Now's the Time to Think About What Comes After 5G

We need to make sure the backbone of every network can support future demands for data

5G technology, with its promises of self-driving vehicles and immersive virtual reality, will be a data-hungry generation of wireless communications. But engineers have been so preoccupied with designing and building the low-latency networks for these emerging applications that they've neglected the rest of our vast, tangled telecom networks. The result is that there's now a growing gap between the capabilities of the fixed and mobile sides of these networks. • Think of the mobile side as the antennas and radio waves that deliver data to our devices. This is the side that has gotten a lot of attention in recent years with the advent of beamforming and millimeter waves. The fixed side is everything else—the cables, fibers, and switches that handle our long-distance communications. The United Nations' International Telecommunication Union (ITU), an agency that coordinates telecom infrastructure between countries, launched a focus group in August to address this emerging imbalance in wireless communications. • "Right now, when people start deploying [5G], it's the mobile side," says Richard Li, the chief scientist of future networks at Huawei and the chairman of the ITU Network 2030 focus group. "But the fixed network side is still 4G. They do not match." The upshot is that while the larger amounts of data heralded by 5G will zip through edge infrastructure without delay, once that same data reaches the less-advanced core infrastructure it could very well be throttled. • A big part of the problem is that the way data moves through our networks has been designed for efficiency on the mobile side. In the process, according to Li, our networks have become redundant and prone to clogging on the fixed side.

Consider two people streaming a sports game to their phones over a wireless network. The router treats each phone as an independent request. That means two copies of the same video data are sent to the router over the fixed network when just one copy could suffice.

There's no guarantee that today's fixed networks can meet the demands of 5G, Li says. 5G promises low latency but has little to say on the topic of throughput. Low latency is meaningless if so many data packets move through the network that they cause continuous delays.

For example, people using VR goggles feel dizzy if the delay between when they look at something and when their screen refreshes is 20 milliseconds or more. If 5G delivers low enough latency to handle image capturing, framing, transmitting, displaying—everything needed for VR experiences—in 20 ms, that will leave only 5 to 7 ms to transport the data through the network in both directions, Li estimates. Most fixed networks simply don't have a high-enough throughput to move all that data without requiring it to wait at switches and routers.

The next generation, 6G, will likely bring applications with even higher throughput requirements. Li says autonomous vehicles, massive machine-type communications, tactile Internet, and holographic communications are all on the table for the coming years. But the current fixed side won't be able to withstand the coming surge.

Li says the Network 2030 group isn't going to play catch-up to 5G, nor does he want the group to think in terms of what 6G might be. Instead, he's prepared to take a broad view of what future generations of communication technology will bring and what they might require of the network's backbone. "Fixed networks that will be able to support 6G networks: That's the key," he says.

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