Enabling 6G research through rapid prototyping and test

Mobile Korea 2023 - 6G Global

Seyong Lee

Principal Application Engineer

Company overview

45+
YEARS DEVELOPING T&M SYSTEMS

35,000+
CUSTOMERS WORLDWIDE

$1.7B
REVENUE 2022

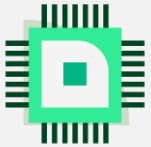
20%
R&D Investment 2022

AT A GLANCE

HEADQUARTERS
AUSTIN, TEXAS

~7,000
GLOBAL EMPLOYEES

KEY INDUSTRIES


Semiconductor & Electronics


Transportation


Aerospace, Defense & Government

VALUES

Be Bold

Be Kind

Be Connectors

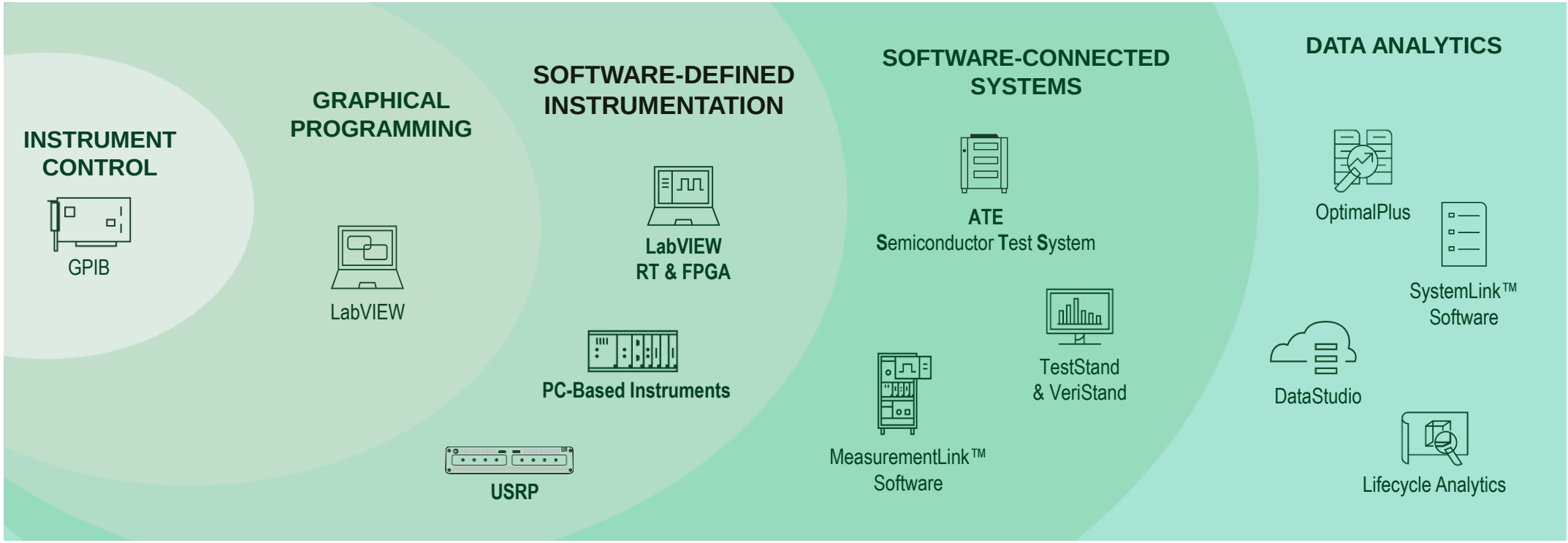
Product portfolio & differentiation

Modular instrument

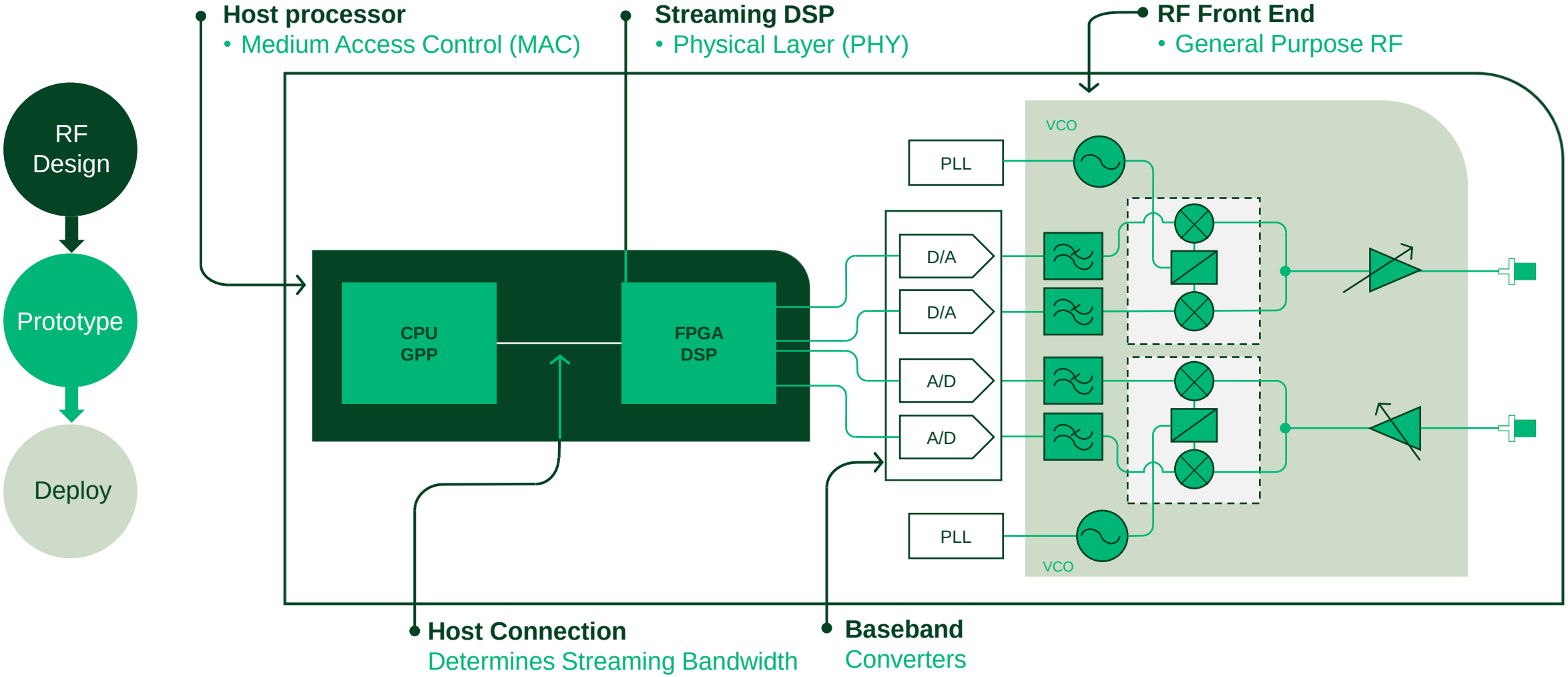
Software & Data Analysis

Customization

Customers & Partners

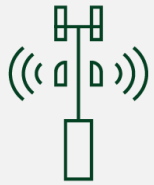


Software Defined Radio (SDR) Architecture

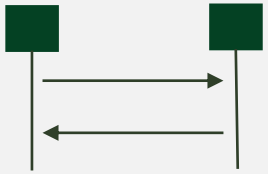


Software Defined Radio (SDR) common use cases

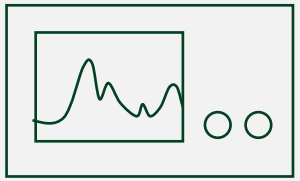
BS Simulation



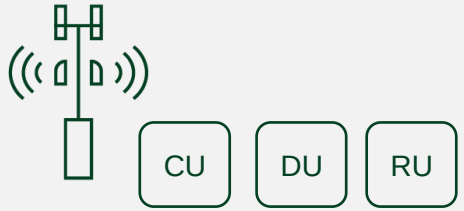
Protocol Design



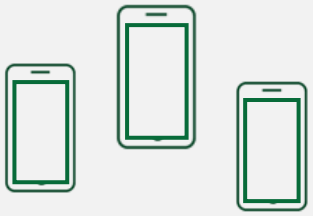
New spectrum research



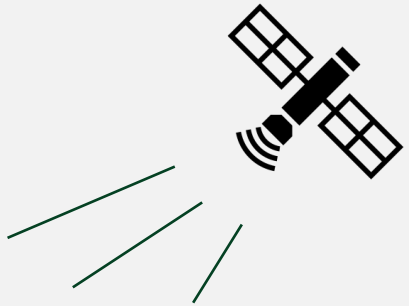
O-RAN



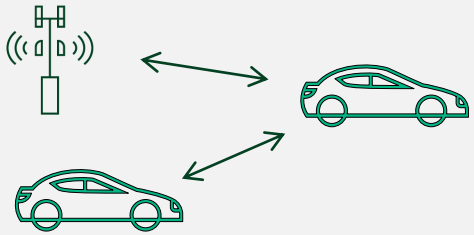
UE Simulation



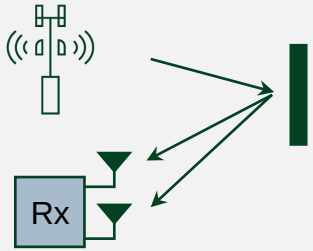
NTN



V2X



RIS



SDR, 5G/6G wireless research prototypes

6G Sub-THz Reference Architecture

Enables sub-THz test configuration through versatile RF instrumentation capable of real-time, high-rate data streaming, and power, spectrum, and modulation measurements.

RF Data Recording for AI/ML in 5G/6G Research with USRP Hardware

Empowers AI and ML research in 5G and 6G communication networks by automatically gathering representable data sets from the real world.

LabVIEW and USRP X410

Provides a starting point for building testbeds for wireless and 6G research, enabling performance improvement for multi-channel, high-bandwidth streaming and storage of RF signals.

OAI Reference Architecture for 5G and 6G Research with USRP Hardware

Use OpenAirInterface software with NI USRP to set up an end-to-end 5G network for real-time communications.

https://www.ni.com/en/solutions/electronics/5g-6g-wireless-research-prototyping.html

SDR, 5G/6G wireless research prototypes

Sub-THz, mmWave Research

Enables channel sounding and a real-time, two-way communications link for 5G and 6G prototyping with 2 GHz of bandwidth and flexible frequency coverage.

USRP Software Defined Radio

Provides a software-defined RF architecture to rapidly design, prototype, and deploy wireless systems with custom signal processing.

Comms System Prototyping

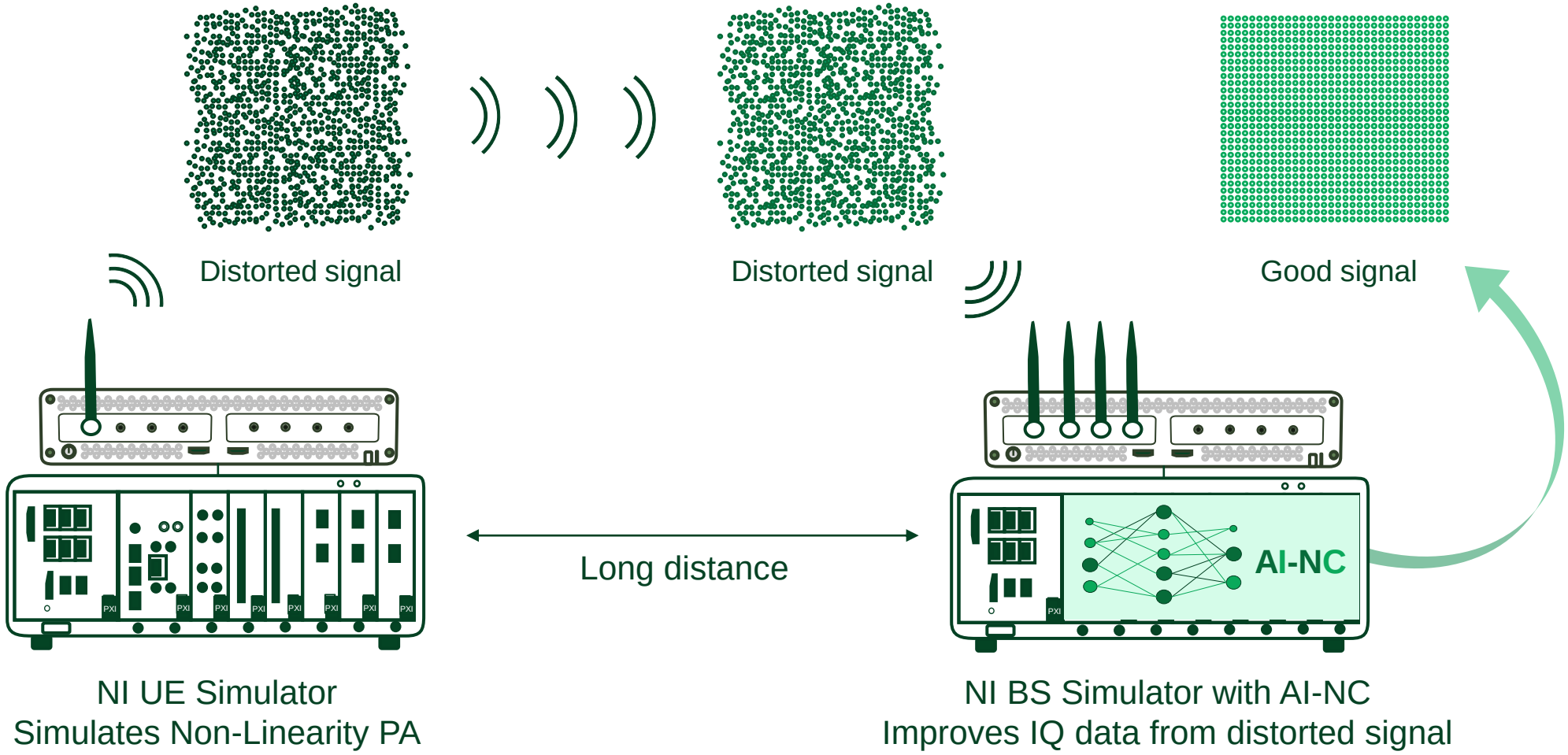
Built on open-source software, the Open Architecture for Communications Research (OACR) streamlines the creation of prototyping testbeds and accelerates the development of new communications algorithms.

NI FlexRIO

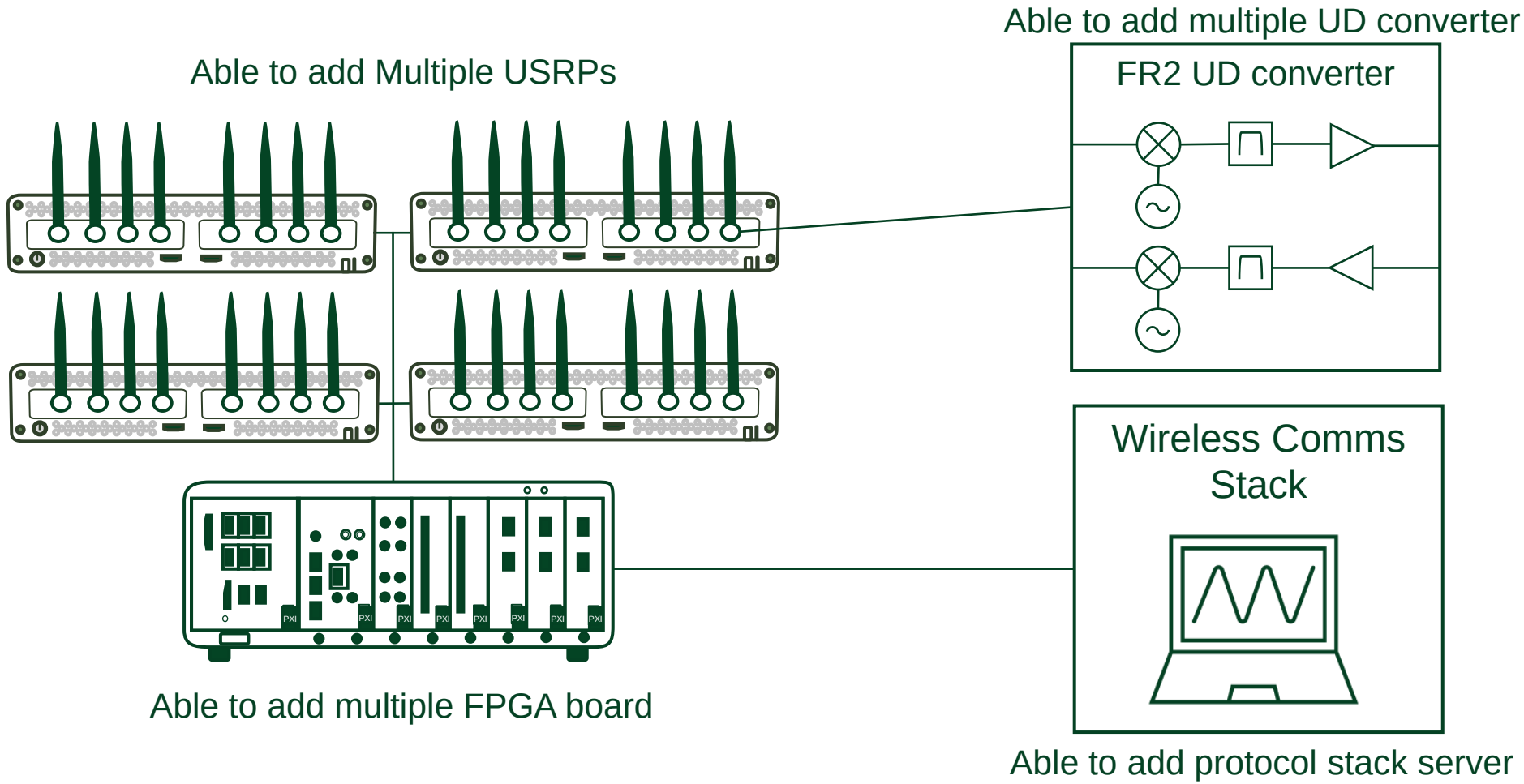
Offers flexible, customizable I/O and FPGAs in a high-performance, reconfigurable instrument for prototyping and deployment.

AI-based Non-linearity Compensator collaborated with Samsung Research

AI-NC SDR prototype with NI SDR & PXIe



More Antennas, higher data rates, and real-time data



Vision For The Future Of Wireless Research

Applications

WIRELESS COGNITION

WIRELESS SENSING

IMMERSIVE XR

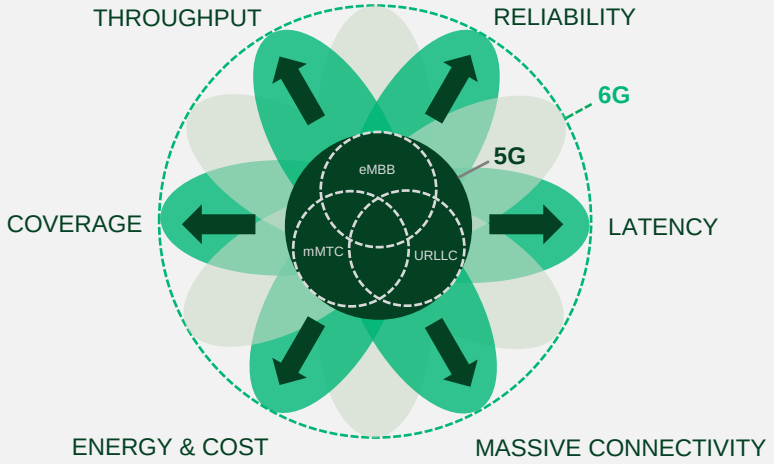
DEVICE LOCATION

IMAGING & RADAR

MOBILE HOLOGRAM

AND MORE

Requirements



Enabling Technologies

- Upper Mid-Band
- Sub-Terahertz Frequencies
- Integrated Sensing & Comms
- Extreme MIMO
- AI and Machine Learning

Overview of 6G

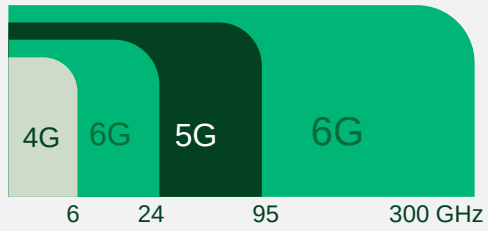
Enabling Technologies that Could Drive 6G

New Spectrum

Utilize extremely wide bandwidths at frequencies once thought impractical for commercial wireless.

7-24 GHz FR3

Sub-THz FR4

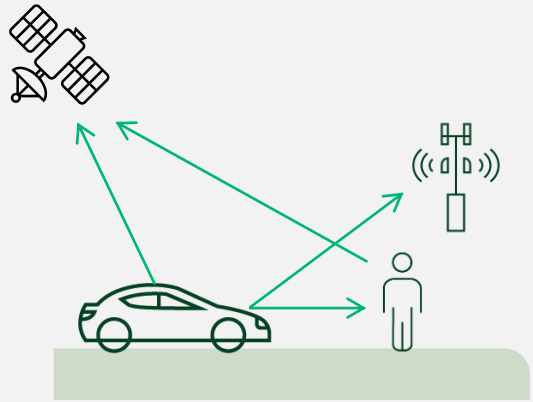


New Applications

Global communications coverage and detailed radio-sensing with multi-purpose radar/comms channels

Non-Terrestrial Networks

Integrated Comms & Sensing

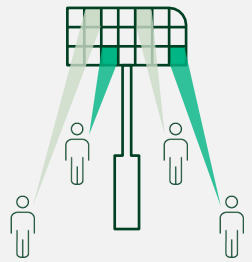


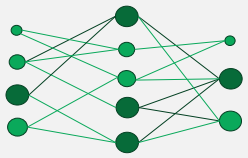
Spectral Optimization

Native application of AI to improve techniques across all 6G — from the signal chain to the network topology

Evolved MIMO

Machine Learning and AI





Customers & Partners are our strength

CUSTOMER STORIES

Efficiently Prototyping 6G Joint Comms and Sensing Systems

With the help of NOFFZ Technologies, researchers at the Barkhausen Institute created a prototyping platform for joint wireless communication and radar sensing for testing communication algorithms.

Learn more

https://www.ni.com/en/innovations/case-studies/22/efficiently-prototyping-6g-joint-comms-and-sensing-systems.html

Thank you for your attention

Please visit ni.com for more information

seyong.lee@ni.com