Remarks of Commissioner Geoffrey Starks
State of the Net Keynote
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Thank you to State of the Net for inviting me to speak with you today, and to anchor a day filed with so many dynamic panels and powerful speakers. Last year, I addressed this audience about broadband, and where we need to take policymaking to achieve the goal of bringing high speed internet to all Americans. With Congress's help, the Commission is delivering on that promise, and there's much more to come. This year, I want to talk about another issue that will define our shared future–the environment–and the important role I see the telecommunications and technology sector playing. Like our most complex issues, the public and private sectors must be called upon to work together.

The time to act is now. Just today, the UN's Intergovernmental Panel on Climate Change released a report warning that "climate change is a threat to human well-being and planetary health" and that we risk missing the "brief and rapidly closing window of opportunity to secure a livable and sustainable future for all." According to the National Oceanic and Atmospheric Administration, 2021 was one of the warmest years on record – and only the latest in an accelerating trend of record-setting years over the last 2 decades. The International Energy Agency predicts that even if the UN's 2021 emissions reduction targets are met in full and on time, the mean global temperature could still increase by nearly 2 degrees Celsius by the end of this century – a significant event.

Today's Fourth Industrial Revolution has the real opportunity to begin reversing these climate change trends. It starts with addressing our industry's energy consumption. The densification and increased usage associated with advanced networks like 5G inevitably results in increased overall energy needs, from the core to the radio access network. 5G also moves many network services to the cloud, causing an increase in already significant data center energy use. Finally, the number of devices in operation is likely to surge to take advantage of the increased capabilities of 5G and additional unlicensed spectrum. According to one recent study, we will have 125 billion Internet of Things devices in use by 2030, each of which will contribute to our energy consumption. The trend is clear – at the end of 2021, only about two percent of the world's greenhouse gases directly resulted from the Information and Communications Technology (ICT) sector. By the end of this decade, however, that number could reach as high as 20 percent.

But while new technology presents some new environmental challenges, it also holds significant promise. For example, according to some estimates, modernizing the RAN from 4G to 5G could reduce the energy needed to communicate a given amount of data by as much as 90 percent. 5G does so through characteristics like beamforming, which allows antennas to focus their wireless signal on the precise location of a device, rather than broadcasting a signal over a wide area that may not have a single device in use. 5G network equipment and many new IoT devices also use highly efficient power cycles that can instantaneously switch from idle to operational, rather than remaining active and consuming power for longer periods of time.

At the company level, firms are responding to climate change. As many of you know, back in 2019, I worked with Verizon on a first-of-its-kind commitment to make its 5G operations and related supply chain carbon-free by 2025. Since then, all of the major wireless carriers have committed to achieving carbon neutral operations no later than 2035, and T-Mobile just announced that last year it sourced 100 percent of its electricity usage from renewables. And it's not just the carriers. Companies at every level of the telecom and technology sector –equipment and chip manufacturers, software companies, information service providers, and social media giants–are committing to reducing or eliminating their carbon emissions.

As I've discussed before, 5G and other advanced networks also can have tremendous downstream benefits for the conservation of energy and other resources. For example, my hometown of Kansas City has installed wireless IoT sensors integrated with artificial intelligence to track and reduce traffic congestion and energy consumption. Other cities are using connected networks to reduce water consumption and sewage runoff. Energy companies are upgrading their networks so they can monitor usage, respond instantaneously to outages, and route energy in the most efficient manner. Farmers are using precision agriculture to reduce pesticide usage, water consumption, and greenhouse gas emissions, all while increasing production. Each of these are topics unto themselves, and warrant further dialogue.

Holistically, according to recent study, 5G use cases in just a few industries – including agriculture, manufacturing, and energy – could contribute approximately 20 percent towards US emissions reduction targets by 2025. By the end of this decade, another study estimates that ICT technologies could reduce global carbon emissions by up to 15 percent– more than the carbon footprints of the EU and the U.S. combined.

And we must work with industry to ensure that energy efficiency is built into new networking models from the beginning. For example, while many companies have focused on increasing the energy efficiency of their hardware, networks increasingly rely on software to perform many functions. This may increase overall performance, but energy efficiency must also become a priority for software development. Similarly, new networking approaches like edge computing may reduce the amount of energy used by traditional data centers, but replacing a single large data center with a multiple smaller edge data centers could increase energy consumption overall. Policymakers must engage with industry to identify and resolve concerns like these before they become built into our assumptions and much more difficult to address.

Protecting our planet isn't just about reducing the energy consumed by our networks. We also need to discuss the billions of devices that make up those networks. These devices not only consume energy for their operations, but also frequently end up as electronic waste. A recent study found that we generated an estimated 54 million metric tons of electronic waste worldwide in a single year (2019), with 80% of that waste winding up in landfills. This vast amount of phones, batteries, and electronic components will take hundreds of years to decompose, further degrading our environment with toxic byproducts each step of the way.

Manufacturers have shifted to using lower-carbon plastic and expanding their recycling programs, but there is more to do. Manufacturers should expand their use of such materials and

consider reusability at the design stage. Using recycled materials not only reduces waste but also lowers the carbon emissions associated with manufacturing by about 30 percent. I'm encouraged by industry efforts to increase refurbishment, allow consumers to repair their devices, and offer recycling options. We must build on these efforts and increase incentives for consumers and businesses to take advantage of these opportunities. Major cellphone companies have also begun incorporating the use of renewable resources like bioplastics as part of the manufacturing process. We must encourage further research into this technology and expanded use of these materials.

We have long talked about the economic benefits of 5G; we must also put time, thought and attention to generating the <u>environmental</u> benefits of 5G. Every person in the telecommunications and technology space – whether in the private sector, government, public sector or academia – must consider how their work can help reduce our emissions and protect our planet. That means thinking about how new technologies, products and services – from standards setting and design, to manufacturing, deployment, and distribution, and through to the end of product life – will affect our environment and how we can reduce that impact. We must sustain and expand the efforts already underway to reduce emissions, increase renewable energy, and establish a truly circular economy that minimizes electronic waste. We have an important part to play, and I'm ready for it.