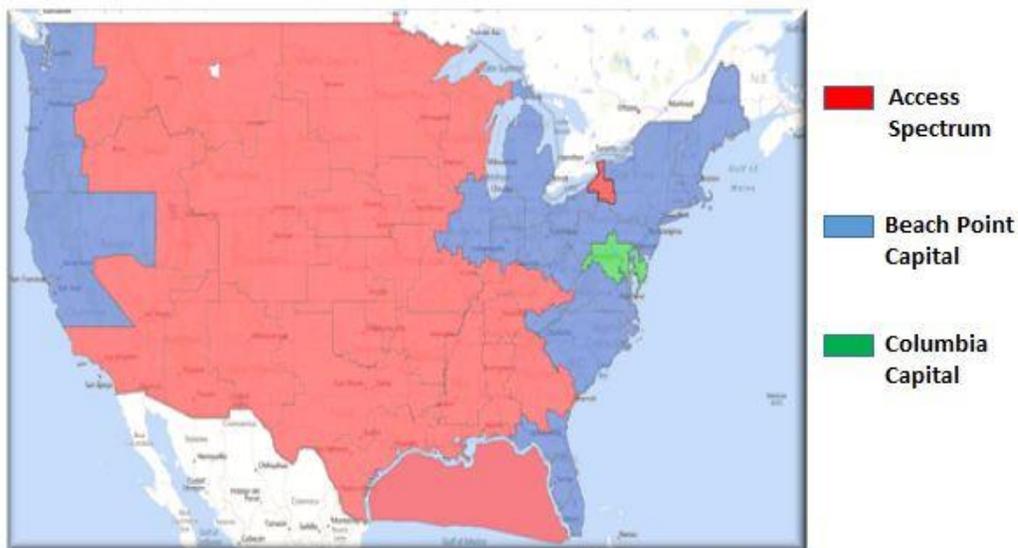


Figure 2: Summary of Upper 700 MHz A Block

2. Regulatory Treatment

Flexible operational rules. Wireless services provided in the Upper 700 MHz A Block spectrum are governed by Part 27 of the Federal Communications Commission's (Commission's or FCC's) rules. As a general matter, the A Block is subject to the same Part 27 flexible technical and operational rules that apply to Verizon Wireless's C Block. Upper 700 MHz A Block licensees are therefore permitted to utilize a wide range of technologies and applications, including voice, SCADA, telemetry, and other data applications.

Not regulated as "guard band." When the Commission established its Part 27 regulatory framework for the Upper 700 MHz A Block in 1999, it treated the A Block as a "guard band" because it was directly adjacent to a spectrum block used for public safety narrowband operations. In 2007, however, the FCC reconfigured the Upper 700 MHz block and relocated the A block so that it is no longer adjacent to public safety narrowband spectrum. As indicated above, the A Block is instead directly adjacent to Verizon Wireless's C Block and FirstNet's broadband spectrum block and *is therefore no longer regulated as "guard band" spectrum.*

Build-out and license renewal. The Commission's Part 27 rules include build-out requirements and license renewal criteria for Upper 700 MHz A Block licensees. Under the Commission's build-out requirements, A Block licensees must demonstrate to the Commission that they are providing "substantial service," which the FCC defines as service which is "sound, favorable and substantially above a level of mediocre service which just might minimally warrant renewal." This requirement must be satisfied by the end of the A Block licensees' license terms, in 2019. The Commission has established a "safe harbor" for satisfying this substantial service test: a license will be renewed if a signal covers 50% of the population in the geographic area covered by the license. Satisfying these build-out requirements is not necessary until the license renewal applications are filed in 2019.

Assuming that an Upper 700 MHz A Block licensee is able to demonstrate substantial service in a given license area, the licensee can reasonably expect the Commission to renew its A Block license. The Commission's Part 27 regulations provide for an "expectancy of renewal" so long as the licensee has satisfied its build-out requirements and has not engaged in any serious violations of the FCC's rules. This expectancy of renewal is the Commission's common standard for wireless licenses. This standard provides considerable certainty to licensees and promotes long-term investment in their licensed facilities.

3. Technical Considerations

Propagation advantages. From a technical perspective, the Upper 700 MHz A Block offers significant advantages. The 700 MHz band (including the Upper 700 MHz band) is often referred to as the spectrum equivalent of "beach-front property" due to its superior propagation characteristics. These propagation characteristics enable broader wireless coverage at lower cost than in other spectrum bands. In addition, the 700 MHz spectrum – formerly used for television analog broadcast signals – is ideal for achieving in-building signal penetration. Signals in the 700 MHz band have longer wavelengths than "higher band" transmissions (*e.g.*, 1900 MHz PCS) and can more easily pass through walls and other obstacles.

Technical flexibility. As indicated above, Upper 700 MHz A Block licensees are subject to the same Part 27 technical rules and interference protections that apply to other portions of the Upper 700 MHz band, including Verizon Wireless's adjacent-band Upper 700 MHz C Block. There are no special restrictions on the A Block related to its adjacency to the public safety broadband spectrum. In 2007, the Commission eliminated a range of technical rules that formerly applied to the A Block, such as a prohibition against cellular architectures and a frequency coordination requirement.

Protection from interference. Like any other wireless licensees, Upper 700 MHz A Block licensees have a right to be protected from harmful interference caused by any entity that is not complying with the Commission's rules. Upper 700 MHz A Block licensees and Verizon Wireless' operations in the adjacent C Block are subject to a range of customary Part 27 technical requirements designed to protect other operators in other spectrum blocks from harmful interference, including power and antenna height limits (47 C.F.R. § 27.50), out-of-band emissions limits (47 C.F.R. § 27.53), and field strength limits (47 C.F.R. § 27.55).

Given these technical rules, it is unlikely that Verizon Wireless' adjacent-band commercial wireless operations will cause harmful interference to operations in the A Block. Verizon Wireless has deployed LTE systems in the C block in geographic areas where the A Block is currently being used by utilities for smart-grid communications. During 2010, there was concern about interference from Verizon's LTE operations to A Block services. Verizon Wireless was very responsive to the concerns, which were investigated promptly and thoroughly. It turned out that the cause of the problem was not Verizon Wireless, but the lack of appropriate filters on the utility communications equipment. Once these filters were installed, the problem was solved. There have been no reported interference concerns in the A Block since then.

In the unlikely event that Verizon Wireless in the future does cause interference to A Block systems, an A Block licensee can file an interference complaint with the Commission. The FCC would investigate this interference, and, if it determines that Verizon Wireless failed to comply with applicable rules, the Commission would take any enforcement action it found appropriate.

Similarly, if an Upper 700 MHz A Block licensee fails to comply with the Commission's technical rules and causes harmful interference to Verizon Wireless' service or another licensee's operations, the A Block licensee would be obligated to remedy this interference. Such interference appears unlikely. Past and current deployments in the A Block have included fairly extensive smart-grid operations in areas where Verizon has deployed LTE facilities. The co-existence of these adjacent-band services, along with engineering analyses, have demonstrated that a range of technologies and systems can be deployed in the A Block in compliance with FCC rules and without causing harmful interference to other licensees.

The same interference protection/resolution rules apply to FirstNet's spectrum, which is also adjacent to the Upper 700 MHz A Block. In fact, in October 2013, the FCC reaffirmed these interference protection rules with respect to FirstNet. FirstNet will be required to comply with the FCC's technical rules and interference requirements like any other FCC licensee.

Technology options – FDD and TDD. The Commission has a policy of encouraging technologies that comply with its rules and do not cause harmful interference to adjacent bands. For instance, while the FCC has not specifically addressed the issue, the Commission’s rules and policies permit the use of either frequency division duplex (“FDD”) or time division duplex (“TDD”) systems in the A Block as long as those systems otherwise comply with the FCC’s existing technical requirements in the band. This is consistent with the Commission’s well-established policy of establishing technical rules for spectrum use that are technology neutral. The FCC’s policy of technology neutrality gives A Block licensees substantial flexibility to choose among a variety of technologies, applications, and services in their licensed spectrum. The flexibility to utilize both TDD and FDD offers CII enterprises and equipment manufacturers a diversity of options in technology and equipment deployment.

Equipment. If the CII makes a commitment to the Upper 700 MHz A Block, we are confident that sufficient equipment will be available to support a variety of technologies and applications. For instance, Access Spectrum is currently working with Full Spectrum, an equipment manufacturer in developing TDD equipment for the A Block. That said, robust “ecosystems” around spectrum bands only really develop once the spectrum licensee announces its use case, and the build-out timeframe is largely driven by how aggressive the spectrum holder is. For instance, when Verizon Wireless acquired the Upper 700 MHz C Block and declared its intent to deploy LTE, a common standard was developed and equipment manufacturers designed and built equipment to meet that need. Similarly, when the railroad industry formed a spectrum consortium to acquire 220 MHz spectrum for its Positive Train Control initiative, a common standard and several equipment options were developed. This example is particularly relevant because the equipment ecosystem developed quickly for the Railroad industry once it was determined that 220 MHz was the intended spectrum frequency for Positive Train Control. We expect a similar ecosystem to develop if the CII industry declares its intent to make the Upper 700 MHz A Block its spectrum home.

4. Transactional Considerations

FCC process. In order for Upper 700 MHz A Block spectrum to be acquired through a private market transaction, the assignment of an A Block license to an acquiring party or parties must be approved by the Commission. Assuming that utilities’ use of this spectrum would be consistent with the Commission’s current rules for the A Block, there would be no need for any FCC auction, allocation, or rulemaking proceedings for this private transaction. The Commission’s process for approving the assignment of such licenses is routine under the expedited procedures the FCC has established for reviewing license assignment and transfer applications. Assuming that an assignment application is unopposed by other parties and does not raise any competition issues, it is likely that the Commission would rule on an assignment application within one to two months from the date this application is filed. If an assignment application were opposed by other parties, FCC approval of the license assignment would still be expected, but the Commission’s review process could take longer.

Price. As the chart below indicates, in two material transactions involving unencumbered 700 MHz spectrum (one public and one private), the spectrum has been valued at more than \$1.00/MHz-pop. These values are in part the result of the acquiring party having a

clear use case. The Upper 700 MHz licensees are willing to sell the Upper 700 MHz A Block for \$0.75/MHz-pop. The reason for this discount is two-fold. First, the licensees do not have a clear use case; this is what the CII provides and something the licensees themselves cannot create like AT&T and Verizon Wireless can. As such, the licensees believe the CII should participate in the value creation that will result from the combination of the licenses with the use case that triggers the development of the ecosystem. Second, we expect the spectrum to be acquired by a consortium of CII enterprises which will make use of the spectrum for its own purposes and then make the remaining spectrum available to other members of the CII. We believe the initial CII enterprises that make the acquisition and establish the use case should be able to re-sell or lease the remaining spectrum at a market value consistent with other 700 MHz transactions, consistent with the structure described below. This approach would reward those entities for making the investment on behalf of the industry.

Major 700 MHz Spectrum Transactions		
Transaction	Date	\$/MHz-pop. (2000 census)
Auction 73	March-08	
- Total 700 MHz (weighted average of all licenses)		\$1.28
AT&T acquires Aloha Partners (Lower 700 MHz)	October-07	\$1.06

Structure. Based on our initial analysis, we are confident that there are potential structuring alternatives that will enable a utility to include the cost of the relevant spectrum in its rate base. For example, a group of utility buyers could purchase or create a jointly-owned investment vehicle (e.g., NewCo LLC or NewCo Inc.) to acquire the spectrum nationwide. Union Pacific and Norfolk Southern did this in 2008 when they created PTC-220, LLC (PTC-220) to acquire nationwide 220 MHz spectrum on behalf of the entire railroad industry for positive train control applications. Today, PTC-220 is a joint venture of the nation’s seven Class I freight railroads and, with its nationwide 220 MHz holdings, it plans to lease spectrum to and support non-member railroads that lack adequate spectrum for PTC purposes.

Alternatively, if some CII enterprises preferred to directly own the spectrum in their service areas, the NewCo could be set up to transfer the spectrum in participating CII enterprises’ service territories to the participating CII enterprises’ preferred ownership vehicles. As the remaining spectrum is sold to others in the CII community, proceeds from those sales could be distributed to the initial utility buying group. There are likely many ways to accommodate individual CII enterprise’s unique needs, and we anticipate these details and related tax consequences being addressed via the operating agreement of the entity created for this spectrum acquisition. UTC looks forward to facilitating this in any manner possible, including by acting as managing member and/or spectrum manager for the buying entity.

Timing. CII enterprises should be aware that this is the only time that a narrowband block of nationwide spectrum has or likely will ever be available for immediate purchase that has both flexible FCC rules and strong propagation characteristics. As indicated above, this

“beachfront” spectrum offers superior propagation characteristics relative to other bands, including building penetration and rural coverage. The Upper 700 MHz licensees are pursuing a variety of uses for this spectrum, with this opportunity being just one potential application. Each alternative use requires a similar process of identifying use cases and securing a commercial arrangement with a buyer able and willing to make this investment. As such, to take advantage of this opportunity, we should pursue this option in as expeditious a manner as possible to reach a final resolution.

5. Technical Applications and Benefits vs. Common Carrier Solutions

Technical applications. Below we identify potential applications for the CII in the Upper 700 MHz A Block. This is only a suggested list and should not be perceived as a complete review of all potential uses of this spectrum. This spectrum band is unencumbered and exclusive with minimal restrictions on usage.

- Power Delivery and Quality
 - Distribution and Substation Automation
 - Fault and Protection Management
 - System Management
 - Forecasting and Demand Response
 - Advanced Metering Infrastructure
 - Emergency Push to Talk Communications
- Customer Engagement
 - Energy Management
- Operations
 - Data Analytics & Business Intelligence
 - Cyber & Physical Security
 - Network, Device & Asset Management
 - Workforce Management
 - Contractor Management
 - Installation and Maintenance Management
- Other
 - Time Stamp
 - GPS
 - Control Channel to access Regional TV White Space

Benefits vs. Common Carrier Solutions. Having an alternative to common carrier solutions through the ownership and exclusive use of spectrum provides many benefits for the CII, including:

- Gaining full control over its technology choices, coverage areas, priority schemes, and technical specifications

- Controlling costs and reducing the need to re-negotiate capacity with the common carriers. This is especially true after the initial capitalized infrastructure is built by the CII enterprises on the 700 MHz band. All future costs would be limited to changes in technologies, license renewal, and maintenance;
- Ensuring that emergency use is exclusive with the highest assurance of an operating network; and
- Controlling all internal cyber-security for systems deployed on the spectrum.

**APPENDIX: “Coalition for Wireless Communications Excellence for the
Critical Infrastructure Industry”**

COALITION FOR WIRELESS COMMUNICATIONS EXCELLENCE FOR THE CRITICAL INFRASTRUCTURE INDUSTRY

STATEMENT OF PRINCIPLES

Creating a Common Nationwide Spectrum Platform Dedicated to Meeting the Interoperable Wireless Communications Needs of Utilities and Other Critical Infrastructure Entities

December 2013

The undersigned parties, through this Coalition for Wireless Communications Excellence for the Critical Infrastructure Industry (the "Coalition"), support the development of a nationwide wireless communications solution for utilities and other critical infrastructure industry enterprises ("CII"), and in furtherance of that goal, have prepared this Statement of Principles.

- 1. *Critical CII communications needs are going unmet.*** The CII faces a growing need for spectrum to meet its communications needs, from supporting voice, data and smart grid applications to safeguarding the cybersecurity and safety of the nation's critical infrastructure. Yet no new spectrum has been allocated to meet these needs, and current allocations are congested, scattered among different spectrum bands, and often shared with other spectrum users. The current situation has left the CII with inadequate spectrum, discouraged innovation, raised equipment costs, and thwarted interoperability.
- 2. *The CII should have exclusive access to a common, nationwide spectrum band that supports interoperable communications.*** To help meet its critical communications needs, the CII should have access to a spectrum block that is:
 - Exclusively dedicated to CII needs;
 - Nationwide, so that it supports interoperability and economies of scale in the development of innovative, cost-effective CII communications equipment;
 - Situated below 1 GHz to facilitate signal building penetration as well as network coverage in rural areas; and
 - Subject to flexible technical rules and provides sufficient bandwidth for a wide range of technologies and applications.
- 3. *A core group of CII enterprises should seek to acquire a nationwide block of spectrum for their own use and make it available to other CII enterprises, thereby being the catalyst for establishing a common, nationwide CII spectrum platform.*** The acquirers (which could include investor-owned and cooperative utilities, critical infrastructure entities, equipment providers, system integrators, and/or industry associations) should seek to acquire a nationwide block of spectrum that meets the objectives described above. The acquirers would own and manage the spectrum for their own and other industry participants' benefit. As part of recouping their investment, the acquirers would charge other enterprises a fee for using the spectrum through resale, lease, or partitioning arrangements. This effort would parallel efforts by the railroad industry to establish a common, nationwide spectrum band dedicated to positive train control and the efforts that established FirstNet to promote a nationwide, interoperable public safety broadband network.

COALITION FOR WIRELESS COMMUNICATIONS EXCELLENCE
FOR THE CRITICAL INFRASTRUCTURE INDUSTRY
STATEMENT OF PRINCIPLES

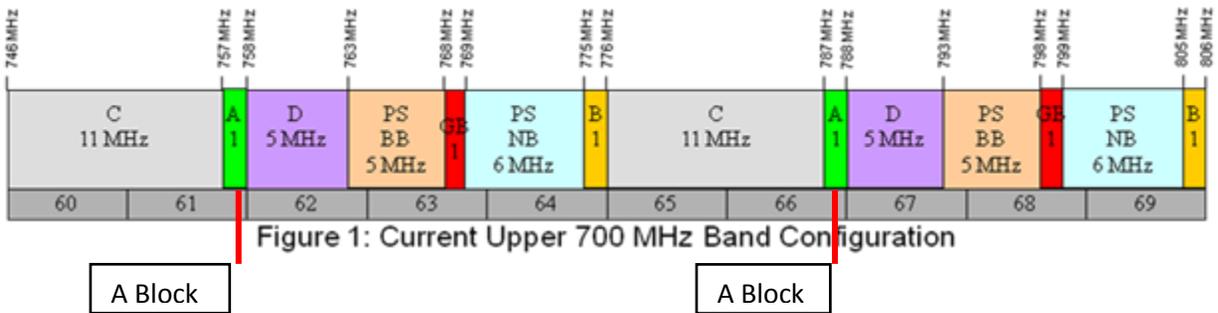
Creating a Common Nationwide Spectrum Platform Dedicated to Meeting the Interoperable Wireless Communications Needs of Utilities and Other Critical Infrastructure Entities

December 2013

4. The Upper 700 MHz A Block offers a unique solution to help meet the CII's communications needs.

The Upper 700 MHz A Block, depicted in the band plan below, would satisfy each of the objectives described in principle 2 and provide other benefits:

- It would provide an exclusive home for CII communications;
- It is a nationwide block of spectrum;
- It is in the 700 MHz band, which offers superior propagation characteristics (building penetration and rural coverage) relative to other bands;
- It provides adequate bandwidth (one megahertz paired, or two megahertz total) and is governed by flexible service and technical rules which permit a wide range of technologies and applications (voice, SCADA, telemetry, and other data applications);
- It will stimulate economies of scale and common standards that are critical in developing innovative, cost-effective, interoperable communications equipment for the CII; and
- *And* the A Block could be acquired *now* in a private market transaction from the three licenses that presently hold the spectrum without the need for any FCC allocation or rulemaking proceedings.



5. Acquiring the Upper 700 MHz A Block will not address all spectrum needs of the CII though it will go a long way towards rationalizing and optimizing their wireless communications needs.

Even with the acquisition of the A Block, the CII will need to continue ongoing efforts to obtain spectrum in a variety of different bands for a variety of uses. No single spectrum band will be adequate to address all of the CII's spectrum needs. But the A Block provides an opportunity for taking action *now* to address many of these needs.

**COALITION FOR WIRELESS COMMUNICATIONS EXCELLENCE
FOR THE CRITICAL INFRASTRUCTURE INDUSTRY**

STATEMENT OF PRINCIPLES

*Creating a Common Nationwide Spectrum Platform Dedicated to Meeting the Interoperable Wireless
Communications Needs of Utilities and Other Critical Infrastructure Entities*

December 2013

The undersigned parties affirm and support the foregoing Statement of Principles:

ACCESS SPECTRUM, LLC

s/ Michael I. Gottdenker

Michael I. Gottdenker

Chairman and CEO

Access Spectrum, LLC

3 Bethesda Metro Center, Suite 500

Bethesda, MD 20814

BPC SPECTRUM CO. LLC

s/ Gary A. Hobart, Managing Director

BPC AS LLC, its manager

c/o Beach Point Capital Management LP

1620 26th Street, Suite 6000

Santa Monica, CA 90404

DOMINION 700, INC.

s/Monish Kundra

President

Dominion 700, Inc.

201 N Union Street # 300

Alexandria, VA 22314

UTILITIES TELECOMMUNICATIONS COUNCIL

Connie E. Durcsak

President & CEO

1129 20th Street, NW

Suite 350

Washington DC 20036

**COALITION FOR WIRELESS COMMUNICATIONS EXCELLENCE
FOR THE CRITICAL INFRASTRUCTURE INDUSTRY**

ADDENDUM

Creating a Common Nationwide Spectrum Platform Dedicated to Meeting the Interoperable Wireless Communications Needs of Utilities and Other Critical Infrastructure Entities

December 2013

The parties' participation in the Coalition and their support and affirmation of the foregoing Statement of Principles (collectively, "Coalition Participation"), are subject to the following:

1. Coalition Participation shall not (i) make any party an agent or fiduciary of another party or create any agency or fiduciary relationship between or among the parties, (ii) constitute an offer or commitment by any party to take any action, including to buy, sell or lease an interest in spectrum, or (iii) create any form of exclusive arrangement between or among the parties.
2. No party may obligate or bind any other Party in any manner or purport to act for or make any offer or commitment on behalf of any other party.
3. Any party is free to withdraw from Coalition Participation at any time without liability to any other party.