

5G Drives Service Innovation

By: Tim Young

As most of you know, AT&T and Verizon just a few weeks ago wrapped up a bidding war for Straight Path Communications. Verizon came out on top with a \$3.1 billion offer. The prize? Straight Path's vast swath of high-frequency spectrum. And as [Bloomberg's Paul Barbagallo and Todd Shields](#) noted, that spectrum would have blended beautifully with the FiberTower spectrum AT&T secured earlier in the year (FiberTower's spectrum, like Straight Path's, is in the 39 gigahertz frequency band).



But the bidding war didn't break AT&T's way, and now Verizon is well-positioned for a 5G run while AT&T is forced to find another path forward.

It's all part of that scramble and scrape for that next golden ring: 5G.

Sometime this year, [Verizon is planning 5G tests](#) in 11 U.S. markets and [AT&T will be testing](#) its 5G networks with streaming services to DIRECTV customers in the Austin, TX, market. T-Mobile USA, meanwhile, [has announced that it expects to roll out 5G](#) in 2019, with full nationwide coverage in place by 2020. Providers in South Korea and Japan are working to get 5G networks in place in time for the 2018 Pyeongchang Winter Olympics and the 2020 Tokyo Summer Olympics, respectively, working with partners such as [Ericsson, Qualcomm, Nokia, Samsung, Fujitsu, and Huawei](#). In addition, [it was revealed through a recent FCC filing](#) that Apple is testing 5G technology, so there's a good chance that an upcoming version of the iPhone will support 5G.

Of course, these are the early stages, still. No one expects an instant overnight shift. Cisco's VNI predicts, that by 2021, 5G will still only represent 0.2 percent of connections (around 25 million), though that tiny slice will still manage to generate 1.5% of total data traffic. They estimate that a 5G connection will average 4.7 times more traffic than a 4G connection.

So why are we talking about it now? Well, for one thing, it's just that annoying thing that the tech press does. "Oh, 3G is an actual thing now? Tell me about 4G! Or LTE! Or LTE-A!" But beyond that constant what's-the-next-big-thing reflex, there is significant interest emerging about the sorts of business models that 5G could theoretically enable.

Because we're not exactly talking about more of the same, only faster. [As Jamie Carter at TechRadar points out](#), given the higher frequencies and short wavelengths of the millimeter waves that offer so much promise for 5G, that the coverage areas will be necessarily small. In part, this represents a need—and an opportunity—for the continued incorporation of many different access technologies in a single network. Cellular (5G and otherwise), WIFI, LPWAN, and more will all have roles to play.

But 5G networks can and probably will be built out in a way that enables a single physical network to be partitioned into a variety of virtual networks with different attributes that serve different customers and application types. These partitions—network slices—can allow a single network to simultaneously serve streaming video, IoT, augmented reality, connected vehicle, and other services with each operating on a partition of the network optimized for the needs of that service.

[In a recent paper](#), the IEEE's Prof. Alex Galis from University College London and Dr. Chih-Lin I from the China Mobile Research Institute outline the motivations and challenges of network slicing in a 5G context.

"The establishment of slices is both business-driven as slices are the support for different types and

service characteristics and business cases, and technology-driven as slices are a grouping of physical or virtual resources (network, compute, storage) which can act as a sub-network and/or a cloud,” the authors write. “A slice can accommodate service components and network functions (physical or virtual) in all of the network segments: access, core, and edge/enterprise networks.”

Professor Galis and Dr. Chih-lin I outline a number of challenges to making this slicing a reality, including the establishment of a uniform reference model, the definition of slice templates, and the clarification and implementation of a variety of other network slice operations and capabilities.

These challenges aside, ETSI and a wide variety of other bodies are eagerly pursuing the exploration of network slicing.

The potential that 5G offers in industries other than communications and media, particularly if network slicing can be fully and properly utilized, is enormous. Here are a few of the hundreds of potential use cases across a variety of industries:

Mining

Mining is dangerous and energy-intensive enterprise, but an undeniably crucial one. Efforts to make the industry safer have been ongoing for decades, and [according to a project](#) recently undertaken by Ericsson and industry experts ABB, Boliden, Volvo Construction Equipment, and others, 5G may be the key to further advances. Low latency and high reliability are crucial in mining applications, and efforts to make the vital acquisition of minerals and other natural materials safer and more productive through 5G have shown considerable promise.

Healthcare

It's no secret that the healthcare industry can benefit greatly from better networks with high reliability and airtight security. [As Netcracker noted](#) at this year's Mobile World Congress, there is already a complex and cutting-edge ecosystem of tech companies that specialize in the unique needs of healthcare, and extra competition or interference into that space from the telecom world isn't necessary or useful.

But Netcracker and others have made the rightful observation that “equipping the innovators who are driving this revolutionary tech with an open 5G platform that supports virtualized network services, security appliances, charging mechanisms and other useful resources provides a basis for cross-industry partnership.”

Robotics

One of the many frontiers of IoT is the enabling of a wide array of semi-autonomous mechanical helpers, making our every Jetsonian fantasy come true. [Ericsson has noted](#) that a 5G cloud could help us step closer to that reality, reducing the need for hardware and making robots more energy efficient and less expensive to produce. In one use case, Ericsson R&D worked with the Biorobotics Institute (part of Sant'Anna School of Advanced Studies) and Zucchetti Centro Sistemi in Italy to explore the potential for 5G cloud-connected robots.

“Mobile technologies will enable the robots to exchange considerable amounts of information with the cloud at low latency,” said Roberto Sabella, Research and Innovation Manager for Ericsson, “which will allow the robot system to do its job at the desired performance level.”

VR gaming

This may be one of the more obvious use cases, but it's undeniable that we're finally at a stage where the real possibilities for VR have caught up with our desire to make the technology a reality. [As Netcracker notes](#), “in today's on-demand entertainment environment, production is more

distributed than ever. New technology such as VR is emerging due to the creation and demand for new entertainment, and service providers are competing to acquire and produce that new content.”

Enter 5G, which can serve as a platform for delivering the resources required to create and deliver immersive VR content. “Those resources can then be distributed to anyone—from local teams to large-scale production houses—to create the next wave of content and bring it to a global marketplace immediately via broadband and 5G.”

Transportation

With autonomous vehicles on the horizon, the control and monitoring of these vehicles is top of mind, and 5G provides a potential platform for this. [According to Ericsson](#), “The next generation of Intelligent Transport Systems (ITS) will combine vehicle to vehicle (V2V) and vehicle to off-board software (vehicle to infrastructure, or V2I) communications so that vehicles can operate autonomously and be controlled and monitored from cloud-hosted software.” The potential to manage actual traffic in the same way we already manage network traffic is compelling.

Moving forward

These are only a few of the possibilities that 5G networks present. The list goes on and on, from farming to manufacturing to utilities to shipping. A well-sliced, carefully managed 5G network may be the key to an awful lot of innovation.