

Hilton Head Island Computer Club

# The Chip Shortage

November 8, 2021



Will it effect us?

A Brief look at the chip market

# What is happening with chips?

## Technology

- Computer Chips
  - CPU – more “threads”; more integrated functions
  - Memory – Memory Cache in CPU
  - Storage – Memory Chips

## Phones

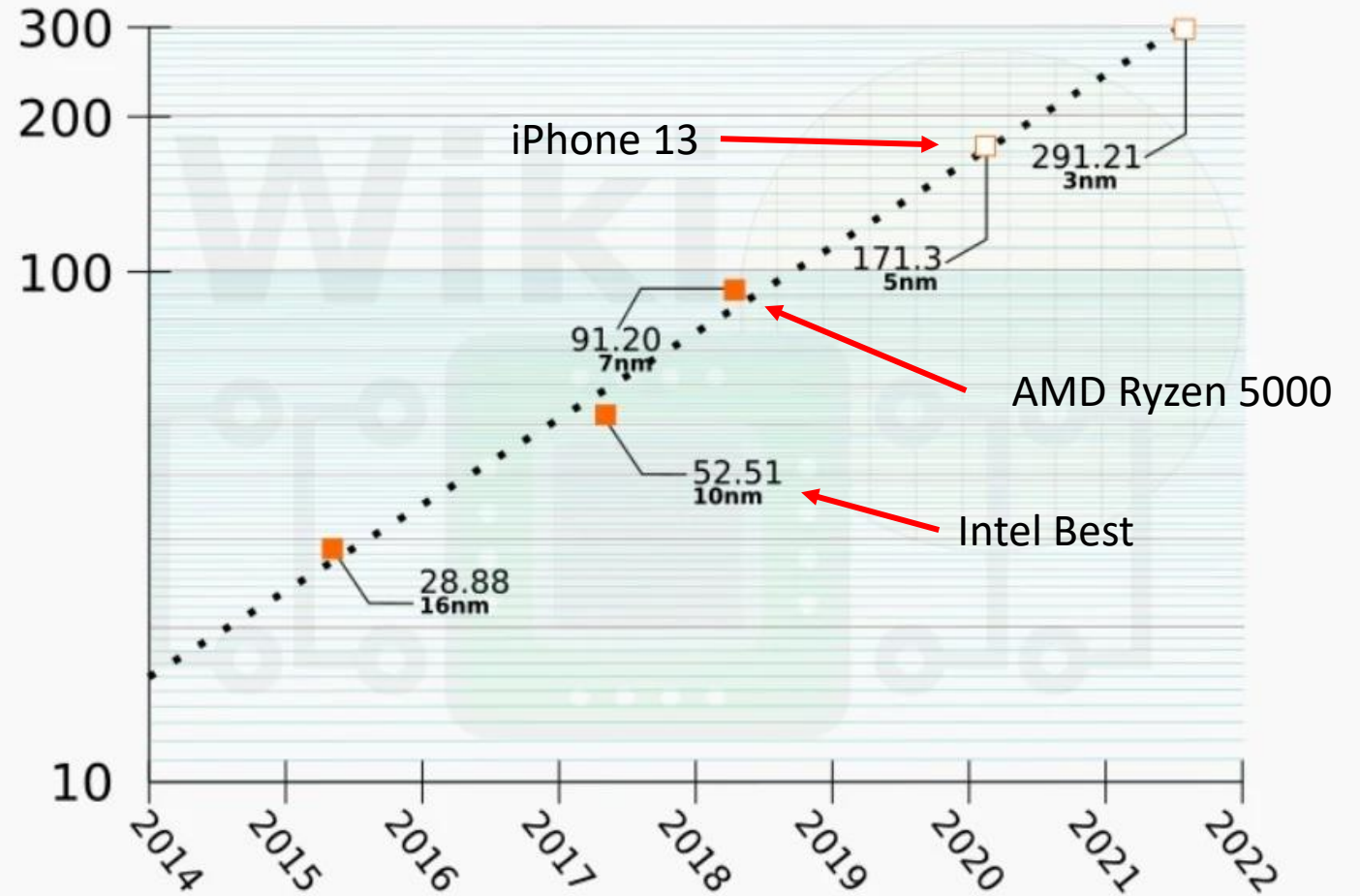
- SOC - System on a Chip, 5 G

So much else : Cars, IOT, Crypto ...

# “Chips” or “Integrated Circuits” all use millions of Transistors

- Chips are fabricated by incredibly complex processes
- A “Fab” or Fabrication Plant is very expensive to build
- Moore’s Law has held since 1970
  - The number of transistors in an Integrated Circuit doubles every two years because of the advancement in manufacturing technology. This is called Die Shrink.
- Smaller Die Size
  - Allows more transistors per area
  - Allows faster switching time
  - Consumes less power

# Transistor Density



# How does this effect computers?

## **Intel is WAY behind in chip density**

- Intel chips are at a competitive disadvantage to chips fabricated by TSMC
- TSMC's customers
  - Apple - iPad chips
    - iPhone
    - M1 processor
  - All the crypto mining customers – specialized ARM
  - AMD - Ryzen chips
  - Qualcomm - Snapdragon chips

Chips are getting much better, faster, use less power

Chips are getting more expensive!

Apple is moving all its CPU chips to TSMC

Microsoft is shifting as much as it can to TSMC through AMD and Qualcomm

**Result – Computer Chips much better and MORE expensive**

# Pandemic Perfect Storm

## 2020

- March/April – All businesses predict less demand, reduce orders to Fabs
- April/May – Tech companies realize their mistake – technology demand surges, send new, larger orders to Fabs
- Fall/Winter - Demand for new cars surges, Fab capacity filled with new tech orders

## 2021

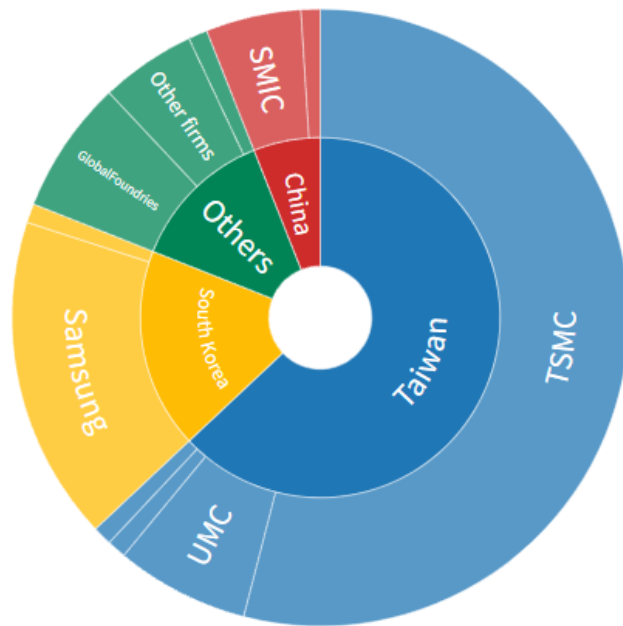
- Auto chips not scheduled
- Sporadic Fab closures as Delta Variant spreads (Malaysia)
- Tech demand greatly increased
  - Mobile phones, 5 G equipment, IOT, Computers, Cloud server farms, Crypto Mining
- 3 years, billions of \$'s to build a single new plant

Businesses predict: Several years before demand = supply

# Foundry Location (Intel doesn't operate as a Foundry)

## Semiconductor contract manufacturers by market share

Total foundry revenue stood at \$85.13 billion in 2020



“So TSMC, if you just have a look at market share, I believe manufactures around 50% of all semiconductors in the world. And I think that still understates how important it is, because these are some of the most advanced chips out there,” said Wang.

Semiconductor designers and manufacturers are on a quest to make chips smaller and better. Currently, TSMC and its South Korean rival [Samsung](#) are the only foundries capable of manufacturing the most advanced 5-nanometer chips.

# What is happening

## New Fab Construction

- In 2021, the global semiconductor industry is on target to bring online 26 new fabs globally (3 in the United States)
- There are another 26 fabs under construction (4 in the U.S.)





Questions?