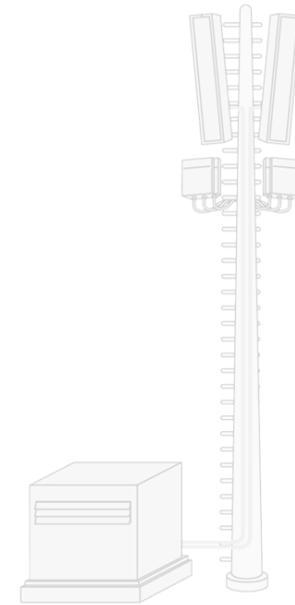**November 2022 | USTTI Course**

vRAN & ORAN
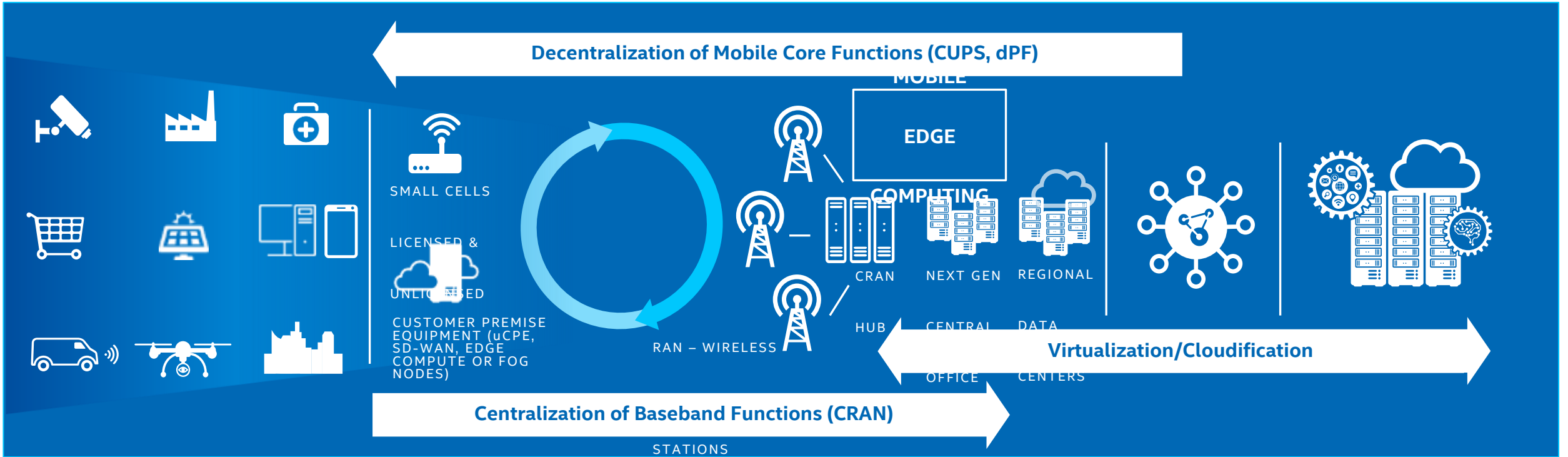
Deepak Dandekar

intel®

Radio Access Networks (RAN)

RAN EVOLUTION TRENDS

Decentralization of Mobile Core Functions (CUPS, dPF)

MOBILE

EDGE

COMPUTING

SMALL CELLS

LICENSED & UNLICENSED

CUSTOMER PREMISE EQUIPMENT (uCPE, SD-WAN, EDGE COMPUTE OR FOG NODES)

RAN – WIRELESS

CRAN

NEXT GEN

REGIONAL

HUB

CENTRAL OFFICE

DATA CENTERS

Virtualization/Cloudification

Centralization of Baseband Functions (CRAN)
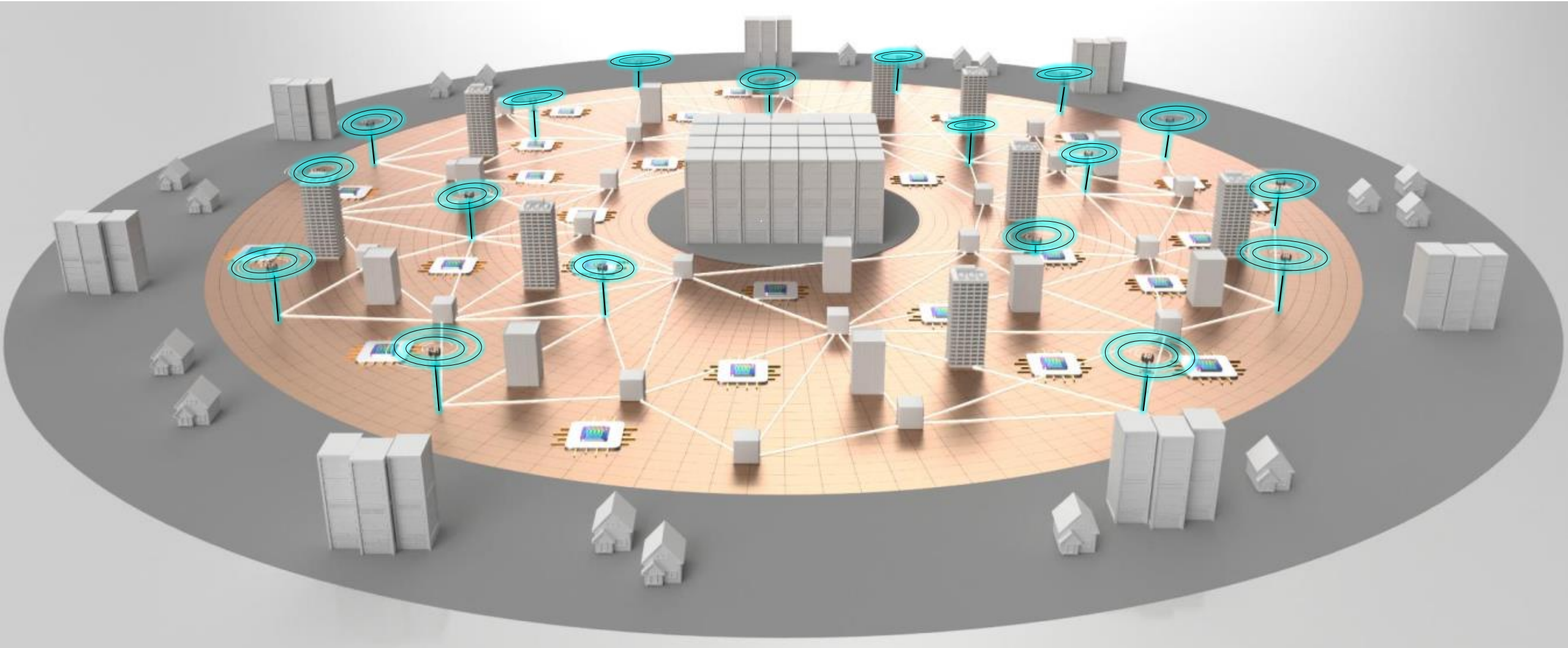
STATIONS

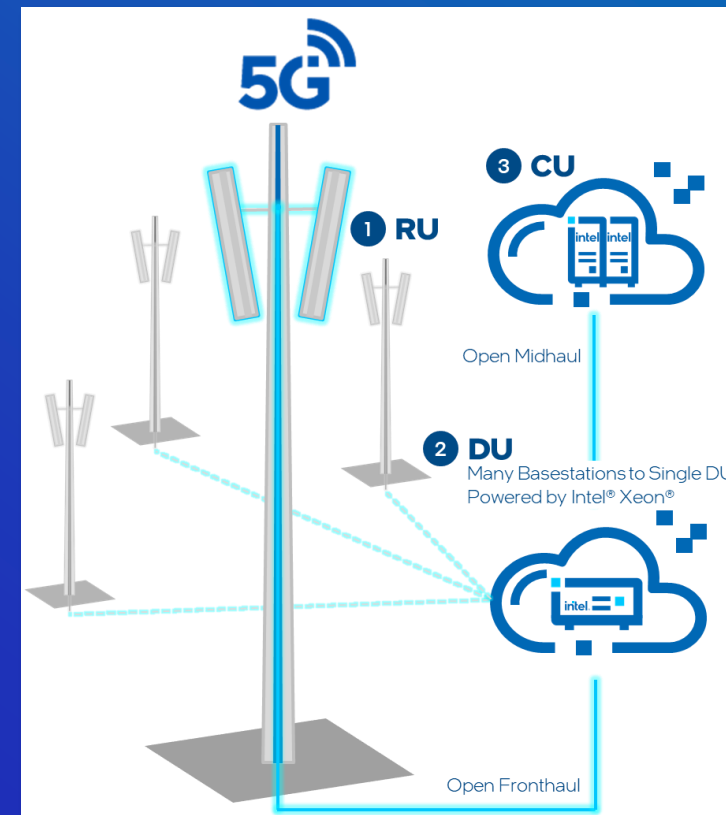| DEVICES/THINGS	ON-PREMISE EDGE	NETWORK EDGE OR REGIONAL DATA CENTER	CORE NETWORK	CLOUD DATA CENTER
LATENCY EXPECTATION	Varies <1 ms	<5 ms	<10-40 ms	< 60 ms	~100 ms

Virtual RAN (vRAN)

Traditional RAN
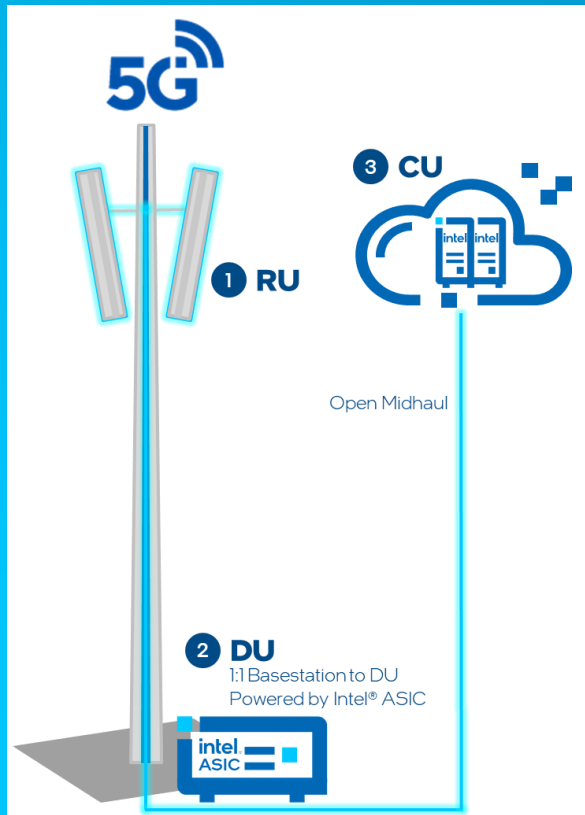
Proprietary, purpose-built and **customized** solutions for TEMs
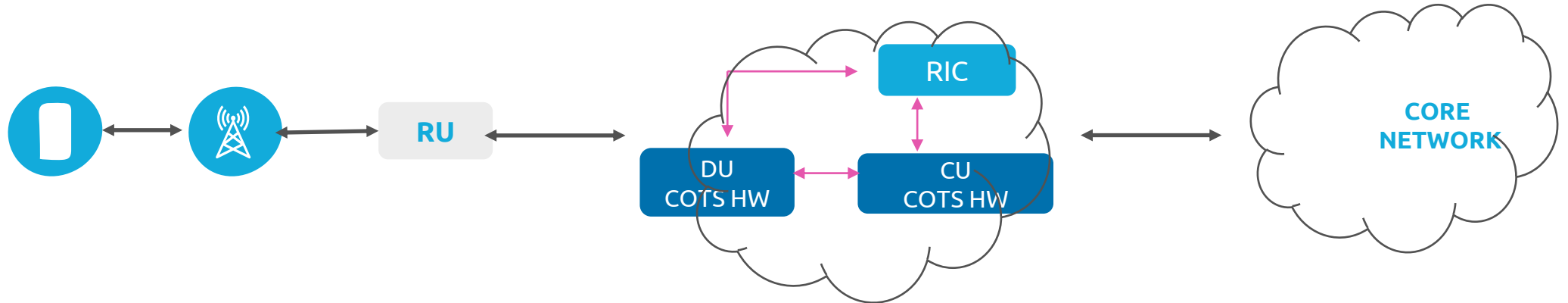
Virtual RAN (vRAN)

Implementation of technologies leveraging **standard server-based architecture plus software** to perform traditional RAN functions
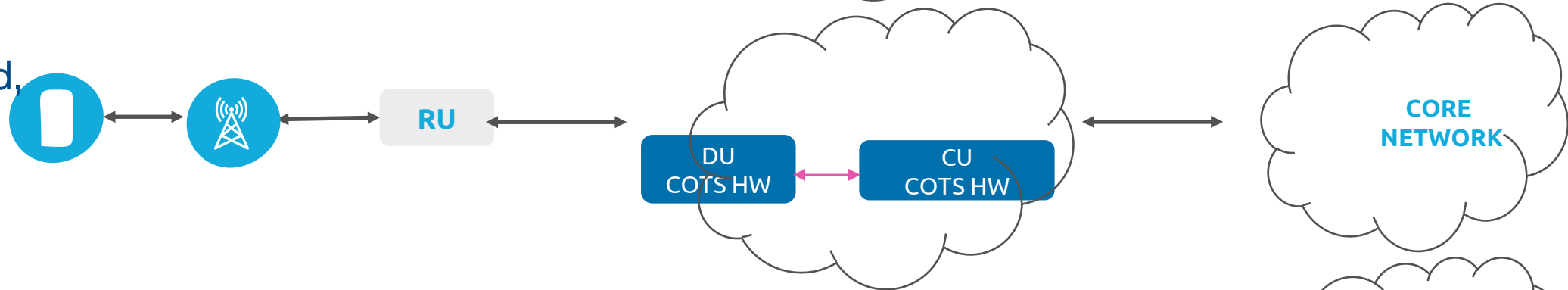
❶ **RU:** Radio Unit
❷ **DU:** Distributed Unit
❸ **CU:** Centralized Unit

Evolution of RAN

Open, Intelligent RAN

RU — RIC — DU COTS HW — CU COTS HW — CORE NETWORK

Disaggregated, virtualized RAN

RU — DU COTS HW — CU COTS HW — CORE NETWORK

Traditional RAN

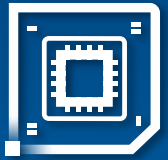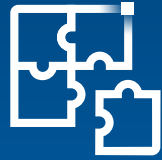RRH — **Base Band Unit (proprietary hardware** — CORE NETWORK

Top Reasons for Adopting Open, Virtual RAN

Layer 1 Virtualization

Common Hardware Platform

Hardware and Software Disaggregation

More Robust 5G Ecosystem

Full Cloud Native Benefits

Fastest Innovation

vRAN/ORAN Momentum with Major Operators

Many vRAN deployments are running on Intel® Xeon®

● Brownfield ● Greenfield

Includes trial/pilot and commercial deployments. Marker indicates estimated long-term deployment goal size.
Greenfield opportunity size is total network. Brownfield opportunity is estimated based on vRAN/ORAN percentage of total network size.

Open, Virtual RAN in the Market

verizon✓

Deploys +8K vRAN sites on way to 20K by 2025

vodafone

Switched on UK's first 5G Open RAN site in Jan. 2022

Telefónica

Brownfield-based Open RAN network turned on for live traffic

dish

1st US cloud-native, Open RAN-based 5G network

Rakuten Mobile

5G cloud-native mobile network based on Open RAN principles

Ecosystem Innovations

Capgemini
Using deep learning to boost subscriber quality of experience

Canonical Ubuntu
Brings fully secured, open source, intelligent orchestration & automation for CSP Cloud and Edge Infrastructure

cohere technologies
Universal Spectrum Multiplier software for up to 2x spectral efficiency gain

DEEPSIG
AI-enhanced L1 algos enabling up to 63% throughput enhancement & 42% computational efficiency[1]

ERICSSON
Ericsson-Intel Tech Hub launched to prioritize, develop, & deliver innovations for virtual RAN

JUNIPER driven by Mist AI
Cloud native solutions, delivering leading ORAN use cases for RAN optimization & energy efficiency

vodafone / intel / O-RAN ALLIANCE / KEYSIGHT / Radisys / WNDRVR
Sustainability advances in an E2E multi-vendor setup, with up to 12% power savings

Microsoft
Capturing wireless data via Intel® FlexRAN™ enabling RAN analytics for optimal user experience

[1]DeepSig AI I L1 improvement for Intel® FlexRAN running on 3rd Gen Intel® Xeon® Scalable Processor: 63% increased uplink throughput and 42% computational efficiency in the O-DU. Estimated as of 9/13/22.

5G runs on intel

9

5G runs on

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