

# Spectrum Reallocation for Public Safety and Broadband: The 700 MHz Auction

Even a casual observer walking across a U.S. campus recognizes the increasing use of mobile communications. Students leave class and reach for their cell phones. Others connect over wireless networks while sitting in student unions and building lobbies or at outdoor tables. Connectivity seems to be available nearly everywhere. But what often goes unrealized is that this widespread connectivity is based on radio spectrum availability, spectrum assigned by the Federal Communications Commission (FCC). These assignments are used for radio and television broadcasts, two-way radio services, cellular services, and many other communications. Very soon the FCC will auction a large block of spectrum that can be used for public safety, or for additional cellular capacity, or for creating new regional or national wireless services. This auction is important to colleges and universities for three reasons:

1. Spectrum will be available for public-safety use.
2. The additional capacity will allow for growth in the number of users and supported applications.
3. The rules for the auction of these frequencies and their subsequent use could give the user greater control over choice of communication device used and applications running on it.

## Background

For decades, television has held a great deal of radio spectrum for use with delivering analog TV signals. Like many other services, television signals are today rapidly migrating from analog transmis-

sions to digital. The FCC has encouraged this by providing additional spectrum to television broadcasters for use with digital transmission systems. Congress, recognizing the growing importance of spectrum, required the broadcasters to return the analog spectrum to the FCC following the digital conversion. In the Digital Television and Public Safety Act of 2005, Congress set a date of February 17, 2009, for completing this transition. This same act also required the FCC to establish rules and procedures for auctioning the returned spectrum and to begin the auction by January 28, 2008.

The spectrum included in this auction is currently assigned for use by analog TV channels 52–69. The FCC refers to the spectrum used by channels 52–59 as the “lower 700 MHz band” and that used by channels 60–69 as the “upper 700 MHz band.” The upper band has drawn particular interest, since its use will include spectrum for public-safety frequencies and, possibly, a new wireless broadband opportunity. To achieve the greatest public benefit, the FCC will need to find common ground and balance among many competing interests and ideas. For example, a public-safety communications network might best be achieved by dedicating some of the bandwidth solely for such use (roughly the frequencies now used by channels 63, 64, 68, and 69). On the other hand, a public/private partnership with a combined infrastructure built out and usable for commercial purposes but with emergency and public-safety usage always preempting in the designated frequencies could yield a more rapidly deployed, robust infrastructure. National service providers want the spectrum to

be auctioned in large regional sections and large blocks of spectrum, whereas companies providing services in small geographic areas want small sections and small blocks of spectrum.

Through the late spring and early summer of 2007, many in the networking community called for reducing the level of control that cellular carriers can exercise in their spectrum. The media frenzy around the introduction of Apple’s iPhone amplified the awareness of this issue as questions arose over the fact that communication via this device is available only on the AT&T cellular network. Driven in part also by ongoing concerns over net neutrality, some potential bidders and nonprofit organizations sought more openness in the use of the frequencies to be auctioned. Google, for example, called on the FCC to insist on four requirements: open applications, open devices, open services, and open networks.

## Rules and Procedures

In the “Second Report and Order” released by the FCC on July 31, 2007, the commission adopted the rules for how this spectrum will be used and the procedures for the auction, giving particular emphasis to frequencies designated for public safety. In a difficult split decision on the auction rules, the FCC adopted a mix of geographic areas in how various components of the auctioned spectrum could be used, with designations for up to 734 cellular market areas, 17 economic areas, 12 regional economic area groups, and 1 nationwide area. In the upper band, the FCC embraced Google’s first two principles (open applications and open

devices) but not the open services and open networks principles. The upper 700 “D” block will be a national 10 MHz allocation and will include a public/private shared network (expanding available frequency for public-safety use). In a break with traditional spectrum auction rules, bidding for all commercial blocks will be anonymous. Finally, commercial auction winners will have aggressive performance requirements. Licensees in the upper 700 “C” block must cover 40 percent of their license area within four years and 75 percent by the end of the ten-year license.

tion at the network edge, citing the choice and innovation stemming from the FCC’s 1968 *Carterfone* decision. Commissioner Deborah Tate endorsed the public-safety elements of the order but expressed concern about the open-access requirements of the C block. Commissioner Michael Copps reinforced the public-safety portion of the order, acknowledging the needs of first responders following 9/11 and Hurricane Katrina. Although he expressed strong support for the open-access requirements, he was unhappy with the lack of a wholesale requirement

on the C block, a requirement that he felt may have created a “third broadband pipe.” Commissioner Jonathan Adelstein began his statement by applauding the “modest” open-access requirements. Most notably, he expressed doubt that the public/private partnership would succeed. Finally, Commissioner Robert McDowell was the sole commissioner to dissent, in part. He concurred with the public-safety plan of the order, but he dissented with the section that places

open-access restrictions on the C block.

### Why All the Fuss?

This truly feels like a land rush. Most of the current spectrum is already committed, and frequency bands between other allocated portions of the spectrum—the so-called white spaces—are far smaller than those being made available in 700 MHz. (Even so, creative proposals are in the works for the use of the white spaces, an effort supported by FCC Chairman Martin.) The roughly 22 MHz in the upper 700 C block for commercial regional economic area groups translates into approximately 22 Mbps bandwidth. Although higher-frequency ranges have somewhat greater

data-carriage capacity, the 700 MHz range has extremely desirable propagation characteristics, with high permeability and low absorption. Whether used for wireless broadband, emergency service, or other wireless applications, such permeability/absorption properties significantly reduce the cost of network deployment.

Two huge direct benefits could flow from the 700 MHz auction. The 22 MHz in the upper 700 C block could be the basis for a national wireless broadband “third pipe.” The penetration characteristics in the 700 MHz range would enable a national deployment at faster speeds than cable modems and at two orders of magnitude less cost than fiber to every home. In many rural areas, where dial-up (at best) is available, or even in poorer sections of technologically rich cities, this might not be the third pipe but the *only* pipe. What better tool to extend the riches of the Internet to all Americans!

The second potential benefit is in the area of public safety. The inadequacy of the U.S. emergency communication system was apparent on September 11, 2001, and in the aftermath of Hurricane Katrina. Since then, many improvements in durability and interoperability have enhanced the communication tools available to the emergency and public-safety communities. But the spectrum allocated for public safety, and the additional spectrum available for public safety through a public/private partnership, offer a rare opportunity for a clean-slate design of an emergency network on a national scale in a frequency range with superb propagation characteristics.



Although organizations will win the licenses, this spectrum should be used for the benefit of all Americans. The FCC welcomes input and provides contact information on its Web site: <<http://www.fcc.gov/contacts.html>>. In addition, EDUCAUSE will be closely tracking progress and posting developments. We all need to stay informed about, and stay active in, this spectrum reallocation.

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The complexity of the deliberations was emphasized by the thoughtful—indeed, passionate—statements that the commissioners attached to the press release on the auction rules decision. These statements provide valuable, and widely varying, perspectives on how best to ensure competition, promote openness, and create a national public-safety infrastructure. Chairman Kevin Martin began his statement by highlighting the public/private partnership and its importance for public safety. In addition, Martin discussed the open devices and open applications requirements attached to the C block of spectrum and his belief that these requirements will increase innova-