



## Background

# Table of contents

NVIDIA in Telecommunications

---

6G RAN Development

---

Emerging Use Cases

---

About the OpenAirInterface

---

# List of Figures

Figure 0. Image1

---

# NVIDIA in Telecommunications

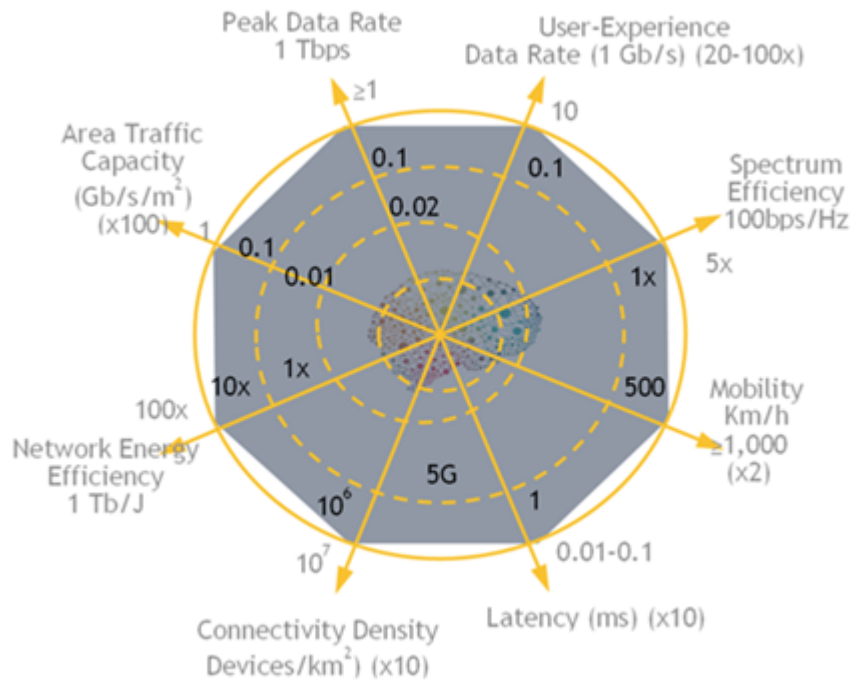
NVIDIA is the global leader in GPU accelerated computing and is enabling a fully cloud-native virtual 5G and 6G RAN solution to support a wide range of next-generation edge AI and RAN services using COTS servers. Solutions include [Aerial CUDA-Accelerated RAN](#) and [Sionna](#).

## 6G RAN Development

With the deployment of 5G systems in full swing, the research focus on 6G wireless communications systems has begun. Keeping up with the tradition of a new generation of cellular systems once every ten years, there is an expectation that 6G systems will be standardized and ready for deployment starting around 2030 [[https://www.itu.int/en/ITU-T/focusgroups/net2030/Documents/White\\_Paper.pdf](https://www.itu.int/en/ITU-T/focusgroups/net2030/Documents/White_Paper.pdf)]. Because it typically takes ten years for a NG (Next Generation) wireless technology to see commercial daylight, the time to begin research for 6G is now.

It is crucial to ensure availability of a comprehensive programmable end-to-end (E2E) research and innovation platform to develop technologies for future communication systems. While it is possible that some of the requirements for NG wireless can be met by incorporating new advancements within the advanced 5G framework, it is already clear that meeting the goals of 6G will require some fundamental shifts in system architecture, waveform design, protocols, interference management, and channel modelling.

Besides enhanced mobile broadband for consumers with very high data rates of 1Tbps, 5G+ is widely expected to enable the Fifth Industrial Revolution through the digitalization and connectivity of all things (humans, machines, sensors). Digital twins of objects created in edge clouds will form the essential foundation of the future digital world. The realization of a comprehensive and true digital rendering of the physical world at every spatial and time instant will be required at extreme low latency. Sensors will accurately map every instant and integrate into the digital and virtual worlds, to enable new Artificial Intelligence (AI) enabled capabilities. Augmented reality user interfaces will enable efficient and intuitive human control of all these worlds, whether physical, or virtual. Simply put, 6G is widely expected to be smarter, faster, and more efficient than 5G. Specifically, the following image outlines the key 6G trending KPIs:



## Emerging Use Cases

The following major new use case themes are emerging for the new communications framework:

Use Case	Reference
End devices extending from being single entities to a collection of multiple local entities acting in unison to create the new man-machine interface.	5G NR Rel 18 - Gateway UE function for Mission Critical Communication
Distributed compute among multiple local devices and the cloud	5G NR Rel 18 - Ad hoc Group Communication support in Mission Critical Services
Knowledge systems that store, process, and convert data into actionable knowledge through AI systems in network functions as well as operations.	5G NR Rel 18 - AI/ML model transfer in 5GS
Precision sensing and actuation to control the physical world	5G NR Rel 18 - Application layer support for Factories of the Future (FF)
Network digital twin	ITU-T Y.3090 Digital Twin Architecture and Requirements

The following are top requirements from 6G researchers:

- Massive MIMO and mmWave support
- Easy access to high-performance, cloud-native compute resources
- Access to large-scale datasets, digital twins, and other simulation environments
- Distributed AI, online training, federated learning, network prediction, and native ML simulation
- Standards-compliant OTA platform to maximize real-time, closed-loop experimentation
- Ease of programmability and customization of the network (CN + RAN + UE)

## About the OpenAirInterface

The [OpenAirInterface Software Alliance \(OSA\)](#) is a nonprofit organization founded in 2014 by EURECOM, a research institute based in the South of France. The Alliance manages and promotes the OpenAirInterface (OAI) open-source software that offers 4G and 5G and Core Network stacks as well as orchestration and management and control software. OAI implements 3GPP and the O-RAN specifications.

The OAI software development is organized into three project groups: Radio Access Network (RAN), Core Network (CN), and MOSAIC5G (M5G). Another project called CI/CD allows OAI to control the quality of all software produced within the Alliance. Each project group is composed of an engineering team following and achieving the objectives defined in its roadmap. The OSA stands out thanks to its large international community of contributors and users. The OAI software is used by many organizations around the globe for research and testing purposes as well as for building blocks of systems for various 4G/5G use cases, a growing number of them industrial.

For end-to-end deployments and control, OAI enables 5G deployment including the 5G gNB, Core Network, and RAN control capability thanks to O-RAN specified E2 and RIC software.

© Copyright 2024, NVIDIA... PDF Generated on 06/13/2024