

4G World: The Need For More Spectrum

The wireless industry may run out of spectrum in three years, and it needs government help to find more to realize the promise of mobile broadband.

By Peter Rysavy, [InformationWeek](#)

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[4G World in Chicago](#) this week is highlighting many of the wonders that the fourth-generation of mobile broadband technology is bringing us. But it also bringing to sharp focus the capacity and spectrum issues that are bedeviling the industry.

At the spectrum summit on October 29, Chris Pearson, president of [4G Americas](#) contrasted the mobile industry with the auto industry. The latter is deeply concerned because it only has fifty-four years of proven oil reserves. In contrast, the wireless industry is lucky if it has three years of spectrum resources.

The demand for additional for spectrum-based services is only accelerating. A panelist at the spectrum summit stated, that according to [ByteMobile](#), tablets consume three times more data than smartphones. That's easy to believe with the bigger screens and the longer interaction times users have with tablets.

A common argument made by skeptics of the spectrum crisis, and one made at the spectrum summit, is that the industry is simply not investing sufficiently in infrastructure to increase capacity. The counter from one national operator was that it invested \$20 billion in infrastructure in 2011, and that building out of the crunch is simply not possible -- additional demand can only be addressed through more spectrum. Fortunately, the FCC has been aggressive about its plan for the next major wave of auctions, which are known as The Incentive Auctions. The frequencies in question are in the 600 MHz band, which are currently UHF channels licensed to TV broadcasters. Since only 10% of the population relies on over-the-air television broadcast, it makes sense to make this spectrum available to an industry that is desperate for more capacity.

These incentive auctions were discussed at length at the conference, including with new FCC commissioner Ajit Pai who was thwarted by Hurricane Sandy from attending the conference in person, but participated in a keynote interview by video link.

The good news is that these auctions could provide an additional 60 MHz to 120 MHz of badly-needed spectrum for the industry by 2014. The bad news is that these will be the most

complicated auctions ever held. This stems from a three-step process that will comprise the auction.

In the past the FCC simply reassigned or designated spectrum for commercial mobile use and then conducted an auction. As explained by Ajit Pai, this time, in the first of the three steps, the FCC will first conduct a reverse auction to determine what broadcasters might wish to relinquish their spectrum in exchange for compensation. The amount of compensation will depend on the amount of spectrum the FCC is trying to carve out in each market and how many broadcasters wish to vacate spectrum. It is unclear how many broadcasters and in what markets spectrum will be relinquished. The reverse auction is supposed to provide answers to all these unknowns, making it an unprecedented auction design, and how it will be done exactly is under discussion.

The second step is to completely reorganize and repack the relinquished channels as well as channels needed for broadcasters that want to keep broadcasting so as to make useful blocks of spectrum for mobile broadband. This itself will also be complicated, and is likely to result in varying amounts of spectrum in each market available for auction to commercial operators. In the third and final step, mobile operators will bid for spectrum in a forward auction, similar to past spectrum auctions. As Commissioner Pai said, doing any one of these steps would be a challenge, but "doing them in conjunction will be daunting indeed."

For those who want to wade in the mind-boggling complexity of this process, there is a 205-page [Notice of Proposed Rulemaking](#) released late last month that explains the FCC's proposed process. The 2014 timeline for completing these auctions is thus optimistic, although it is hoped that having an aggressive date will move things along as quickly as possible.

The other big spectrum issue discussed at the conference is spectrum sharing. The idea is that rather than clearing bands used by government applications, government users may share their spectrum with commercial licensees. Such an approach was proposed by the President's Council of Advisors on Science and Technology when it issued a report earlier this year titled, "Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth." Spectrum sharing has become a controversial issue. I have argued [in multiple pieces](#) that making sharing work is going to be extremely complex and time-consuming. Commissioner Pai expressed a similar position when he said that nothing beats clearing.

The band that will get the most immediate scrutiny as possibly ripe for sharing rather than clearing is 1755 MHz to 1780 MHz, currently used by multiple government applications. The mobile industry as well as the FCC wants to see this band paired with 2155 MHz to 2180 MHz, a band already available for mobile. By law, this band must be auctioned by 2015. The government, however, wishes the 1755 MHz to 1780 MHz portion to be shared. Whether this is possible or not is under investigation and nobody yet knows the answer. The lessons learned in this process, however, will provide valuable insight on spectrum sharing in other bands.

Bottom line -- there are no easy spectrum answers. But there is a huge amount of activity trying to address the problem. It is clear that all options -- including advanced technology, more cells, smaller cells, offload and various spectrum approaches -- must be employed to allow the promise of mobile broadband to continue to be realized.

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