

A Perfect Storm:

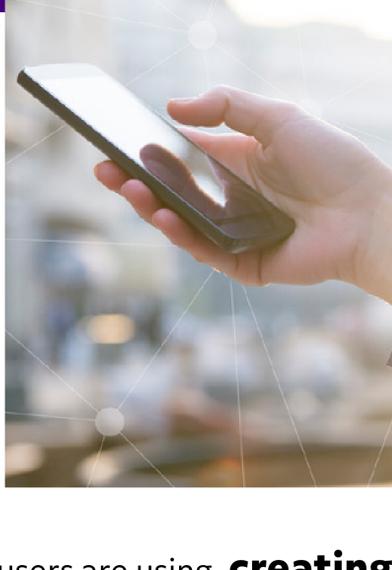
Bigger Data, Power Consumption and Bandwidth Driving Alternatives to Traditional CMOS Chipmaking Process

Today there are

42 billion IoT connected devices

growing to

75.4 ↑
by **2025**¹



Almost five billion Internet users are using, **creating and sharing ~177 ZB of data by 2026**²

5,000,000,000 USERS

Even as the amount and types of data increase, the **number of opportunities to create and share data has exploded** across devices ranging from home security systems, appliances, gaming systems, computers and phones to huge data centers that handle social media, streaming content, games and enterprise applications.



2.5 quintillion bytes of data are created every day and

90% of the world's data has been created in the last two years.³

Much of that data has been driven by increases in almost four billion users of social media sites worldwide.⁴

The ongoing pandemic has only further increased the world's hunger for more data - and more bandwidth to share the data.



Home data usage increased 38%

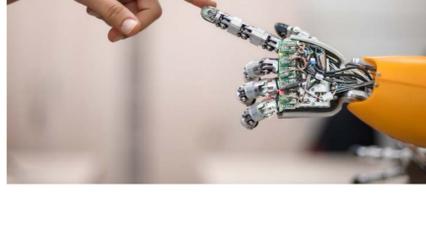
from March 2019 to March 2020.

Work-from-home increased during the pandemic from an average of 17 percent of workers to 44 percent.⁵

17% ▶ 44%

Covid-19 also resulted in an **increase of 138%** in a group called **power users consuming more than 1 terabyte** of Internet data.⁶

As the metaverse joins AI, machine learning and virtual reality as well as the continued expansion of connected devices in driving data creation and transmission.



How data is stored and shared is evolving as well.

↑ **Power Consumption**
Bandwidth Volume

At the heart of the data center, new kinds of computing engines will be necessary to handle not only the volume and bandwidth of data but new kinds of data.

Historically, the chip industry has relied on Moore's Law.

(The number of transistors on chips would double every two years).⁷



But due to the limitations of physics, continuing that pace of performance increases will be difficult.

Over time, **the number of transistors has increased from thousands to trillions.**⁸

It's becoming simply impossible to put more compute power in chips using today's processes and manufacturing technologies. Limitations?



Physical Space



Power Needs



Heat Emission



Data Leakage

With AI, metaverse and other applications requiring complex software and new use models for chips, designers are looking for **more creativity in how they design chips and elements of functionality.**

As a result, optical communications solutions are poised to enable **new levels of performance** in hyperscale data centers, cloud computing and 5G-driven network transformation.



Sources:
 1 <https://findstack.com/internet-of-things-statistics/>
 2 Ericsson Mobility Report Nov 2019
 3 <https://www.the-next-tech.com/blockchain-technology/how-much-data-is-produced-every-day-2019/>
 4 <https://ourworldindata.org/internet>
 5 <https://www.statista.com/statistics/1106863/covid-19-daily-in-home-data-usage-change-us-2020/>
 6 <https://www.pcmag.com/news/data-usage-has-increased-47-percent-during-covid-19-quarantine>
 7 <https://history-computer.com/moores-law/>
 8 <https://medium.com/0xmachina/moores-law-and-the-evolution-of-microprocessors-2d3371d395d9>