How Verizon might kill any hope for LTE interoperability

The technology wars were supposed to be over. The global adoption of LTE as a common 4G technology was going to heal the rift between the CDMA and GSM camps and give U.S. consumers more freedom to switch between carriers, as well as the ability to choose from set of common devices that could work on any network. Well forget it: Verizon's planned sale of its extra LTE spectrum pretty much quashes that dream.

Instead of coalescing around mutually exclusive technologies, U.S. carriers are now coalescing around mutually exclusive spectrum bands; but the result is the same. A Verizon LTE phone won't work on an AT&T LTE network, and vice versa. This was always going to be a problem, but Verizon's proposed fire sale of 700 MHz licenses would essentially codify that rift. If Verizon dumps all of its lower 700 MHz spectrum, it won't share a single similar license with any of the country's other operators, effectively creating its own private band within the 700 MHz airwaves.

That means device makers like Apple will have to design phones that work on Verizon's network and no one else's. That means dozens of carriers who own spectral real estate in the same band won't be able to roam onto Verizon's network. LTE was supposed to change everything, but the industry remains as Balkanized as it always was.

A little bit of background

The 700 MHz band is a truly messed-up patch of the electromagnetic spectrum. It's been sliced and diced into every sort of license and configuration possible. In 2008, Verizon bid on and won at auction what was essentially a nationwide 22 MHz license called the "upper C block," over which it is today

deploying the first phase of its LTE network.

The C-block is a pretty choice chunk of airwaves, but it's also a weird one. Its duplex is reversed, which means that the frequencies normally used for the downlink are used for the uplink and vice versa. That makes C-block a special case that requires special hardware. To build devices that work universally across the 700 MHz band, a device maker would be forced to cram filters and other elements into the device to prevent the disparate parts of the band from interfering with one another: a costly proposition.

But Verizon didn't just pick up the C-block in the 2008 auction, it also picked up a bunch of lower A-and B-block licenses in big and mid-sized cities across the U.S. In the big urban areas — like New York, Los Angeles and Chicago — Verizon needs more capacity to meet the higher mobile broadband demand, and those 12 MHz and 24 MHz chunks were supposed to provide that extra bandwidth. But if Verizon wanted to incorporate those additional LTE airwaves into its network, it would have been forced to go to the extra effort and eat the added expense of sourcing cross-band devices.

Dozens of operators also own spectrum in the those lower 700 MHz airwaves, which means any device Verizon procured to work across its bands would have also worked on their LTE networks as well. But the proposed spectrum sale tosses that scenario out the window. By dumping everything but its core C-block spectrum, Verizon would no longer need to wrestle disparate frequencies into submission. Instead Verizon gets to segregate itself in the upper half of the band, leaving everyone else to their own devices in the lower half.

Verizon has made the calculation that it's easier to buy up friendlier airwaves than try to whip the conflicting halves of the 700 MHz band into shape. That friendlier spectrum happens to be the Advanced Wireless Service (AWS) airwaves at 1700 MHz/1900 MHz that Verizon is buying from the cable operators.

That's why Big Red has made regulatory approval of its cable airwaves buy a condition of its 700 MHz spectrum sale.

The national and tech media has largely portrayed Verizon's proposed fire sale as an concession to the Federal Communications Commission and U.S. Department of Justice in exchange for approving its AWS acquisition for the cable operators. But I think that's hogwash.

Verizon probably had little intention of ever using the lower 700 MHz if it could avoid it. It wanted the frequencies as backup (and to keep it out of its competitors' hands), but now that the cable operators have presented it with a much more marriageable bride in the AWS airwaves, Verizon feels it can trade up to a better class of spectrum.

If the sale goes through, Verizon won't have to play ball with anyone else – its band, its rules.

It gets worse

Verizon isn't the only one trying to carve its own private band. AT&T is trying to separate itself from the rest of rabble in the lower 700 MHz by creating its own band class surrounding the B-and C-block licenses it is using to roll out its own LTE network.

Like Verizon, AT&T has legitimate technical reasons for doing so, the main ones being it would be able to utilize even-funkier parts of the 700 MHz for its new super-LTE scheme and avoid interference problems in the A block. But the end results will be the same: AT&T isolates itself in its own part of the electromagnetic spectrum and everyone else gets shut off from the iPhones and other devices Apple, Samsung and the rest build for its network.

There's a chance that the FCC won't let AT&T's plans fly. There's

also a chance that AT&T will buy up a lot or all of the A-and B-block licenses Verizon plans to sell, which would suddenly give AT&T common cause with every other lower 700 MHz license owner in the country. But as it stands now, we're looking at future of three distinct band classes within 700 MHz, one for Verizon, one for AT&T, and one for everyone else.

If you don't believe me that the implications of this are tremendous, just look at the Apple's new 4G iPad. The CDMA version is designed to work on a single 700 MHz network, Verizon's. The GSM version is designed to work on a single 700 MHz network, AT&T's.