The Importance of Lower 700 MHz Interoperability to the Development of the LTE Ecosystem

December 3, 2012

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Summary

- Restoring Interoperability is the key to development of a robust 4G LTE ecosystem which will unleash additional Lower 700 MHz deployment and deliver consumer benefits.
- There are no technical impediments to implementing Band 12 across the Lower 700 MHz band. Every real-world technical study confirms no customer impacting interference.
- The FCC must act quickly to restore Interoperability across Lower 700 MHz networks.

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Small and Regional Carriers Provide Important Consumer Benefits

- A robust competitive marketplace requires the active participation of a variety of carriers – not just national carriers. Following approval of pending transaction with Sprint U.S. Cellular will still provide a competitive alternative for approximately 32 million POPs. A Block license holders – exclusive of Verizon have the potential to address approximately 156 million POPs
- Competition provided by small and regional carriers in many areas of rural America constitutes the sole competitive check on the nations largest carriers. In many markets there are only two effective players – a single national carrier and a single smaller carrier such as U.S. Cellular.
- Carriers like U.S. Cellular have a rich tradition of innovation, risk taking and quality of service which has served customers well and in ways in which larger carriers have failed:
  - Overage Protection – first in the industry now replicated everywhere through "bill shock" commitments
  - Belief Project – no contracts after the first for postpaid customers
  - Battery Swap
  - J.D Power & Associates Award for Call Quality – North Central Region – 14 consecutive periods
  - Back up power to virtually all cell sites which resulted in less than 2% of cell sites in states affected by Superstorm Sandy being off line.
- Without interoperability standards, these carriers will lack the ability to continue to provide meaningful competition to dominant providers in the marketplace.

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Rated Best

Consumer Reports

2011, 2012, and 2013 voted Best Major Wireless Carrier according to a reader survey

14 consecutive awards for network quality in the North Central Region

2011 and 2012 Customer Service Champion

nielsen

Highest call quality and network satisfaction of any national

PC Magazine Readers' Choice Award four times in the last five years

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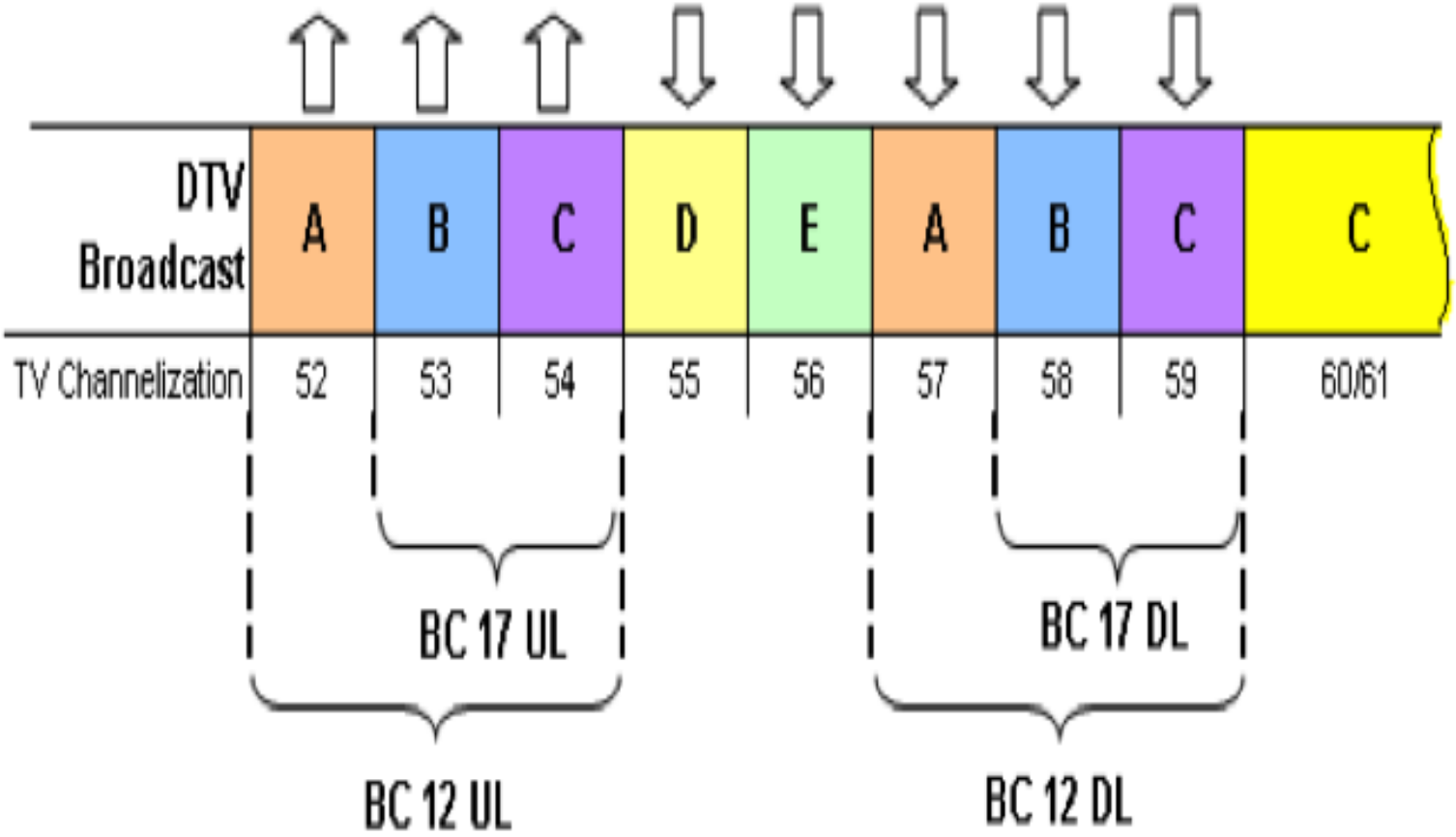
Lower 700 MHz



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LTE Deployment Progress

- U.S. Cellular in partnership with King Street is deploying LTE on Band 12. By the end of 2012,we will have covered 58% of our customer base including Wisconsin, Iowa, Illinois, Missouri, Maine, New Hampshire, Vermont, West Virginia, Virginia, Tennessee, North Carolina, Washington and Oregon.
- Together with King Street, we are the only wireless carrier that has been able to deploy on Band 12 but only with a limited set of devices. To date more than $400 million invested in Band 12 spectrum and more than $250 million in LTE Network Deployment.

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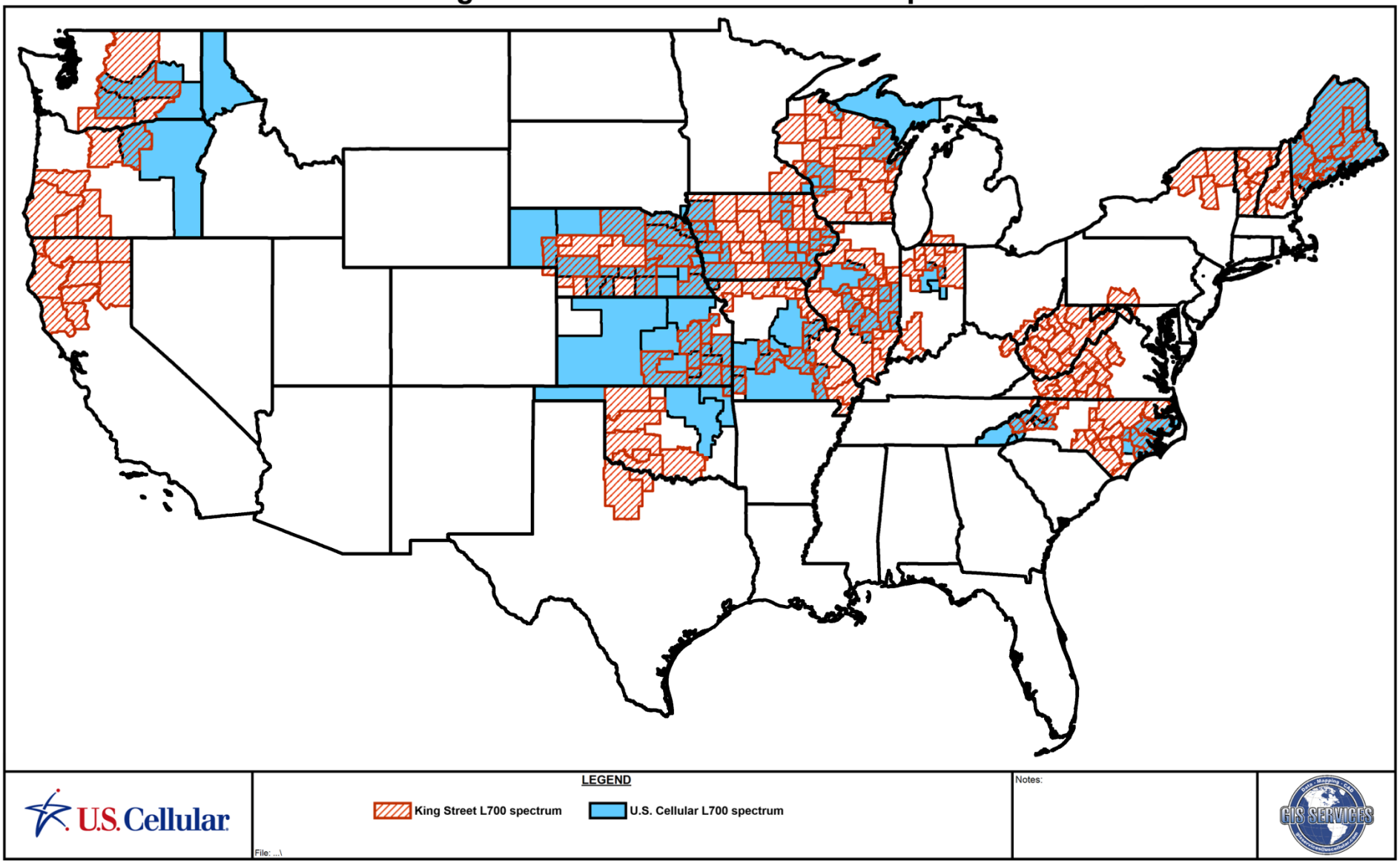
King Street and U.S. Cellular L700 Spectrum



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Current State of the Marketplace

- The lack of interoperability in the Lower 700 MHz Band with the concomitant inability to gain access to Band 12 devices has resulted in substantial network deployment delays, particularly in the rural areas that otherwise would be served by Lower A Block licensees. Over $3 billion in stranded spectrum investment in A Block licenses at a time when carriers desperately need additional spectrum to meet booming data demand.
- The lack of interoperability also has added to Band 12 device costs and significantly diminished diversity of LTE devices available to U.S. Cellular and other Lower A Block licensees, resulting in a limited Band 12 product ecosystem and providing large wireless competitors a commanding head start advantage.
- Access to chipset upgrades that support Band 12 is expected to trail the commercial introduction of the same chipsets to non Band 12 carriers by up to six months causing a significant lag in introducing new smartphones. This is a substantial problem because introducing up-to-date devices is a competitive necessity

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Current State of the Marketplace - Continued

- U.S Cellular continues to face higher costs for LTE product development, and delays of up to 11 months after comparable product introduction by large wireless competitors is not uncommon.

- Several device manufacturers have indicated that due to the lack of scale around the current and near term future demand for Band 12 devices they are unwilling to commit to manufacturing any Band 12 devices or will only consider doing so with substantial volume and/or financial commitments.

- The iPhone 5 (which doesn't include Band 12) illustrates how Band 12 is being increasingly stranded by manufacturers of the most popular smartphones.

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Current State of the Marketplace – Continued

- Absent interoperability, small and regional carriers lack broad roaming capabilities, preventing them from becoming meaningful competitors to the large nationwide carriers.

- During the Commission's *Forum on Future of Wireless Band Plans*, representatives from several device component manufacturers confirmed the current industry practice of meeting the design needs of high volume customers first and in some cases going no further to meet the needs of Band 12 carriers.

- Current LTE devices can only have a limited number of sub 1 GHz bands, thus limiting the ability of Band 12 carriers to have several sub 1 GHz roaming partners.

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700 MHz LTE Smartphone Comparison

Carrier	U.S. Cellular	at&t	verizon wireless
Smartphones	5	25	20
Vendors	2	8	7
Operating Systems	1 (Android)	3 (Android, Windows and iOS)	3 (Android, Windows and iOS)

Data from http://www.phonescoop.com/ as of November 19, 2012

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Public Policy Benefits of Restoring Interoperability

- Consumers would benefit from a diversity of service providers competing based on the features, prices, and service quality.
- Interoperability is essential to promoting economies of scale and alleviating inequities among Lower 700 MHz licensees by enabling the formation of a robust device ecosystem serving all Lower 700 MHz licensees and their customers.
- In the medium term, interoperability aids in the ability to permit consumers to change carriers without having to change out equipment.
- Public safety entities would benefit from a reduced number of separate bands in the Lower 700 MHz. This would allow their devices to support affordable access to as many commercial networks as possible.
- A single Lower 700 MHz band with nationwide scope would benefit all Lower 700 MHz customers because it would promote the diversity and affordability of device roaming to and from networks inside and outside the 700 MHz band.
- Restoring Interoperability removes the inequity created by the creation of Band 17 which occurred **after** carriers had already made substantial investment in Lower A Block Licenses.

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No Technical Impediments to Restoring Interoperability

- Several compelling engineering studies demonstrate that there are no technical impediments to Interoperability.
- The studies show that managing and mitigating the possible reverse intermodulation interference from adjacent DTV Channel 51 operations to Lower B and C Block operations is **not an obstacle** to interoperability. The circumstances where interference might occur would be **extremely rare**.
- The V-Comm Study relies on actual, commercially-available Band 12 and Band 17 devices; laboratory testing; and extensive field measurements. The study demonstrates **conclusively** that the potential for harmful interference due to operating in Band 12, as opposed to Band 17, is **effectively non-existent**.
- Laboratory tests were conducted by V-Comm on commercial devices across various performance scenarios to identify the performance thresholds of receive sensitivity for each device – representing a worst-case baseline for comparison.
- To further validate the conclusive data collected in laboratory testing, extensive field measurements were collected on our commercially-deployed LTE network in Waterloo, Iowa. Field data demonstrates that **the Channel 51 interference scenarios are simply non-existent in commercial deployments**.
- **There are no actual field tests in the record which contravene these real world test results.**

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Our Proposal

The Commission should adopt an interoperability order before the end of 2012 that within six months ("Implementation Date") requires;

- that carriers operating in any portion of the Lower 700 MHz band only provide devices to users from the Implementation Date forward that, (whether designed to operate alone or in combination via carrier aggregation with contiguous or non-contiguous spectrum in other bands), are capable of operating on all paired spectrum in the Lower 700 MHz band;
- and that all mobile networks operating within the Lower 700 MHz band must permit the use of such devices.

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About U.S. Cellular

- Nation's 5th largest postpaid wireless carrier.
- 5.9 million customers across 26 states.
- $4 billion in revenue (2011).
- Parent Company – Telephone & Data Systems, Inc. (Fortune 500).
- LTE deployed to 58% of our customers by year-end 2012.

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About King Street Wireless, L.P.

- King Street Wireless, L.P. currently holds 700 MHz wireless spectrum in 27 states and is partnering with U.S. Cellular to deliver high-speed 4G LTE service to U.S. Cellular's customers in several of the carrier's markets. King Street Wireless is headquartered in Alexandria, Virginia where it is recognized for its involvement in its community both through its economic development and philanthropic efforts. To learn more about King Street Wireless, visit www.kingstreetwireless.com.

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