Capacity vs Bandwidth

- **Areal density increases by 40% per year**
  - Per drive capacity increases by 50% to 100% per year
  - 2008: **500 GB**
  - 2009: **1 TB**
  - 2010: **2 TB**
  - 2011: **3 TB**
  - 2012: **4 TB**
  - 2014: **6 TB**
  - 2015: **8 TB**
  - 2016, 2017**: 10 TB**

8x

Takes longer and longer to completely read each new generation of drive
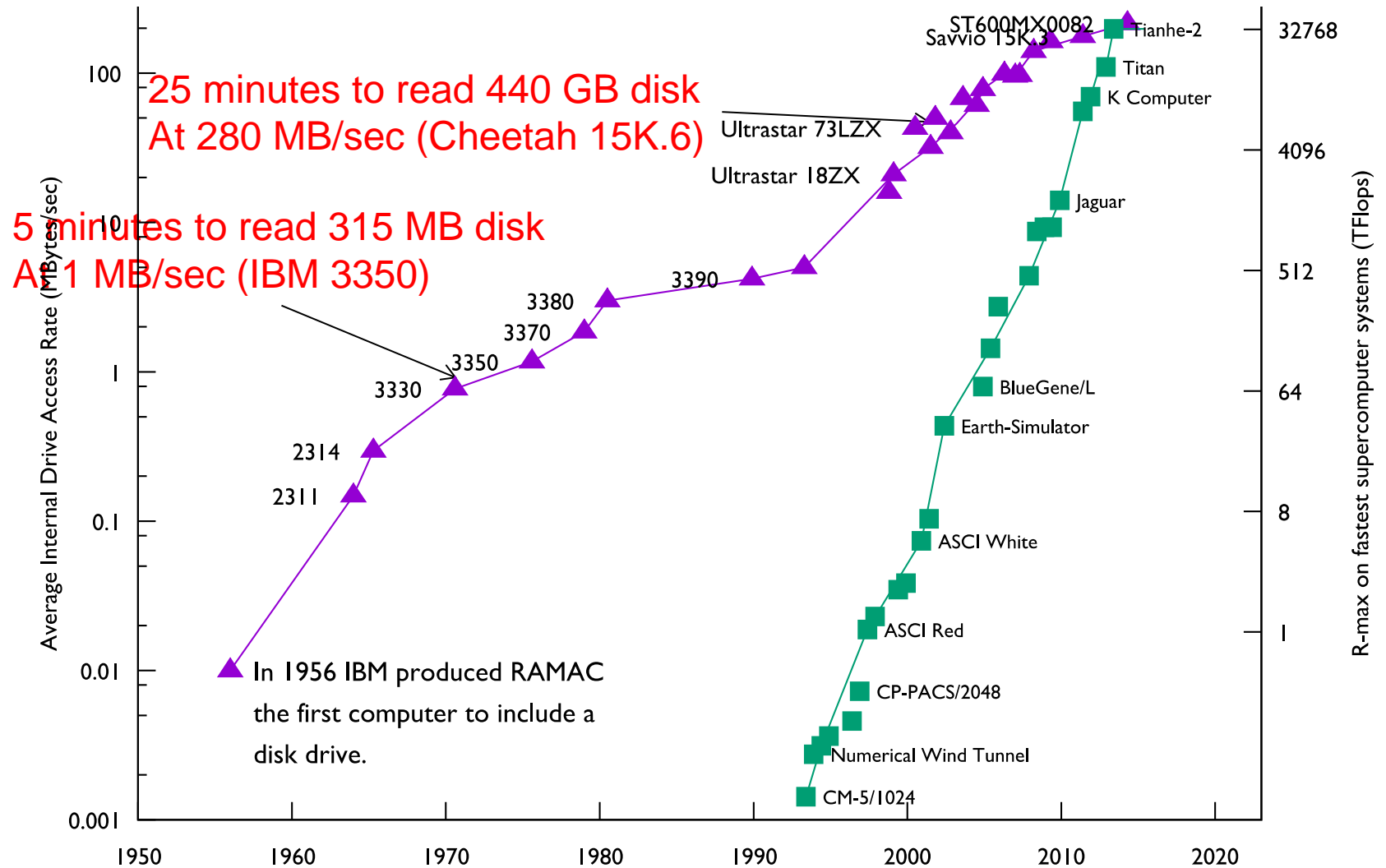
- **Drive interface speed increases by 15-20% per year**
  - 2008: 500 GB disk (WD RE2): **98 MB/sec**
  - 2009: 1 TB disk (WD RE3):   **113 MB/sec** (+15%)
  - 2010: 2 TB disk (WD RE4):   **138 MB/sec** (+22%)
  - 2013: 4 TB disk (WD SAS):   **150 MB/sec** (+ 8%)

1.5x

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Disk Transfer Rates over Time

7.4 hours to read 4 TB SATA
At 150 MB/sec

25 minutes to read 440 GB disk
At 280 MB/sec (Cheetah 15K.6)

5 minutes to read 315 MB disk
At 1 MB/sec (IBM 3350)

In 1956 IBM produced RAMAC the first computer to include a disk drive.

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