

THE NEXT DIGITAL DIVIDE: Falling Off the Edge

Federal and state governments should prioritize funding for coalition-based middle-mile networks to ensure that the rural U.S. is not left behind again.

By Sachin Gupta / *Centranet*

The COVID-19 pandemic caused global adverse consequences of gargantuan proportions. It affected every one of the 8 billion people in the world. However, one good thing came out of the crisis: it laid bare the fact millions of people in the U.S., especially in rural areas, do not have access to broadband. It brought laser sharp focus to the digital divide, which the U.S. government took steps to close in a rare show of bipartisanship. More than \$150 billion of federal and state funding will be spent over the next five years on this effort. Provided the funds are spent correctly, the expectation is that every household in the rural U.S. will have access to broadband and will be connected to the internet at high speeds. The digital divide as people know it will close. However, a new digital divide lurks in the future, and if broadband stakeholders don't plan for it now, one digital divide will just trade places with a different one.

SPEED VS. LATENCY

Good high-speed broadband has two components. Bandwidth – aka speed – is what everyone knows about and asks for. A 1 Gbps connection refers to the peak rate at which someone can download or upload data.

The second component is latency. Measured in milliseconds, latency is the delay before data transfer begins. All other things being equal, latency depends on the distance between the user and the resource being accessed. A signal over fiber travels about 124 miles every millisecond. A user in Miami accessing a Microsoft server in Seattle located more than 2,700 miles away will have a minimum of 22ms latency. In reality, this is a much larger number because the signal hops across multiple networks and devices to get to its destination, and each hop adds extra latency.

THE EDGE REVOLUTION

Seventy percent of the traffic on the internet today is video. Video streaming technology requires bandwidth, but the latency requirements are low. Most video can be streamed

without any stuttering issues, with latencies up to 100ms. This leads to an added emphasis on bandwidth over latency today. When the current digital divide closes, everyone in the rural U.S. will have access to capacity.

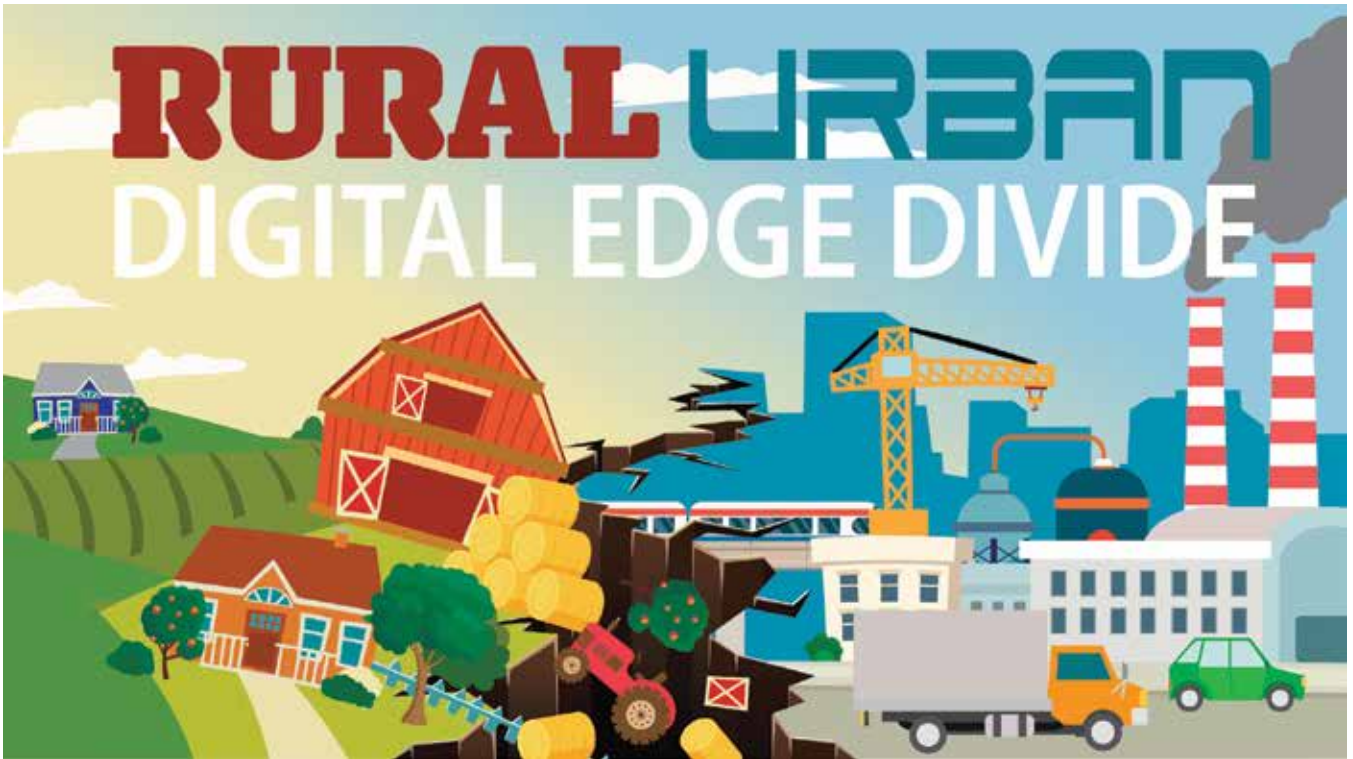
In the coming years, other technologies will rule the internet. These will include virtual reality (VR), augmented reality (AR), Internet of Things (IoT) and other technologies in the enterprise and manufacturing space. All these technologies require low latencies. VR and AR require less than 7ms latency, an order of magnitude lower than video streaming. Any more than 7ms causes users to experience cyber sickness. Such latencies are possible only by utilizing edge networking and computing.

New kinds of low-latency content and applications from companies such as Meta, Apple, Amazon and Google will come to dominate the internet and be delivered from edge data centers close to users. Nothing moves faster than light, so users who want to benefit from new low-latency content and applications must be located within 150 miles of the data center. New manufacturing facilities and enterprises will be established within that radius as well. The new infrastructure build will spur the edge revolution.

THE NEXT DIGITAL DIVIDE

Opinions differ on when these technologies of tomorrow will take off and when the edge revolution will come. The biggest roadblock to new technologies is the lack of infrastructure, specifically fiber-to-the-home (FTTH) networks that enable low-latency applications. Ironically, the large investment federal and state governments allocated to improving infrastructure with preference for FTTH will accelerate the adoption of the new technologies. Closing the digital divide of capacity will accelerate the creation of the digital divide of latency.

Rural people living far from data centers will not be able to access low-latency applications. Given the distance between a rural user and an edge data center, it will not be possible to receive data quickly enough to utilize low-latency applications and content. The rural U.S. will very soon be able to step into



the world of remote work and distance learning but very soon after that will again be left behind once telepresence and virtual classrooms become a reality. The rural boom that investment in broadband infrastructure is supposed to bring will be short-lived.

PREVENT OR CURE?

The U.S. government is making an unprecedented investment in broadband infrastructure. The focus is on ensuring that the rural U.S. has access to the same capabilities that urban areas have today. This is a myopic view. The focus should also be on ensuring that rural areas are on equal footing with urban areas in the future when the technologies of tomorrow dominate the internet. This will be possible only if the broadband infrastructure being built

today can support edge networking for rural populations.

Coalition-based middle-mile networks are the perfect way to supply such future-proofing. They provide access to a large number of points of presence (POPs) to content providers under a single banner, allowing them to use the POPs as mini edge datacenters. The same low-latency content and applications cached in an urban edge data center can be cached at POPs and accessed by rural populations.

This decentralized model can be more lucrative for content providers because it can be operated on demand, can have higher resiliency and provides access to about 42 million Americans they did not have access to before. It can even be used to supplement providers' urban operations.

Federal and state governments should look at prioritizing funding for such coalition-based middle-mile networks to ensure that the rural U.S. is not left behind again. Last-mile deployment is important, but these networks of the future will ensure that all Americans have equal access to the internet. 🌱



Sachin Gupta is the director of government business and economic development at Centranet.

Read more about coalition-based middle-mile networks here: www.bbcmag.com/broadband-applications/a-middle-mile-model-for-rural-operators.