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# How the COVID-19 Pandemic Highlights the Importance of Latency in Internet Access

The pandemic moved school and work to the home, with no consideration on how the increased connections would impact internet access. This article discusses the importance of latency as society moves from a consumption-based to a connection-based model.

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## What you'll learn:

- Impact of remote school/work on internet access.
- How 5G and Wi-Fi 6 help.
- The impact felt in Industry 4.0.

Before the COVID-19 pandemic, our days started by dropping children off at school, heading to the office to work, and then on the weekend, visiting family, seeing movies, watching sports, and eating out. Ah, those were the days!

Then in March 2020, that all changed as the pandemic raged and people across the globe were asked to stay in their homes. Overnight, children had to start Zooming from their bedrooms, business was done via conferencing, and the only way to see Grandma was on video. All of this caused a dramatic shift in what is required from the internet to enable these two-way, real-time video connections.

*Forbes* reported in March that internet usage jumped over 50% with streaming video rising just 12%. So, the majority of the increase in internet usage has been real-time connections, much more than consumption.

The current internet is designed to prioritize consumption. Over 70% of internet traffic is video, and most of that is pure consumption or what's called streaming. So, the data paths into homes were designed to provide lots of download capacity, but not much upload capacity.

Such asymmetry is built into many of the internet communication standards, e.g., the cable standard DOCSIS 3.1, which has 10X more download than upload bandwidth. As a result, when homes are running two or more video connections at the same time, the upload capacity is insufficient for a positive user experience.

Internet service providers (ISPs) sell connection bandwidth today, but network latency also is vitally important for real-time interactive connections. For streaming, latency isn't a problem because any pauses or interrupts are covered by big video buffers that smooth over interruptions. However, real-time interactions can't be buffered, or they won't be real-time, so the whole network needs to be designed for low latency.

The world needs better standards for connecting people in real time, and fortunately, the new 5G and Wi-Fi 6 wireless technologies are here. These technologies are wireless and thus don't require streets to be torn up to install new connections. They provide much higher bandwidth connections with flexible assignment of bandwidth between the downlink and uplink channels, and provide much lower latency, all key features for real-time connections.

## 5G

Each decade, cellular technology has moved forward from 2G to 4G and now 5G. 5G data rates can be 10X faster than the current 4G technology, but just as important, the latency in the network drops by a factor of 10 as well. Latency for users will drop from an average of 50 ms in 4G to 10 ms in 5G, on average, and even 1 ms in optimized cases. This lower latency will allow for multiple real-time connections on a channel without lag or freezing.

5G also has more flexible assignment of downlink versus uplink bandwidth, and can handle more users per channel, increasing overall network capacity.

Finally, there's a very-high-frequency version of 5G that will enable 1-Gb/s connections into homes and offices. This millimeter-wave technology can be deployed without tearing up roads.

## Wi-Fi

For many years, Wi-Fi has used a data collision-avoidance sensing system to manage user access to the network. For example, if two people send an email at the same time and those packets collide, it's not a big deal for one of the users to retransmit when the network is free. The delay from that retransmission isn't noticeable to the person receiving the email.

However, when two people are talking on a video call at the same time, packet collisions add latency and rob bandwidth at a time when the applications needed it. And as more and more real-time network applications operate at the same time, more collisions happen, and throughput begins to suffer. This was made worse with streaming and other applications sending mega-sized packets that would hog the network and increase the odds of losing packets.

With Wi-Fi 6, access points have become a lot smarter and they manage the information flow to handle simultaneous users. Fewer collisions occur, and by managing the bandwidth, users can get much more throughput. This makes Wi-Fi 6 a key technology as we migrate to this more connection-based society.

## Impact on Industry 4.0

The need for lower-latency networks also is critical for industry as smart-factory technology is adopted. Called Industry 4.0, it involves more real-time data being collected, analyzed, and acted on. This shifts the people-to-machine and machine-to-machine communications to real-time and requires a low-latency connection with more uplink capacity.

In a consumption-based model, a facility manager, upon arrival in the morning, might see how a factory performed overnight through a static report. From a connection-based perspective, though, the facility manager can see what's happening at the factory in real-time, get an alert, and be able to interactively improve things. With lower latency, the factory isn't tied to updates just once per day, which can have major impacts on uptime and safety.

Wi-Fi 6 and 5G will be key enablers for this real-time, connection-based model in Industry 4.0.

## Conclusion

This year, communication over the internet has become more mission-critical to daily life and much richer as it became about real-time communications. It's likely that society will continue to stay virtually connected beyond the COVID-19 pandemic. As outlined in this article, it will be very difficult for the internet, as it's currently built, to adjust to these changes. But fortunately, the new 5G and Wi-Fi 6 wireless standards have arrived just in time.