

5G Technology

Opportunities for Investments?

Ed Jennings
November 12, 2019

1

5G Advertisements



2

1G, 2G, 3G, 4G, 5G, What is the Difference?

- 1G = 1980. The rise of Motorola Phones.
- Phone only.
- Speed 2.4 Kbps or Kilo bits per second. 2.4 Kilobits is 2,400 bits per second.



3

2G or Second Generation. The Rise of Nokia.

- 2G = 1991 in Finland, home of Nokia
- Speed = 50 Kbps or 50,000 bits per second.
- Killer application = texting



4

3G the Rise of the Blackberry Personal Digital Assistant

- 3G = 1998
- Speed = 2 Mbps (Million bits per second)
- 1.3 megapixel camera; logon to AOL; short video clips, calendar.



5

4G The Rise of Apple

- 4G = 2008
- Speed = 1 Gigabit/second = 1 million kilobits per second = 1,000 megabits per second.
- First iPhone introduced January 9, 2007
- Video, download movies, games, video conferencing.



6

5G The Rise of Realtime Communication

- 5G = Late 2019 / Early 2020. Testing in select cities now.
- Speed = 20 gigabits per second or 20 times faster than 4G

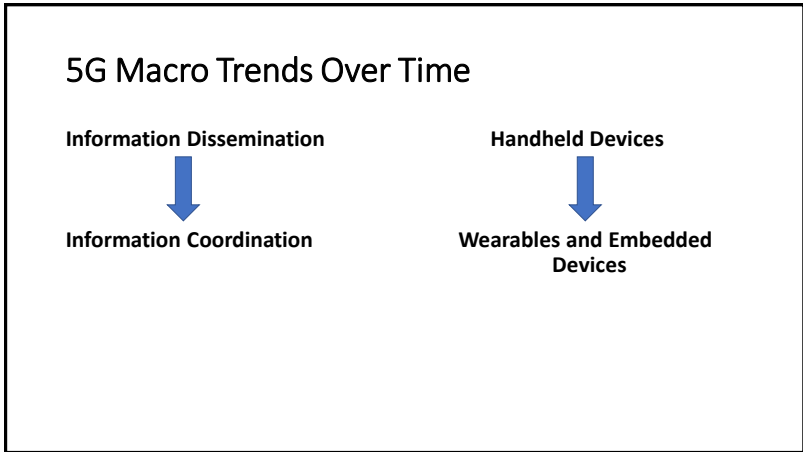


7

How Fast is 5G Really?

- With a speed of 5G, you can download 3 HD movies in just one second.
- If you are a music lover, you would be able to download approximately 1,250 songs in a second.
- For all the collectors, who are in love with their HD wallpapers, with 5G you can download nearly 2,000 HD images in a second.
- With 5G you can also go for uninterrupted voice over Internet protocol (VoIP) on your smartphone.

8



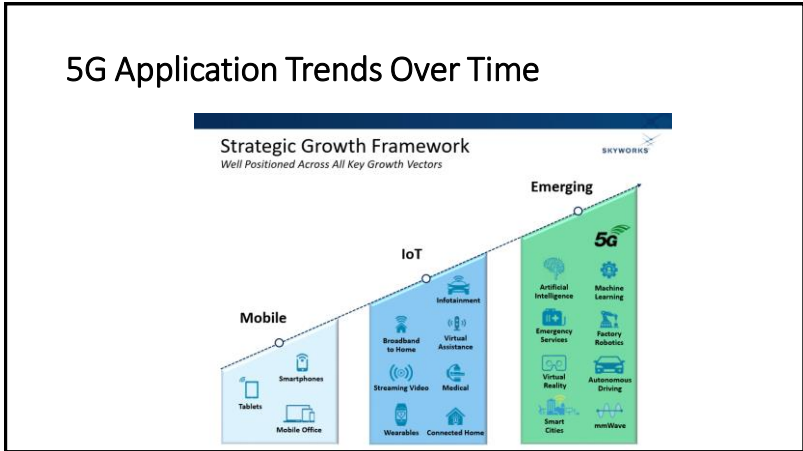
9

5G Usage Profile

There will be winners in all these areas

- **General population spread over wide areas:**
Low Power – Many Devices
- **Densely Populated Cities:**
High Speed Data Transfer
- **Outdoors:**
Device Control and Automation. High Reliability

10



11

How Does 5G Relate to Stocks?

- \$200B was invested in 4G
- 5G = \$400-\$500B
- McKinsey estimates Internet of Things alone will generate \$11T per year, to the world economy.
- **Winners in 5G Deployment?:**
- **Motley Fool says:** Skyworks Solutions (SWKS)=chips, Corning (GLW)=backbone optical fiber, Verizon (VZ)=Wireless network.

12

Continued: Winners in 5G Deployment?

- **Investor Place says:** Intel (INTC) chips; Nokia (NOK) cell sites; Cisco (CSCO) Routers; AT&T (T) Network; Apple (AAPL) Services.
- **Seeking Alpha says:** Nokia (NOK); Ericsson (ERIC); Qualcomm (Qcom); Skyworks (SWKS); Apple (AAPL); Samsung (SMSN)=A.I.; Netflix (NFLX)
- **Forbes says:** Xilinx (XLNX) Field Programmable Gate Arrays
- **Market Watch says:** Qualcomm (QCOM); Intel (INTC); Ericsson (ERIC)
- **Zacks says:** Cisco (CSCO); Skyworks (SWKS); Qualcomm (QCOM); AT&T (T); Verizon (VZ); Intel (INTC); Qorvo (QRVO).
- **Kiplinger says:** Vodafone (VOD); Cisco (CSCO); Nokia (NOK); Qualcomm (QCOM); Verizon (VZ); AT&T (T); Ericsson (ERIC).

13

Ed's Thoughts on Winners and Losers

- Phase 1 – **Cellular Tower Manufacturers** (Huawei / Nokia / Ericsson)
I would not invest – Experiencing higher costs, price competition is hurting margins and deployment.
- Phase 1 – **Cellular Real Estate Tower Brokers** (SBA Communication / American Tower / Crown Castle)
I would not invest – Low PE's are 70. These are REIT's. There are lots of REIT's to invest in.
- Phase 1 – **Service Providers** (Verizon / ATT / T-Mobile)
Verizon and ATT are overpriced. T-Mobile is interesting. You have to build a scenario where the Sprint merger goes through; The CEO leaves and goes to WeWork but a better CEO takes his place; and growth can hit double digits. Keep it on your watch list.
- Phase 1 – **Chips and Antennas** (Qualcomm and Skyworks)
Qualcomm has a lot of 5G patents and just signed a deal with Apple. However, the SSG looks like a roller coaster and the stock seems to be overpriced. Skyworks is a stock I own and bought in the low \$70's. Q4 results came out today. (sales / earnings miss) I am still high on this stock if the stock can be purchased in the mid to low \$80's on a pull back. Keep it on your watch list.
- Phase 2 – This will be "wireless broadband to the home"; "wearable devices"; Virtual Assistants coupled with Augmented Reality". These companies are likely to be Apple, Amazon, Facebook, Broadband Suppliers, Samsung, and Google. Look for new entrants.
- Phase 3 – This will be Autonomous Driving, Artificial Intelligence, in which large amounts of data are collected, analyzed and used to make real-time decisions. Industry examples: Driverless Cars, Cloud Data Centers, Predictive Maintenance, Traffic Control. Look for the industry leaders.

14

What Are Other Ways to Augment Our List?

- After looking at the stocks being recommended, are there obvious stocks missing? Who are the new leaders for wearable and embedded devices as part of the Internet of Things (IoT)?
- Look at the suppliers of the recommended stocks. For example, I found Skyworks originally because they were a supplier to Apple and the price of Apple was too high at the time.
- While Qualcomm is mentioned heavily in the recommended winners, they were previously in a lawsuit with Apple and the FTC for unfair trade practices. Be aware of recent news and new competitors.

15

Summary: Finding emerging stocks not on everyone's radar is challenging.

- Look for changes in consumer (B2C) and business (B2B) behavior.
- How is our economy changing?
- What jobs are being added or eliminated?
- How much competition is out there for a given market?
- What new technologies are emerging? Who will be the leaders?
- Will government regulation hurt or help certain businesses?
- Sometimes the SSG does not reflect an existing company, who is about to move into a new high growth market.

16

Contact Me

- **Join me on LinkedIn**

www.linkedin.com/in/ed-jennings/

- **Questions or Comments? Email Me:**

ed@edjennings.com

17