

## 程序代写代做 CS编程辅导

*COMP9336 Mobile Data Networking*  
*[www.cse.unsw.edu.au/~cs9336](http://www.cse.unsw.edu.au/~cs9336) or ~cs4336*  
*linked to Moodle*



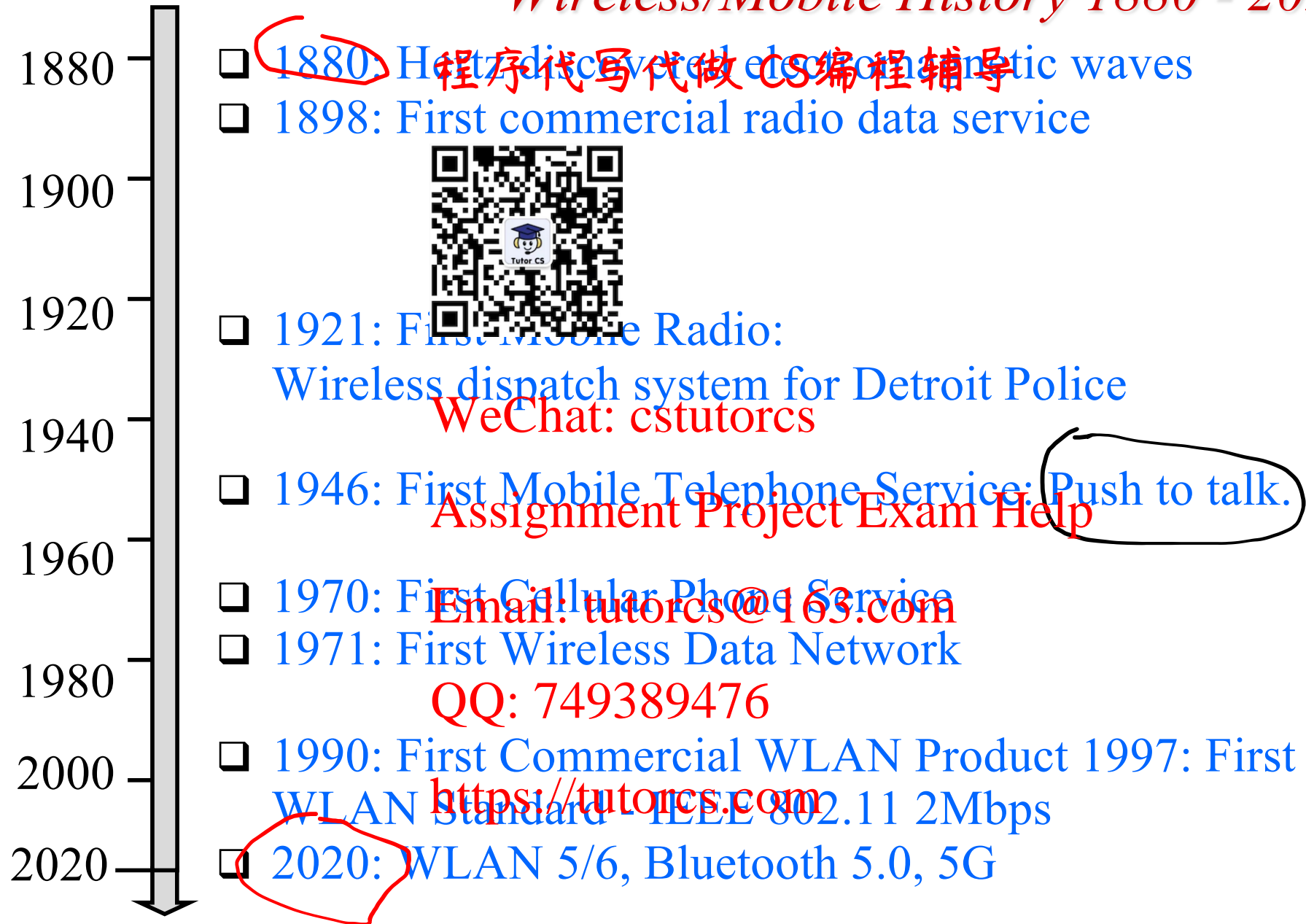
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*Trends*  
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# Wireless/Mobile History 1880 - 2020



# Access is all wireless

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- Wireless, in the context of WiFi, started in 1999.
  - First it was a niche technology
  - Now it is standard in all computing devices
- Most of the access (end user connectivity) is wireless
- Mobile phones, tablets have multiple wireless technologies: WiFi, Bluetooth, Cellular, but *no wired connectivity*



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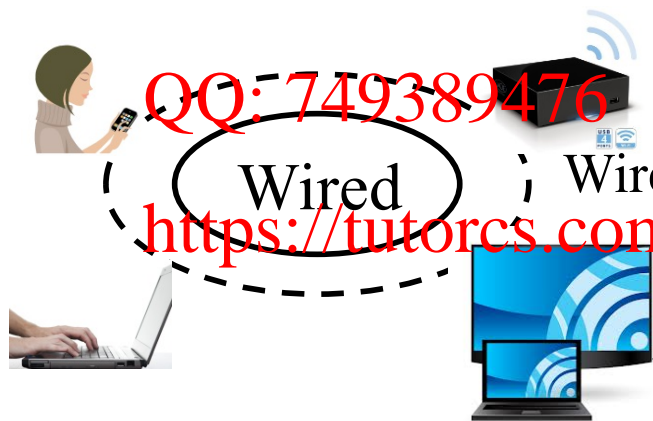
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Wired  
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Wireless storage

Wireless Display



# Most Revenue in Wireless

- US Wireless industry at \$195.5 billion ≥ publishing, agriculture, hotels and air transportation, and motion picture and recording.
- Wireless industry directly provides more than 2.6% of all US employment
- Wireless revenue is expanding



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Ref: <http://www.ctia.org/your-wireless-life/how-wireless-works/wireless-quick-facts>

[http://atlantic-acm.com/index.php?option=com\\_content&view=article&id=557%3Avisual-dataline-us-telecom-wireless-and-wireline-service-revenues-2010-2015&catid=46%3A2010-datalines&Itemid=20](http://atlantic-acm.com/index.php?option=com_content&view=article&id=557%3Avisual-dataline-us-telecom-wireless-and-wireline-service-revenues-2010-2015&catid=46%3A2010-datalines&Itemid=20)

# Mobile speed forecast

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CISCO annual report 2018-2023



- **Wi-Fi speed will triple by 2023.** Globally, the average Wi-Fi speeds will grow from 30.1 Mbps in 2018 to 92 Mbps by 2023.
- **Cellular speeds will more than triple by 2023.** The average mobile network connection speed was 14.1 Mbps in 2018 and will be 43.9 Mbps by 2023.
- The average 5G connection speed will reach 575 Mbps by 2023.

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# *The incredible momentum of WiFi*

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*CISCO report*



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- **Wi-Fi hotspots will grow four-fold from 2018 to 2023.**

Globally, there will be nearly 628 million public Wi-Fi hotspots by 2023, up from 169 million hotspots in 2018.

- **Wi-Fi 6 hotspots will grow 13-fold from 2020 to 2023** and will be 11 percent of all public Wi-Fi hotspots by 2023.

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# WiFi evolution

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By 2023, 27.4% of devices will be equipped with 802.11ax (Wi-Fi 6)  
By 2023, 66.8% of devices will be equipped with 802.11ac (Wi-Fi 5)  
Future Wi-Fi Enables Voice, Speech Processing, Security, Data Analytics

## Wi-Fi 4/802.11n

600 Mbps Max  
Medium Resolution Video

## Wi-Fi 5/802.11ac

3.5 Gbps Max  
High Resolution Video  
Wired Complement

## Wi-Fi 6/802.11ax

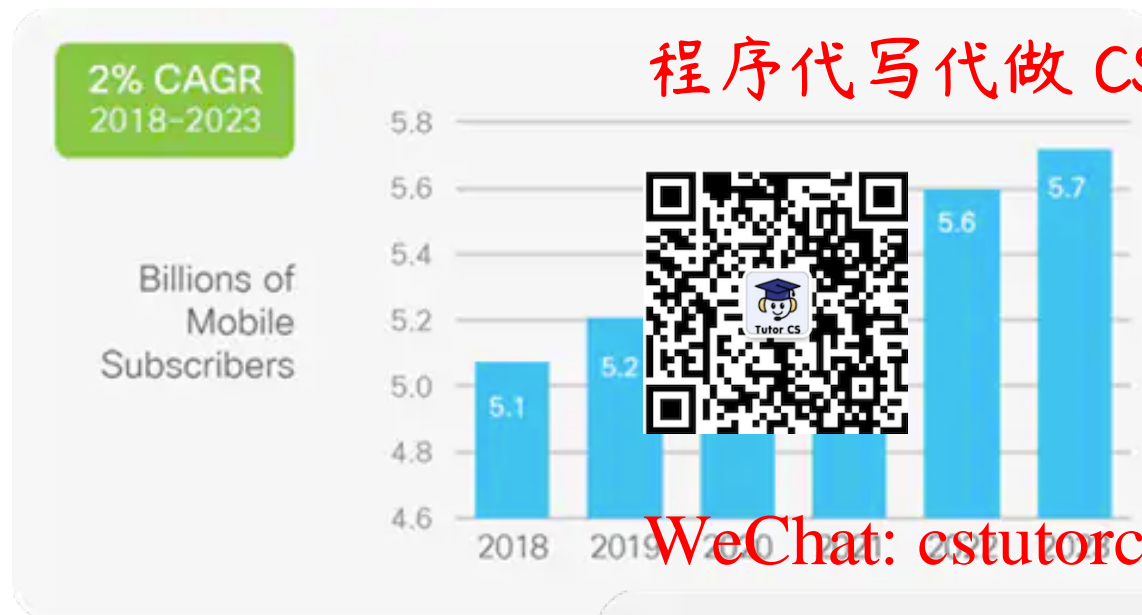
10 Gbps Max  
Dense IoT Deployment





# Mobile growth forecast

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*Bluetooth revolution*

## Total Annual Bluetooth® Device Shipments

numbers in billions

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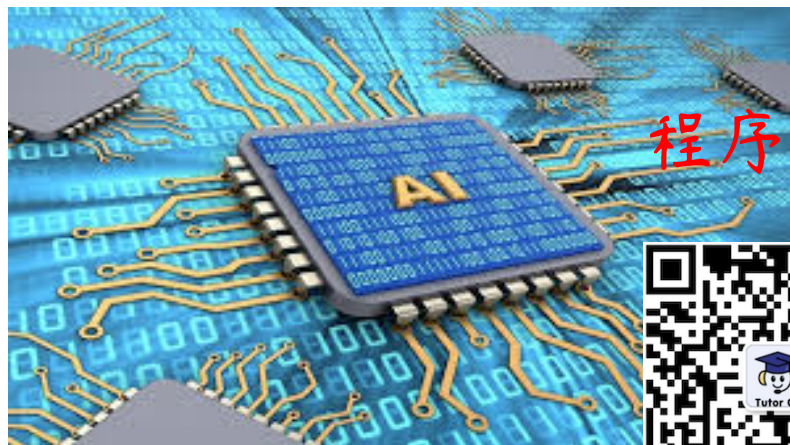
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Source: ABI Research, 2020



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*Other trends  
New developments*



- AI (artificial intelligence) in mobile networking
- Sensor-aided mobile networking
- Drone-aided mobile networking
- Programmable wireless environment
- Simultaneous wireless information and power transfer
- Terahertz wireless networking
- Nanoscale wireless sensor networking
- ...

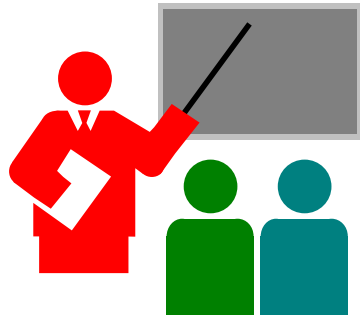
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# Summary: wireless and mobile trends

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1. WiFi has grown worldwide in just 15 years and continues to develop in capacity with innovations in PHY and data link layer
2. Bluetooth has reached the 5 billion milestone in 2020
3. 5<sup>th</sup> generation of cellular technology is already here in 2020 with massive capacity and new features
4. Wireless speed growth following Moore's Law
5. Mobile subscriptions are approaching world population
6. Many innovative new technologies are being developed to meet the unabated demand in wireless and mobile communications

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