Once-Worthless Radio Waves Get New Life in Spectrum Auction

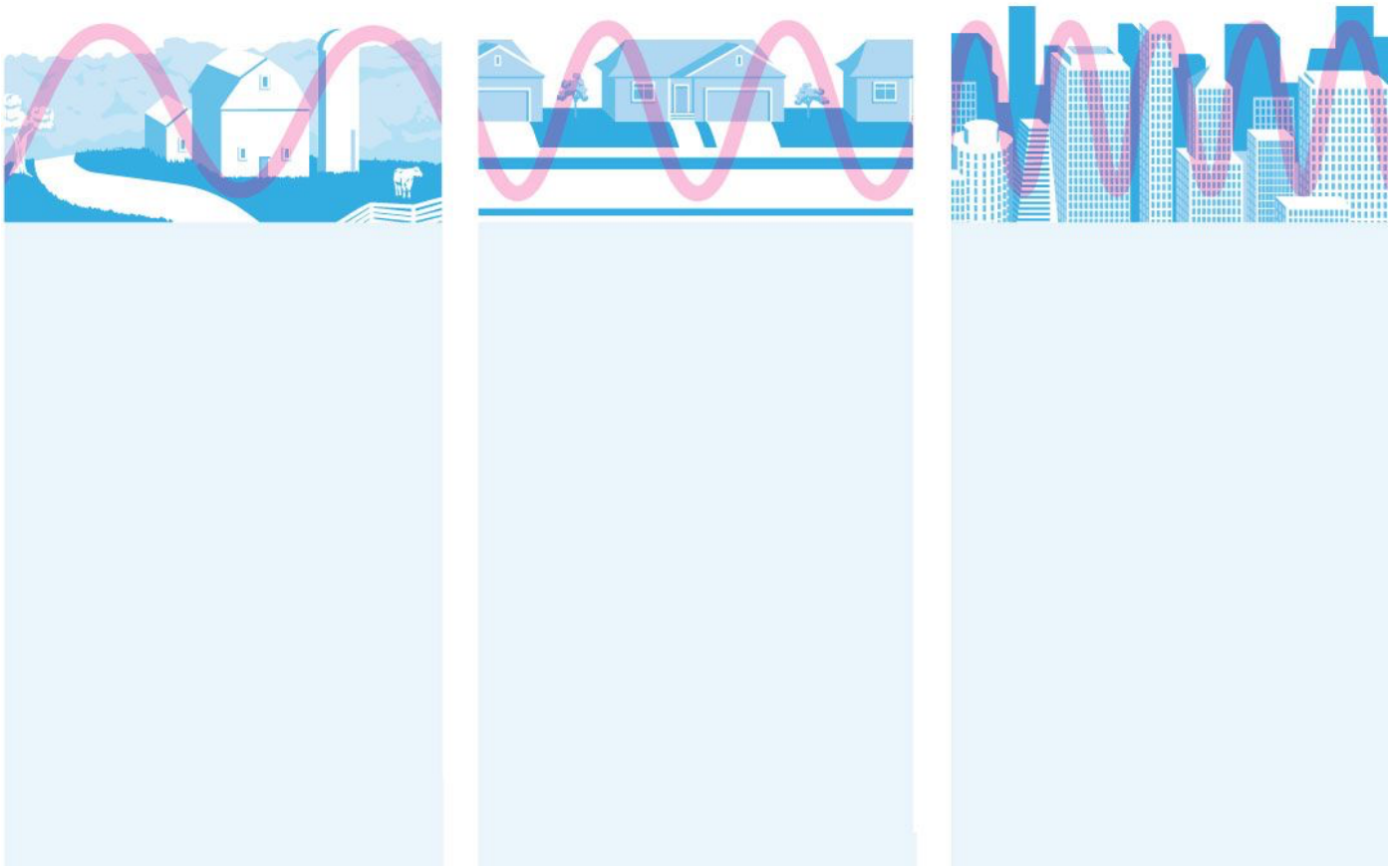
FCC to sell licenses in upper reaches of wireless world, but how useful they are remains to be seen

Drew FitzGerald Nov. 14, 2018 5:30 a.m. ET

Government officials will test that thinking this month by selling some once-barren tracts of that virtual real estate in the upper reaches of the wireless spectrum. How much companies are willing to pay for them remains to be seen.

The Federal Communications Commission will begin the first of two auctions for extremely high-frequency spectrum licenses on Wednesday, raising cash from a type of radio wave once considered useless for wireless service. Recent technological advances have made those frequencies more useful, and officials are counting on the spectrum sales to kick-start the first offerings of fifth-generation, or 5G, wireless service.

Wave of the Future



Mid-band spectrum

Millimeter wave

Low-band

Signals with frequencies above 1 gigahertz help strengthen today's 4G networks by carrying more data. They're often stacked atop low-frequency bands that can't handle dense clusters of customers on their own.

Square one for early cellphone service, these frequencies aren't far removed from TV broadcasts. They're sometimes the only signals providing cellular coverage across rural areas.

Extremely high-frequency wavelengths can carry even more internet traffic but struggle with walls, trees and other obstacles. Early use focuses on urban zones where the signals can strengthen existing cellular capacity or replace

cable service.

Source: WSJ interviews, FCC filings

“The spectrum really is worthless without 5G,” said Jonathan Chaplin, an analyst at New Street Research. Technology that makes signals more precise has changed the equation, he added, making the spectrum “much more valuable.”

Authorities will first auction off licenses around 28 gigahertz and follow it with a second auction for licenses above 24 gigahertz. Both sales will test the market’s appetite for a technology that hasn’t yet been put to commercial use outside a few test cities.

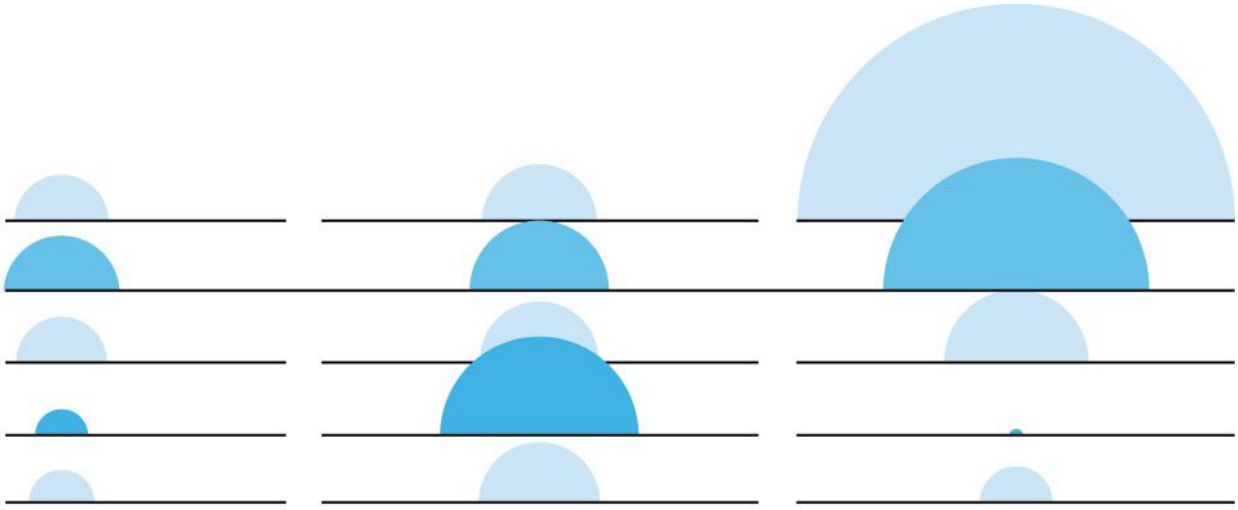
Verizon Communications Inc. already holds most of the licenses in the 28 gigahertz range after agreed last year to spend about $3.1 billion to buy Straight Path Communications Inc., a startup that paid very little to acquire the licenses in the first place. This year’s auctions will allow other companies as well as Verizon to bid for the remaining licenses still held by the government.

The FCC plans to launch three more auctions next year to encourage the use of “millimeter wave” spectrum, so called because its wavelengths are so close together they are measured in millimeters. Such high frequencies allow new radio equipment to squeeze massive amounts of information into a small beam, allowing companies to provide broadband service over the air that is as fast as fiber-optic cable.

“This isn’t spectrum that goes very far,” said AT&T Inc. technology chief Andre Fuetsch. “However, this spectrum, because it’s so much higher in frequency, enables much higher speeds.”

First-Mover Advantage

Two federal auctions will test companies' appetite for millimeter-wave spectrum.



Average national spectrum holdings

Mid-band spectrum

Millimeter wave

Low-band

69

999

46 MHz

Verizon

103

378

72

AT&T

70

41

104

T-Mobile

1

197

14

Sprint

75

22

27

Dish

Note: Holdings include unused and encumbered licenses

Sources: New Street Research

AT&T expects to use its licenses first to provide more-reliable alternatives to Wi-Fi in offices and businesses. The signals also could provide ultrafast downloads in specific urban pockets where people are on the move. Mr. Fuetsch calls it a “Swiss cheese” approach.

Verizon is using its licenses in other patches of the country for small-scale home broadband service. The cellphone carrier says it can use the frequencies to beam internet connections straight through customers’ windows, avoiding the expense and inconvenience of a technician’s home visit.

A crew works with AT&T to install a small cell antenna in New York City. Photo: Thomas Di Fonzo for the Wall Street Journal

Millimeter-wave frequencies have their drawbacks. Walls and trees can block the signals. That forces companies to blanket neighborhoods with clusters of small cellular stations that are both costly and controversial.

There are signs that November's auctions might not live up to the hype created by last year's Straight Path sale. Comcast Corp. and Charter Communications Inc., two cable companies with wireless ambitions, are skipping them.

The U.S. is among the first countries to raise cash by selling millimeter-wave licenses. Other countries are first selling off mid-band spectrum that can also carry videos and other data-heavy applications over the air.

Some companies are waiting for the FCC to auction off mid-band spectrum, but many licenses won't be available until late next year at the earliest. A separate item on the agency's docket to reshuffle spectrum used for satellites could take several years to yield results.

The first two auctions—for 28 gigahertz and 24 gigahertz—could wrap up in a matter of weeks, allowing telecom companies and equipment makers to put more infrastructure on the ground.

Analysts say it is hard to estimate how much cash the spectrum sales will raise because the technology to use it is still young. The last phase of a 2017 auction for television airwaves raised nearly $20 billion. Those licenses were close to others already used for cellular service, so equipment was already available to purchase.

With millimeter wave spectrum, the burden will fall on manufacturers to produce enough cheap equipment to use the airwaves, according to

University of Delaware professor Dennis Prather, a researcher in the field.

“It’s like going to the moon and planting a flag on it,” Mr. Prather said. “There is no technology out there that you can just get and deploy. It has to be developed.”

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