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Buy-rated companies mentioned in this report (SFL indicates companies on the Edward Jones Stock Focus List, and CSFL indicates companies on the Canadian Stock Focus List):

- **Alphabet** (GOOGL - \$1,473.30) - SFL, CSFL
- **American Tower** (AMT - \$260.17) - SFL
- **Amphenol** (APH - \$108.42) - SFL
- **AT&T** (T - \$30.01)
- **BCE** (BCE.TO - \$56.88)
- **Broadcom** (AVGO - \$328.39)
- **Cisco Systems** (CSCO - \$47.67)
- **Keysight Technologies** (KEYS - \$100.30)
- **Telus** (T.TO - \$23.94) - CSFL
- **Texas Instruments** (TXN - \$132.23) - SFL
- **Verizon** (VZ - \$57.91) - SFL, CSFL

Prices and opinion ratings as of market close on 8/4/20 and subject to change.

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Investment Summary

Wireless service providers throughout the world have started migrating their networks to fifth-generation (5G) technology. 5G technology promises to offer faster data speeds, greater network capacity, and quicker responses to user queries. We anticipate that 5G can enable a number of emerging technologies, such as driverless vehicles, intelligent manufacturing, remote health care monitoring, and augmented reality. We will identify several companies in the technology and communication services sectors that may participate in and see some benefit from the implementation of 5G wireless networks. We would note, however, that participating in the 5G upgrade is not necessarily a blueprint for a stock's success, as these companies generally operate diversified businesses.

5G rollout will require significant time and investment

We believe that the 5G network implementation will take several years before the technology is widely available. Wireless carriers are currently upgrading their networks to offer 5G, but service will in most cases run on low- and mid-range radio frequencies that will not enable significantly faster connections than current 4G networks. Technology that enables the fastest speeds on higher frequencies will take much longer to deploy. We expect that the availability of much faster speeds will initially be limited to densely populated urban areas or areas with heavy user traffic, such as sports and entertainment venues.

The high radio frequencies that enable the fastest 5G speeds do not allow a signal to travel very far from a cellular antenna to a user. As a result, a much greater number of small-radius cells will be needed in a given area, which will require time and investment. An example of a small cell is shown in **Figure 1** on the next page. We estimate that 5G will also require upgrades to the core network, which connects cell sites to each other, as well as capacity upgrades, driving demand for fiber-optic, data-switching and routing equipment.

Build it and they will come

We anticipate that the new applications enabled by 5G technology will not be fully realized until the network has been at least partially built and software developers are able to experiment with how to best take advantage of the higher speeds and faster response times enabled by 5G. At this stage, it is difficult to accurately identify what the "killer apps" will be that drive adoption and value creation. However, driverless vehicles, virtual-reality gaming, and augmented-reality headsets to enable on-the-job training and work-process assistance are leading concepts.

Figure 1 - Typical small cell

Source: Crown Castle International Corp.

5G value likely outside the consumer market

We believe that more of the value enabled by 5G could be realized by businesses rather than consumers. We don't think that consumers will be willing to pay a significant premium for 5G cell-phone service. In contrast, a business that is reliant on shipping or delivery by truck could realize significant cost benefits from driverless trucks. Similarly, businesses may realize increased productivity from workers who are able to use augmented reality technology to help guide them while making complicated repairs to machinery. We feel that 5G growth will not only be driven by revenue from providing the wireless connections but also from providing the enabling services and applications. We additionally see an opportunity for business consulting and technology implementation services related to 5G applications.

Companies that may benefit from 5G

We have identified several Buy-rated companies that may benefit from implementation of 5G networks. Within the technology sector, we feel that Broadcom (AVGO) will benefit from chips that are used in wireless infrastructure and handsets, as well as chips that are needed in the network core. We anticipate that Texas Instruments (TXN) will benefit from sales of its analog semiconductors into wireless infrastructure as well as the core network. In addition, we believe that Amphenol (APH) will see growth from sales of electronic and fiber-optic components into wireless infrastructure and the core network. Cisco Systems (CSCO) could benefit when increases in 5G data traffic cause wireless carriers to upgrade data switches and routers in their core networks. Keysight Technologies (KEYS) is a leader in 5G test solutions. Its equipment and software are sold to both service

providers and equipment vendors to design, activate and optimize 5G wireless networks.

In the communication services sector, we anticipate that Verizon (VZ) will be well-positioned to offer 5G services because it is aggressively building its 5G network. We believe that AT&T (T) will also benefit from 5G, although its business is more diversified than Verizon's, so 5G may have less of an impact on AT&T's overall results. In Canada, BCE (BCE.TO) and Telus (T.TO) will be introducing 5G services, although we expect the 5G build in Canada to lag about a year behind the U.S. implementation. We believe Google's parent company Alphabet (GOOGL) could benefit from 5G due to its significant investment in developing driverless-vehicle technology. We anticipate that American Tower (AMT) will benefit because service providers throughout the world will need to add 5G equipment at wireless tower sites. However, we note that all of these companies have exposure to a number of markets besides 5G, so results can be impacted by changes in other parts of their businesses.

Attractive valuations for recommended stocks

We believe that our Buy-recommended stocks trade at an attractive price-to-earnings ratio relative to their growth outlooks and historical valuations. We also conduct a discounted cash flow analysis that takes into account a present value of the estimated future free cash flow that these companies can generate, and these stocks look attractive on this basis. For communication services stocks, we consider a valuation based on a ratio of enterprise value to EBITDA (earnings before interest, taxes, depreciation and amortization). We believe our recommended stocks are attractive on this basis as well.

Risks

We feel that stocks in the technology sector face a number of risks, including markets that are highly competitive, a rapid pace of technological change, sensitivity to economic cycles, and share prices that tend to be more volatile than the overall market. We believe that stocks in the communication services sector also face numerous risks, including highly competitive markets, a high level of regulatory and political scrutiny, significant capital investments to remain competitive, and rising interest rates that can cause telecom stocks to react negatively.

Conclusion

We estimate that the implementation of 5G wireless networks will occur over a multiyear period that is currently in the early stages. We believe this period will extend for at least five years in the U.S. and

likely even longer in international markets. We have identified several companies that we believe will see some benefit from 5G, but these companies have diverse operations that will also be impacted by markets and factors unrelated to 5G.

Please see the full opinions of the individual companies mentioned in this report for additional information, including valuation and risks.

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