DISRUPTIVE TECHNOLOGIES BRIEFING
January 10, 2019

5G or Not 5G?

Is 5G the next New, New Thing? Apple and Samsung reported horrendous handset sales in Q4, confirming that the 4G LTE handset market is officially saturated. Anyone who wants a spiffy phone has one, and in Q4 they didn't see a need to upgrade. But that may change over the next year or two as US phone carriers begin deploying fifth generation—or 5G—wireless networks. To tap into a 5G network, with its faster speeds and lower latency (i.e., delay), users will need new, upgraded phones.

All of the promise and hype surrounding 5G is on display at this week's Consumer Electronics Show (CES) in Las Vegas. Manufacturers are showing off devices that tap into a 5G network that doesn't exist in most areas of the US. In addition, the 5G technology has some serious quirks that could prevent mass adoption. But trade shows are not staffed by pessimists. So read on to hear about both the good and the bad that 5G purports to offer:

(1) *What the 5G bulls see*. The main benefits of a 5G network are faster speed and lower latency. "Qualcomm, the wireless chip maker, said it had demonstrated peak 5G download speeds of 4.5 gigabits a second, but predicts initial median speeds of about 1.4 gigabits. That translates to roughly 20 times faster than the current 4G experience," a 12/31 *NYT* article reported. So downloading a movie should take 17 seconds with 5G compared to six minutes for 4G.

A 5G network will facilitate more realistic virtual reality (VR) experiences because it will enable wireless headsets and thus more user mobility—i.e., no need for the VR headsets to be tethered to a personal computer. The lack of latency and faster connections will also make automated cars possible and empower the smart home of the future.

Verizon and AT&T have started upgrading their networks. Verizon has rolled out its Verizon Home 5G service in Houston, Indianapolis, Los Angeles, and Sacramento, while AT&T has upgraded its network in Atlanta, Charlotte, Dallas, Houston, Indianapolis, Jacksonville, Louisville, New Orleans, Oklahoma City, Raleigh, San Antonio, and Waco. This year, AT&T will add Las Vegas, Los Angeles, Nashville, Orlando, San Diego, San Francisco, and San Jose to that list.

(2) *What the 5G bears see.* Carriers may have started rolling out their 5G networks, but it will be many years before nationwide coverage is available. In the interim, 5G phones will also need to operate on 4G networks, making the phones bulkier and less energy-efficient.

Verizon will be first to offer a 5G phone by offering a device that will attach to the back of Motorola's Z3, a 4G phone. A 1/8 *FierceWireless* article anticipated the phone's arrival in the next month or so. Verizon and AT&T also have plans to offer 5G phones from Samsung later this year. Apple, however, plans to wait until 2020 before rolling out a 5G phone.

Until its phones are developed, AT&T is offering "a 5G mobile hotspot via Netgear's Nighthawk, and free data for up to 90 days. Data will cost $70 a month for 15GB thereafter," a 12/20 article in

Tom's Guide explained. The Nighthawk works on both 4G LTE and 5G networks.

5G does have some drawbacks, including "worse penetration, smaller range, and more susceptibility to weather when compared to [4G] LTE. A [5G] signal can be blocked by your hand, a tree, a building and even rain or fog," concluded a 12/20 article in *Ars Technica*. As a result, 5G networks will need to have more towers and many more antennas. That could limit 5G rollouts to urban areas.

5G phones will have drawbacks as well. 5G phones will need to include more hardware, including a modem and extra antennas. The 5G phones will be more complex and require more power, but the extra hardware in the phones means there will be less space for a battery. The additional hardware needed may also make the phones more expensive, by $200-$300, according to an estimate by OnePlus. As the technology improves, these negatives will likely be reduced, if not overcome.

(3) *Implementation*. Verizon's CEO Hans Vestberg gave a number of examples of how 5G will change our world in his keynote address at CES on Tuesday. At last year's Indianapolis 500, Verizon put a driver in a car that had blacked-out windows and told him to drive the track fast, according to Vestberg's prepared remarks. The driver wore a 5G head cam that allowed him to "see" the track and with much less latency versus a 4G product.

Vestberg said the Verizon 5G network "will support one million connected devices per square kilometer. By comparison, 4G enables connection of maybe 100,000 devices per square kilometer. That increase has all kinds of amazing implications including the emergence of meaningful device-to-device connectivity, a true Internet of Things."

Verizon plans to connect 1 million drones to its 5G network through a company it owns, Skyward. The company's clients use drones for safety inspections when lines of sight from land are obstructed. Low-latency 5G is also expected to be used by the medical profession. Low-latency wireless AR glasses could enable a doctor to look at both a patient's CT scan and the patient at the same time, allowing a procedure to be done more carefully and precisely.

(4) *Carriers vs equipment companies*. Verizon and AT&T are the sole members of the S&P 500 Integrated Telecommunication Services industry, which has risen 6.6% ytd and has lost only 4.9% y/y as of Tuesday's close (*Fig. 1*). That's a far sight better than the performance of the S&P 500 Technology Hardware, Storage & Peripherals industry, which has fallen 3.6% ytd and 13.9% y/y (*Fig. 2*).

The Integrated Telecommunication Services industry is forecast to have revenue growth of 5.1% this year and earnings growth of only 1.4% (*Fig. 3* and *Fig. 4*). The industry's forward P/E has fallen to 9.8, down from 13.0 a year ago (*Fig. 5*).

Meanwhile, analysts expect the Technology Hardware, Storage & Peripherals industry will see revenue decline by 1.0% this year and earnings rise only 0.7% (*Fig. 6* and *Fig. 7*). The industry's forward P/E stands at 11.6, down from 14.0 a year ago (*Fig. 8*).

Ed Yardeni, President & Chief Investment Strategist, 516-972-7683
Debbie Johnson, Chief Economist, 480-664-1333
Joe Abbott, Chief Quantitative Strategist, 732-497-5306
Melissa Tagg, Director of Research Projects & Operations, 516-782-9967
Mali Quintana, Senior Economist, 480-664-1333
Jackie Doherty, Contributing Editor, 917-328-6848
Valerie de la Rue, Director of Institutional Sales, 516-277-2432
Mary Fanslau, Manager of Client Services, 480-664-1333
Sandy Cohan, Senior Editor, 570-775-6823