Why take Digital Coding and Transmission

- Two hotest topics or 'technologies' currently are

    - **AI** or artificial intelligence
    - **5G** or fifth generation mobile communication

- They are changing our society

    - Some experts say AI plus 5G is the future
    - But 5G is simply an integral part of AI

- What is **intelligence**? It is ability

1. to see or to collect information (**communication**)
2. to process information or to make decision (**computing**)
3. to act (often involving **computing**/**communication**)
4. and to see the consequence (**communication**)

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What is AI

- It is often mistaken AI as solely belonging to **Computer Science**

- My AI equation

$$\mathsf{AI} = e_d \cdot C^2$$

  - e_d represents **E**lectronic **D**igital infrastructure
  - C is **C**ommunication,
  - C is **C**omputing

- **Electronic and digital** revolution, **mobile communication** revolution lead to our connected digital world

  - Without this, there will be no AI
  - Not surprisingly, current **AI** new hype coincides with coming **5G**

Brief AI History

- Pre AI period: Second World War

  – Code breaker - after the war, leading to digital computer
  – Less known is 'traffic analysis', analyze German communication flows - after the war, leading to networked communication and information spy

- Birth of AI and initial hype (1950s - 1970s), with new wonder computer lots were promised by AI, but little were realized

- AI winter (1980s - 1990s)

- Endeavour (1980s - 2010s) We were not calling AI, but CI 'computation intelligence',

  – During this period, mobile communications went through from birth (1G) to 4G, and beyond 4G was in development by 2010s

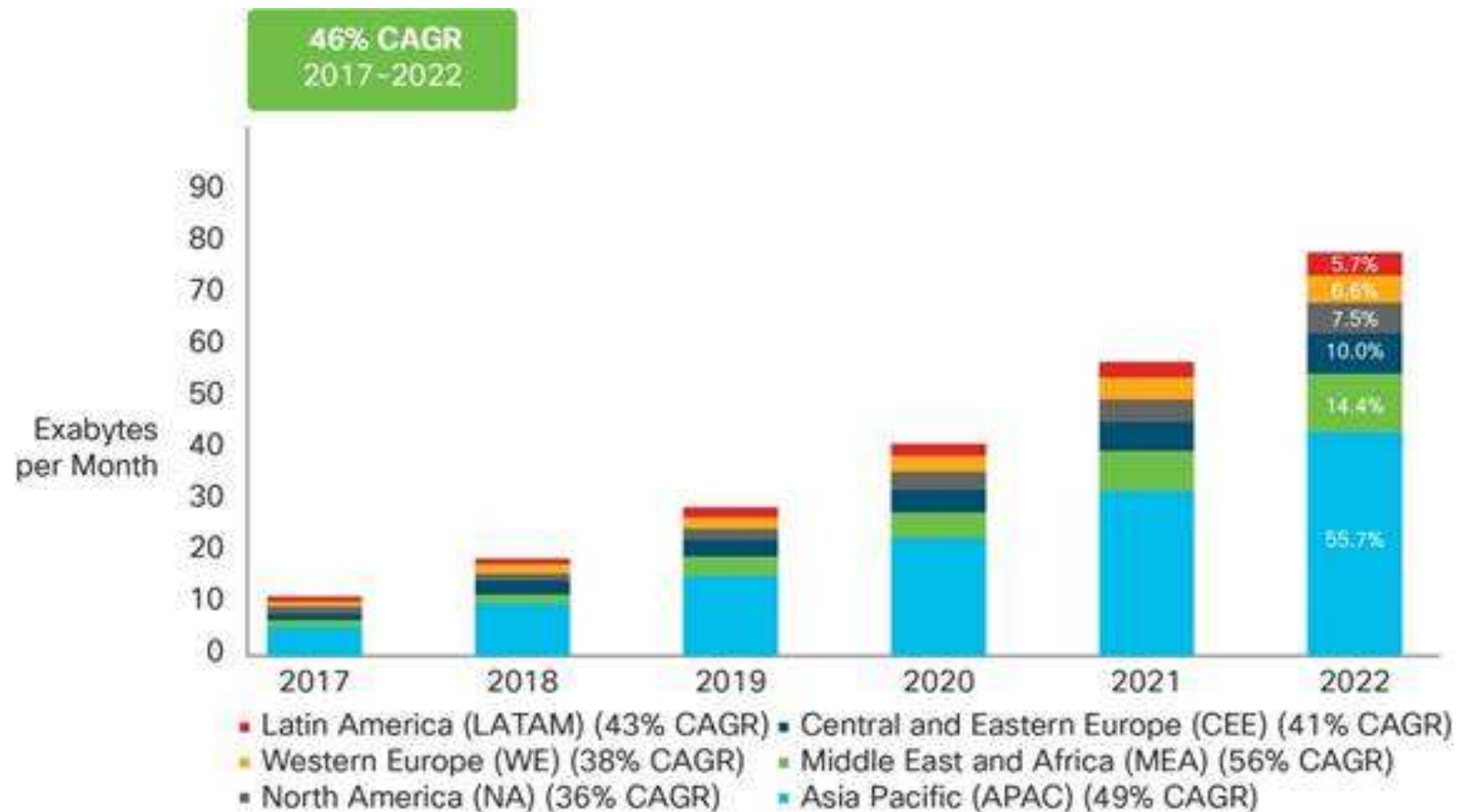- Reborn to new hype (now), not surprisingly, this coincides with 5G

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Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022 White Paper

https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.html

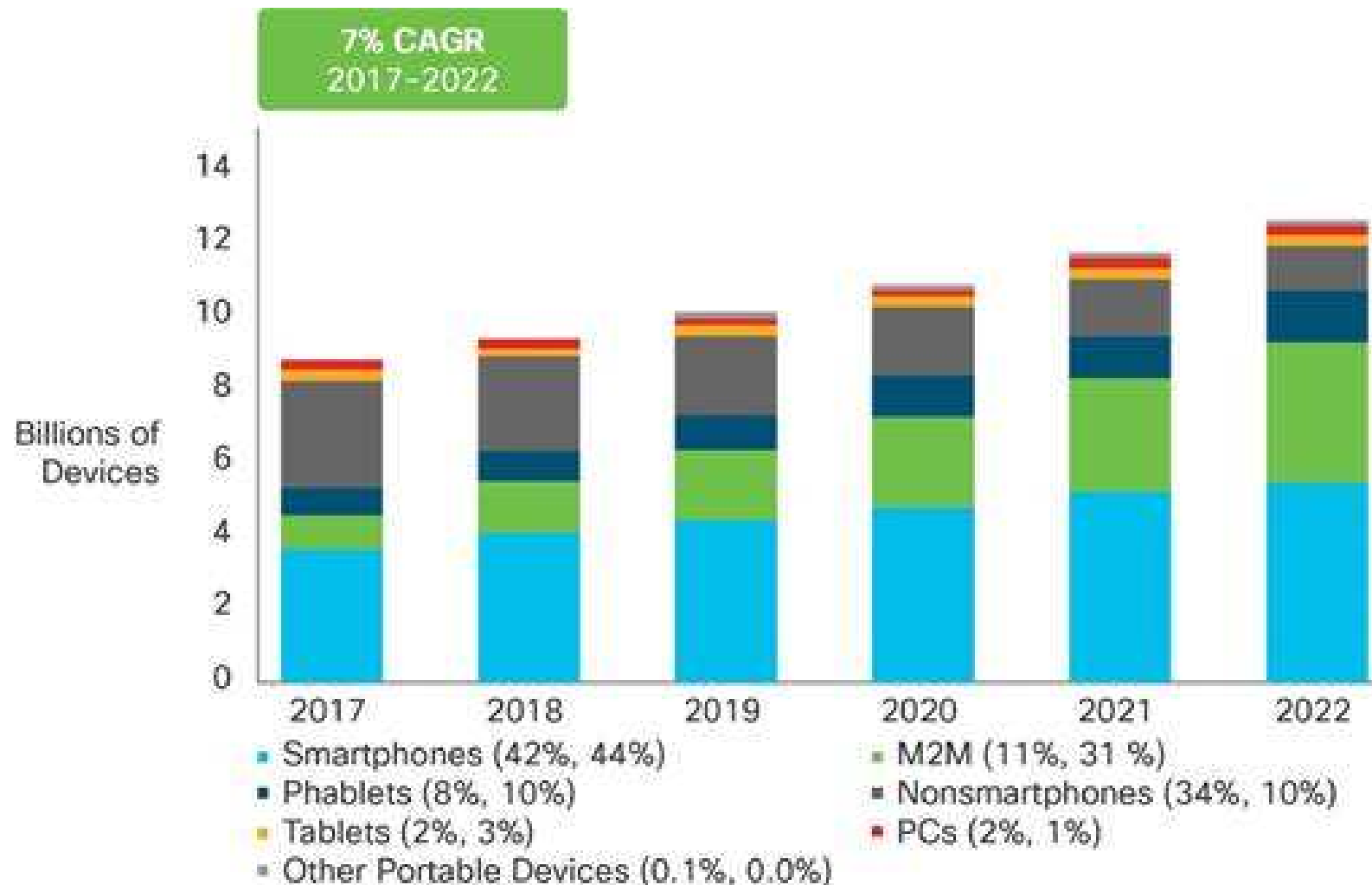- Global Mobile Date Traffic, 2017 to 2022 (exabyte equals to 10^{18} bytes)

- Global Mobile Date Traffic by Region

  - **Asia Pacific** will account for 56 percent of global mobile traffic by 2022
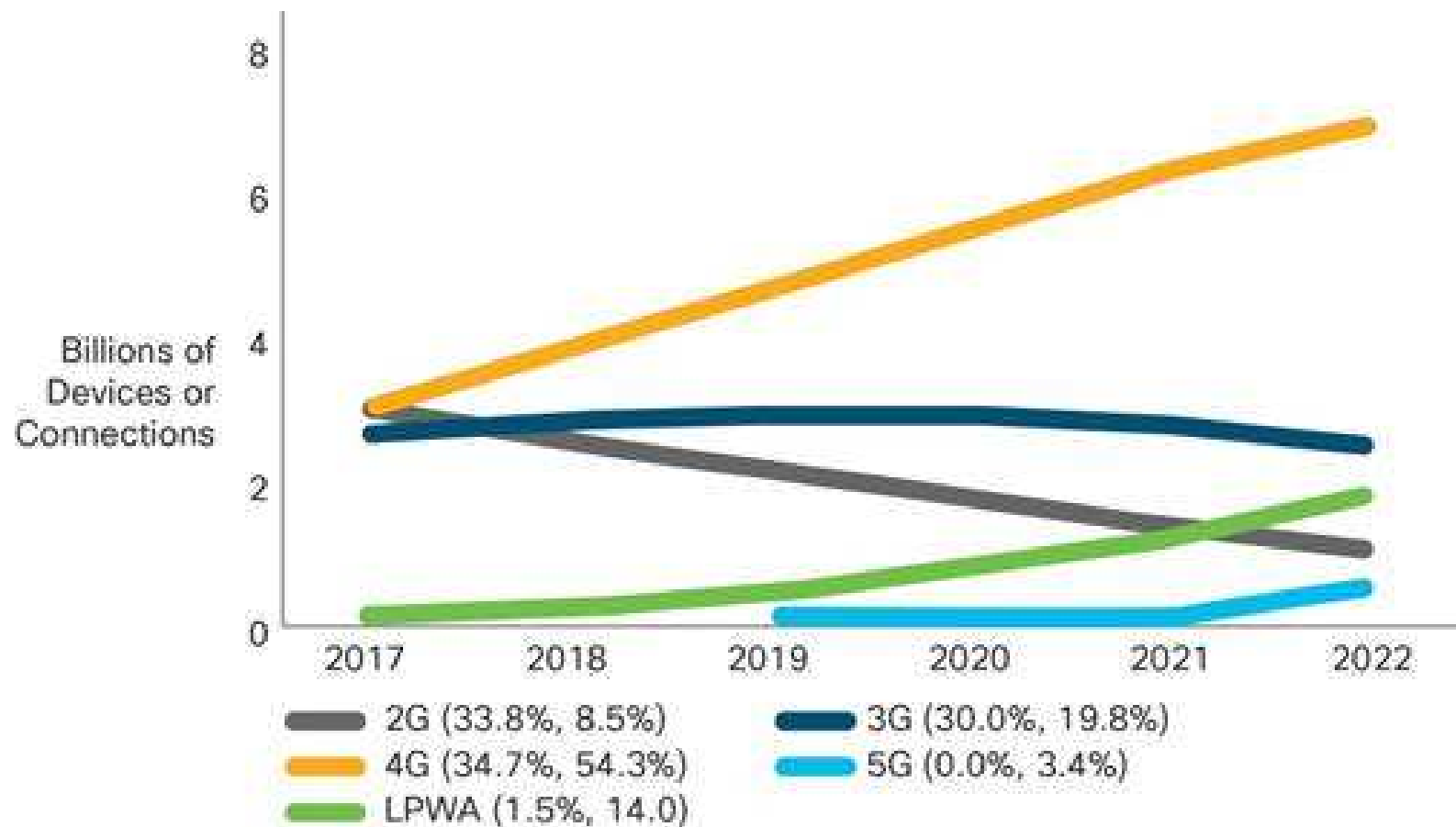
- **Global Mobile Devices and Connections Growth**

  – Forecast is likely to be too low, as with 5G comes massive IoT applications/devices

- Global Mobile Devices and Connections by Network Type

  – Forecast for 5G devices will definitely be wrong (too low!)[1]

    LPWA: low power wide area

	2G (33.8%, 8.5%)	3G (30.0%, 19.8%)
	4G (34.7%, 54.3%)	5G (0.0%, 3.4%)
	LPWA (1.5%, 14.0)	

[1]Cisco is an American company, and we all know USA is lack behind in 5G

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- Global Mobile Traffic by Connection Type

  – Forecast for 5G will definitely be wrong (too low!)

What Digital Coding and Transmission is about

- Digital Coding and Transmission offers

  - Fundamental theory and practice of mobile communication
  - Math, equation, model have real 'physics', explaining everything in mobile communications

- Help you mastering communication technology - one of the two foundations for our connected digital world

  - In future, when our world moves into 6G (it will come soon), you will have essential to master it

- For MSc, Semester II: ELEC6214 Advanced Wireless Communications Networks and Systems