WHAT IS 5G?

HOW DOES 5G COMPARE TO 4G?

WHAT ARE THE RISKS?

WHEN WILL 5G BE AVAILABLE?

5G: THE BASICS

The fifth generation (5G) of wireless technology represents a complete transformation of telecommunication networks, introducing a wealth of benefits that will pave the way for new capabilities and support connectivity for applications like smart cities, autonomous vehicles, remote healthcare, and much more. Here's how it will work:

USE CASES

5G networks will enable the connection for billions of new devices, sensors, and systems that will intelligently connect to the network based on their time sensitivity and computational needs.

RADIO ACCESS NETWORK (RAN)

Mobile Fronthaul

Connects the RAN to the Core

Mobile Backhaul/ Transport Network

Small Cells

Macro Towers

5G networks will leverage low, mid, and high-band spectrum, requiring the deployment of smalls cells in addition to macro towers. These small cells will serve as signal repeaters, providing improved speed, greater network capacity, and stronger reliability in high density areas.

Baseband Unit (BBU) Pool

The centralized BBU Pool implements software defined networking and multi-access edge computing to allocate the network based on need and connects to remote radio units located on macro towers through mobile fronthaul (optical fiber).

CORE NETWORK

Core Network Infrastructure

The Core Network is the backbone of the U.S. communications infrastructure that routes data and connects the different parts of the access network.

5G promises an array of enhancements, providing higher data rates (extremely fast download speeds), ultra-low latency (near real-time interactivity), and increased network capacity (allowing for the connectivity of many more devices at once).

100x

Faster Download Speeds

While a 3GB movie would take 40 minutes to download on 4G, it would take only 35 seconds on a 5G network.

10x

Decrease in Latency

Data response times will be as low as 1 millisecond, providing endless possibilities from remote surgery to self driving cars.

100x

Network Capacity

5G promises greater traffic capacity, allowing for millions of devices to be connected on the same network within a small area.

The Cybersecurity and Infrastructure Security Agency (CISA) leads 5G risk management efforts to ensure that the U.S. can fully benefit from all the advantages 5G connectivity promises to bring. The following risks depict some of the focus areas that CISA is examining as part of this effort.

Susceptibility of the 5G supply chain, due to the malicious or inadvertent introduction of vulnerabilities

Initial 5G deployments leveraging legacy infrastructure and untrusted components with known vulnerabilities

Limited competition in the 5G marketplace resulting in more proprietary solutions from untrusted vendors

5G technology potentially increasing the attack surface for malicious actors to introduce new vulnerabilities

The 3rd Generation Partnership Project (3GPP), a telecommunications standards organization, develops a series of *Releases* that provide developers with a stable platform for the implementation of cellular telecommunications features. Releases 15, 16, and 17 focus on 5G features.

Release-15 Commercialization (Non-standalone 5G network) → Release-16 Commercialization (Standalone 5G Network) → Release-17+

Enhanced Mobile Broadband Deployment in both mmWave and sub-6GHz (e.g., 5G smart phones, connected laptops)

New 5G technologies to evolve and expand the ecosystem (e.g. Industrial Internet of Things, unlicensed/share spectrum, Vehicle to Everything [V2X])

2019 — 2020 — 2021 — 2022 — 2023+

*Source: Yost, S. (2019). "Should We Even Be Talking About 6G?" Semiconductor Engineering. https://semiengineering.com/should-we-even-be-talking-about-6g/. Accessed on March 2, 2020.

LIVEWORKSHEETS