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AI-RAN Global Collaboration & Use cases

AI-RAN Alliance Korea meeting Aug 2026

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6G Is Entering a Multi-Year Validation Investment Cycle

Standards maturity is turning 6G vision into engineering proof



1. **2023** — IMT-2030 framework
2. **2025–26** — 6G early studies
3. **2027+** — 6G spec exploration
4. **2030** — Commercial readiness

The market is shifting from 6G ambition to engineering requirements, increasing demand for simulation, emulation, RF validation, OTA, AI benchmarking, and digital twin workflows.

TECHNOLOGY DRIVER	WHY IT MATTERS
AI-native wireless	AI must be validated under realistic 6G RF and network conditions
Spectrum complexity	Massive MIMO and FR3 beamforming demand testing via OTA
Sensing	ISAC only becomes actionable with AI to interpret the returns

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AI: Artificial Intelligence
FR3: Frequency Range 3
IMT: International Mobile Telecommunications
ISAC: Integrated Sensing and Communication
MIMO: Multiple-Input Multiple-Output
NTN: Non-Terrestrial Networks
OTA: Over The Air
RF: Radio Frequency

AI-Native Wireless Must Be Proven, Not Assumed

AI is moving deeper into the radio stack, making repeatable validation a prerequisite for commercial confidence

01 **Training Data**
Quality, bias, coverage

02 **AI Model**
Behavior, interoperability

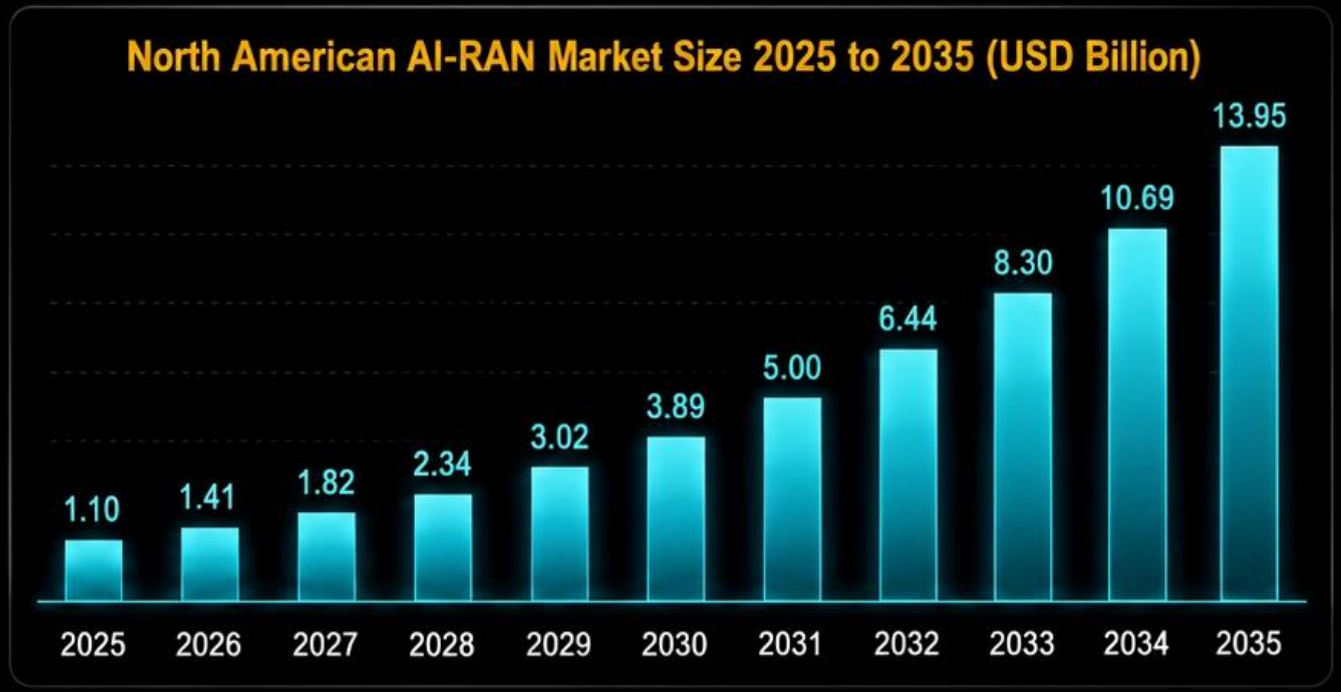
03 **RF Reality**
Impairments, mobility, fading

04 **Network Outcome**
Latency, energy, QoS

KEY SYSTEM DYNAMICS

- AI shifts wireless design from fixed algorithms to adaptive model behavior.
- Model performance depends on training data, RF impairments, mobility, and interference.
- Validation must connect AI behavior to network KPIs: latency, energy, compute cost, and QoS.

AI-native 6G expands Keysight's opportunity from RF validation to AI-RAN benchmarking.



Source: Precedence Research, AI and RAN Traffic Optimization Market

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AI: Artificial Intelligence
AI-RAN: AI Radio Access Network
KPI: Key Performance Indicator
QoS: Quality of Service
RF: Radio Frequency

AI-Native Networks & Devices

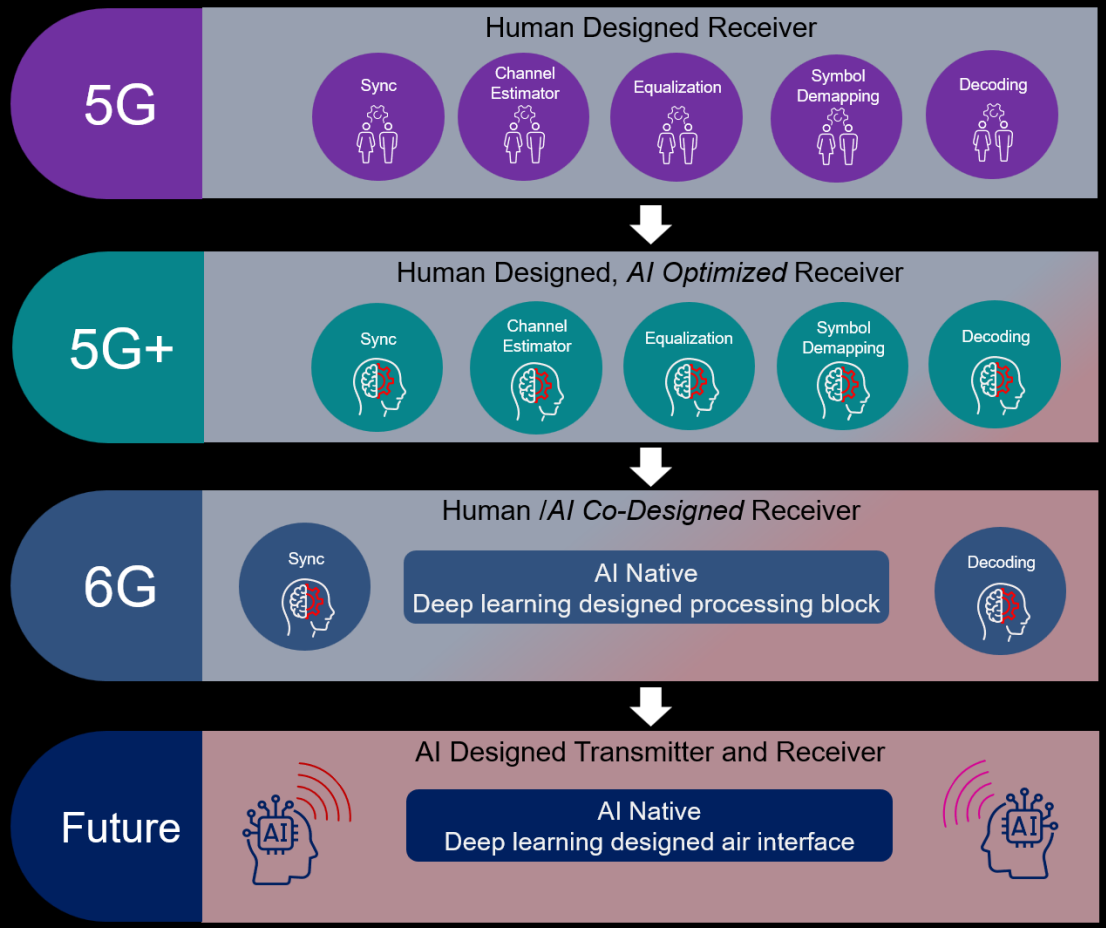
AI/ML will revolutionize wireless communications by optimizing transmitter and receiver components in new and innovative ways.

Benefits

- Solve problems better than existing algorithms
- Make intelligent decisions across multiple dimensions
- Resolve issues currently unmanageable

Challenges

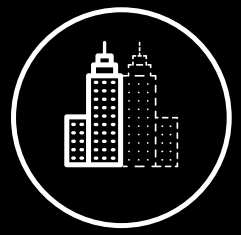
- Need to pressure-test algorithms to deliver consistent results
- Generating data sets for training and validating algorithm performance



Key Challenges for AI RAN Development and Testing



How to generate high quality and curated datasets for AI algorithm development and validation?



How to perform high scale data generation, benchmarking and inferencing using a Digital Twin environment?



How to validate AI algorithm performance improvements?

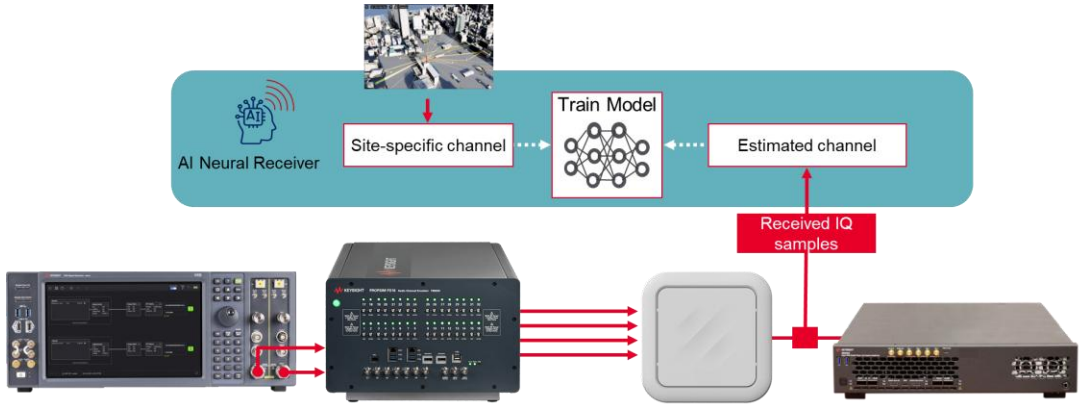
6G AI/ML PHY Research use case

- Simulate RF system architecture and integrate AI/ML algorithms for PHY processing
- Train and validate AI/ML models with realistic scenarios



6G AI-Based Models Validation Solution

EDA and real hardware to integrate AI/ML models into the PHY



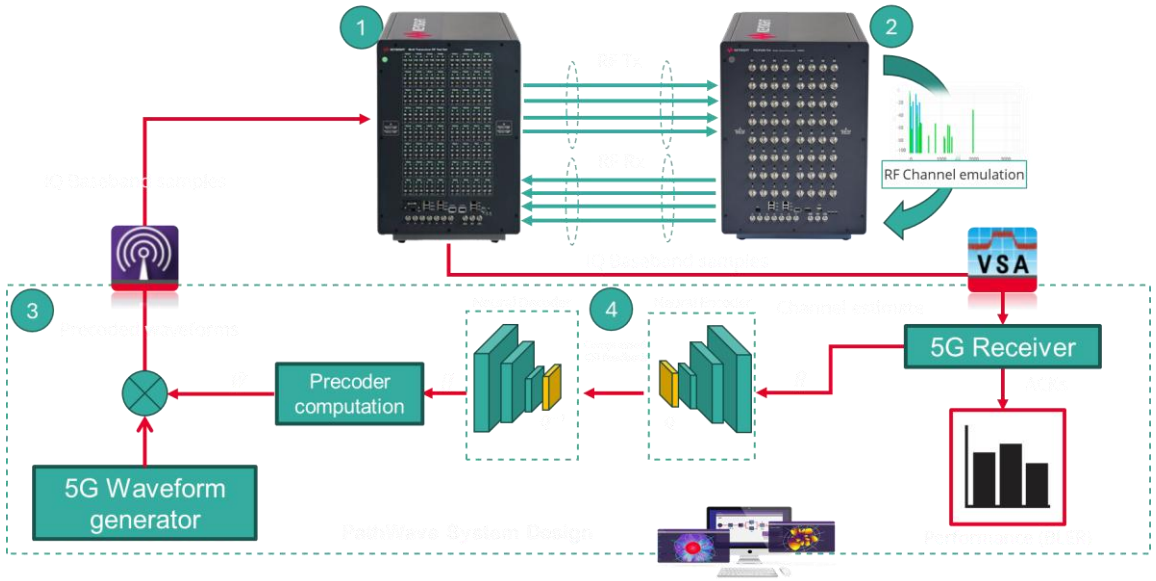
6G AI Neural Receiver Design

HIL system for AI component performance verification

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6G AI/ML PHY Research use case

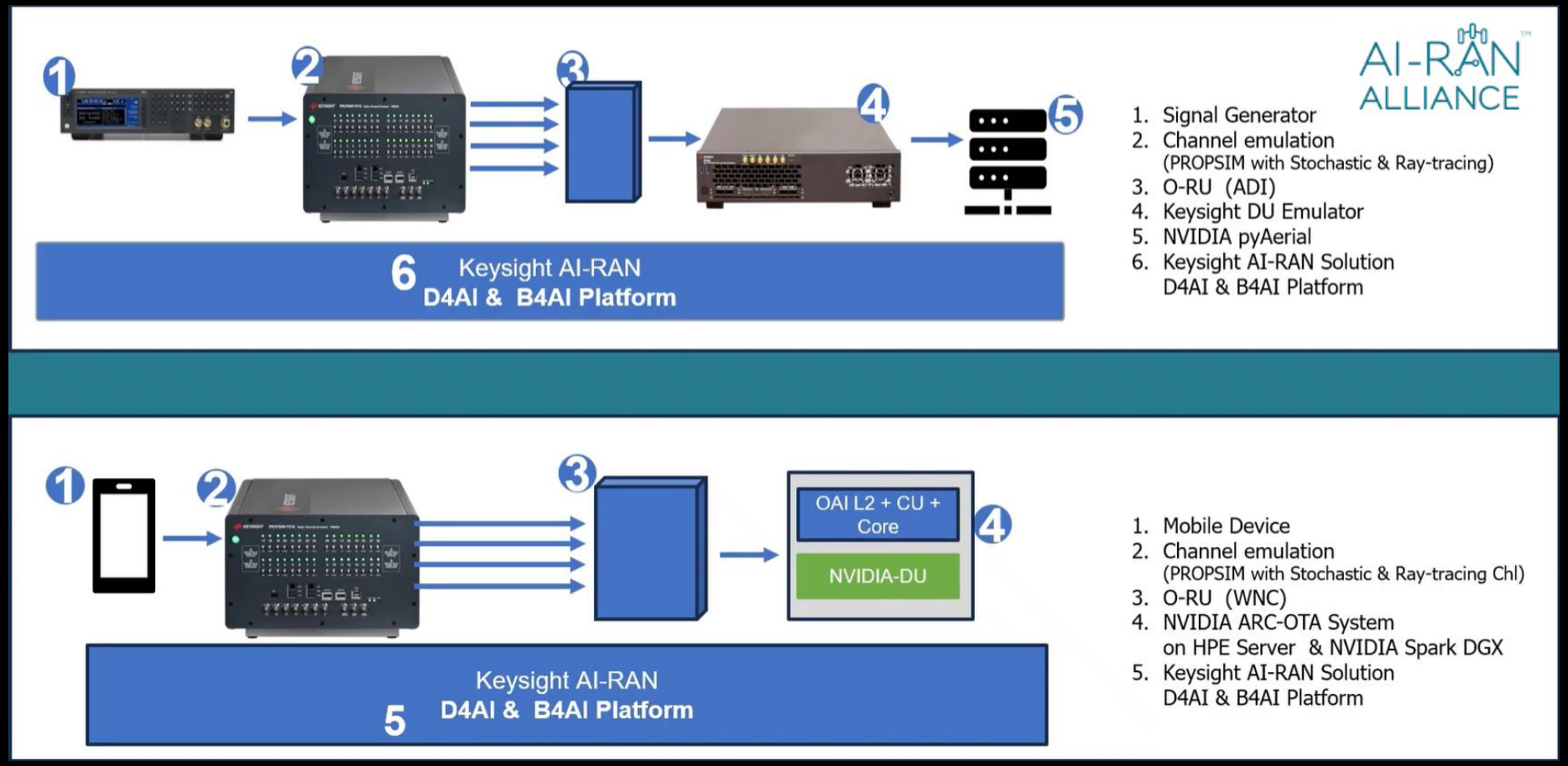
- Generate high-quality datasets in the lab
- Field-to-lab: Include realistic impairments (simulations are NOT enough)
- Generate-Train-Validate within the same solution



CSI Compression Test Solution

HIL system with RF channel emulation capabilities for testing and validating CSI compression models

6G AI/ML
& Bench Marking use case

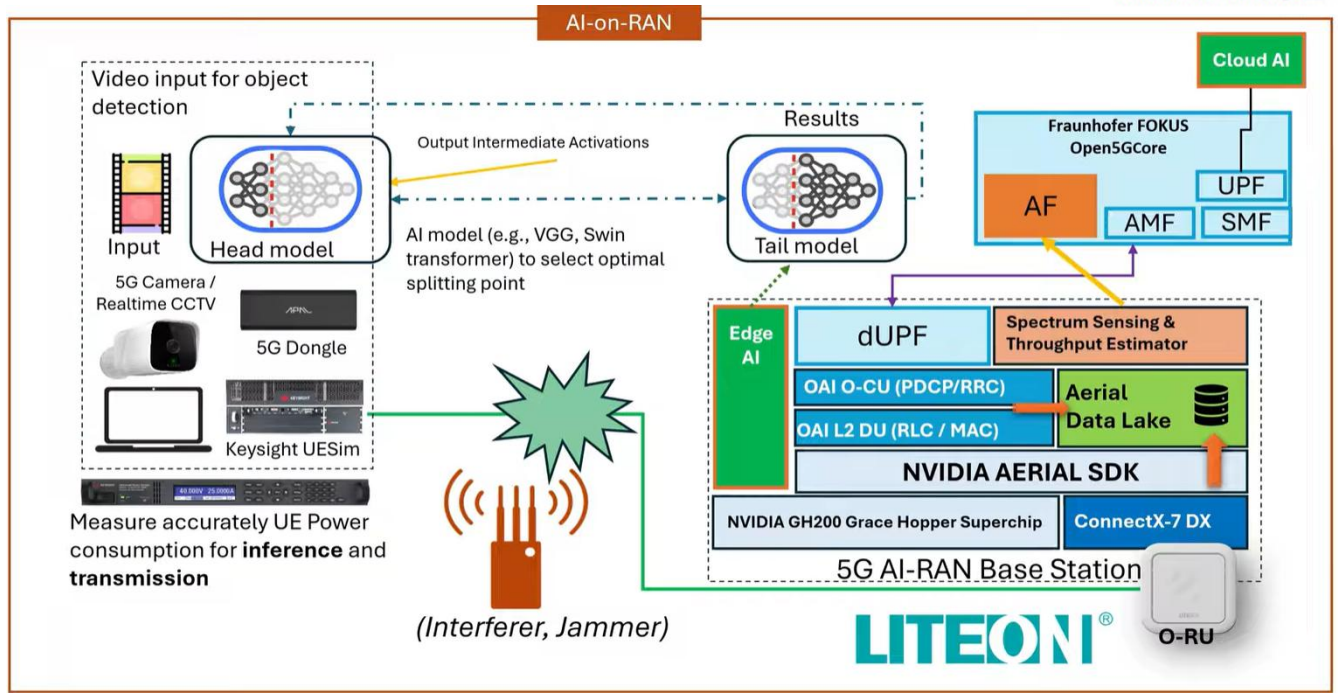


AI-based Workflow for PUSCH Channel Estimation

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AI/ML on RAN
Research use case

- Addressing Privacy and Performance Trade-offs
- AI-Powered Adaptive Model
- Optimized Efficiency and Security



Adaptive Privacy-preserving Edge AI Model Partitioning Solution via Spectrum Sensing

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Circuit and Network Digital Twins

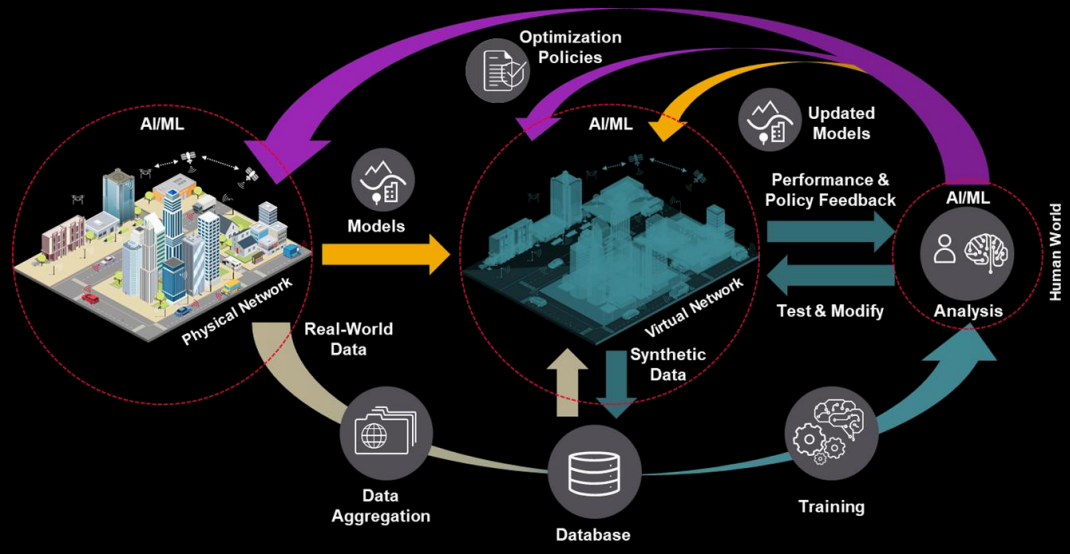
By mirroring the infrastructure, operations, and lifecycle of a physical network in real time, digital twins enable continuous interaction between the digital and physical environments.

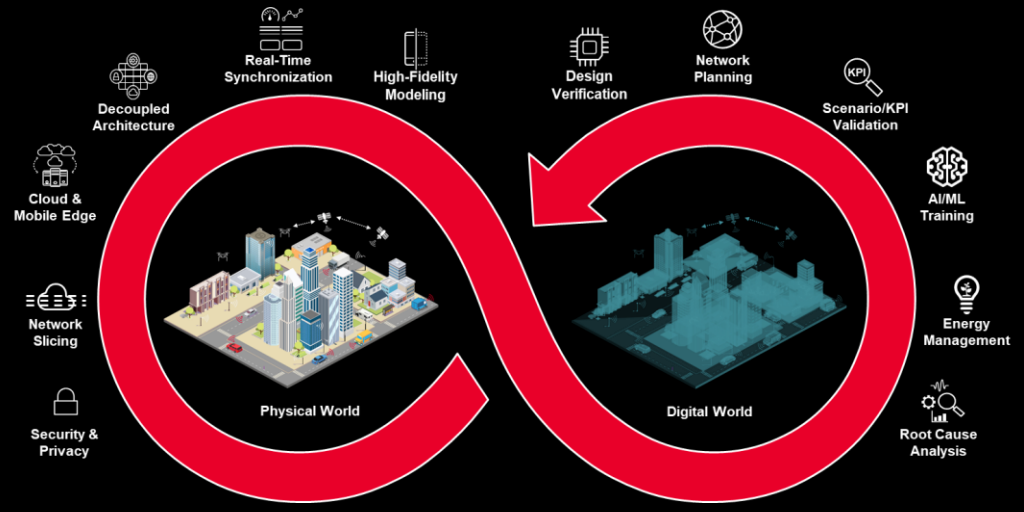
Benefits

- Enables realistic wireless system performance testing
- Reduces reliance on field testing ("test before deploy")
- Accelerates 5G-Advanced and 6G use case development (e.g., ISAC, UM-MIMO)

Challenges

- Real-time synchronization due to high computational and bandwidth demands
- Sustaining long-term accuracy of digital replicas
- Lack of standardized architectures and data formats

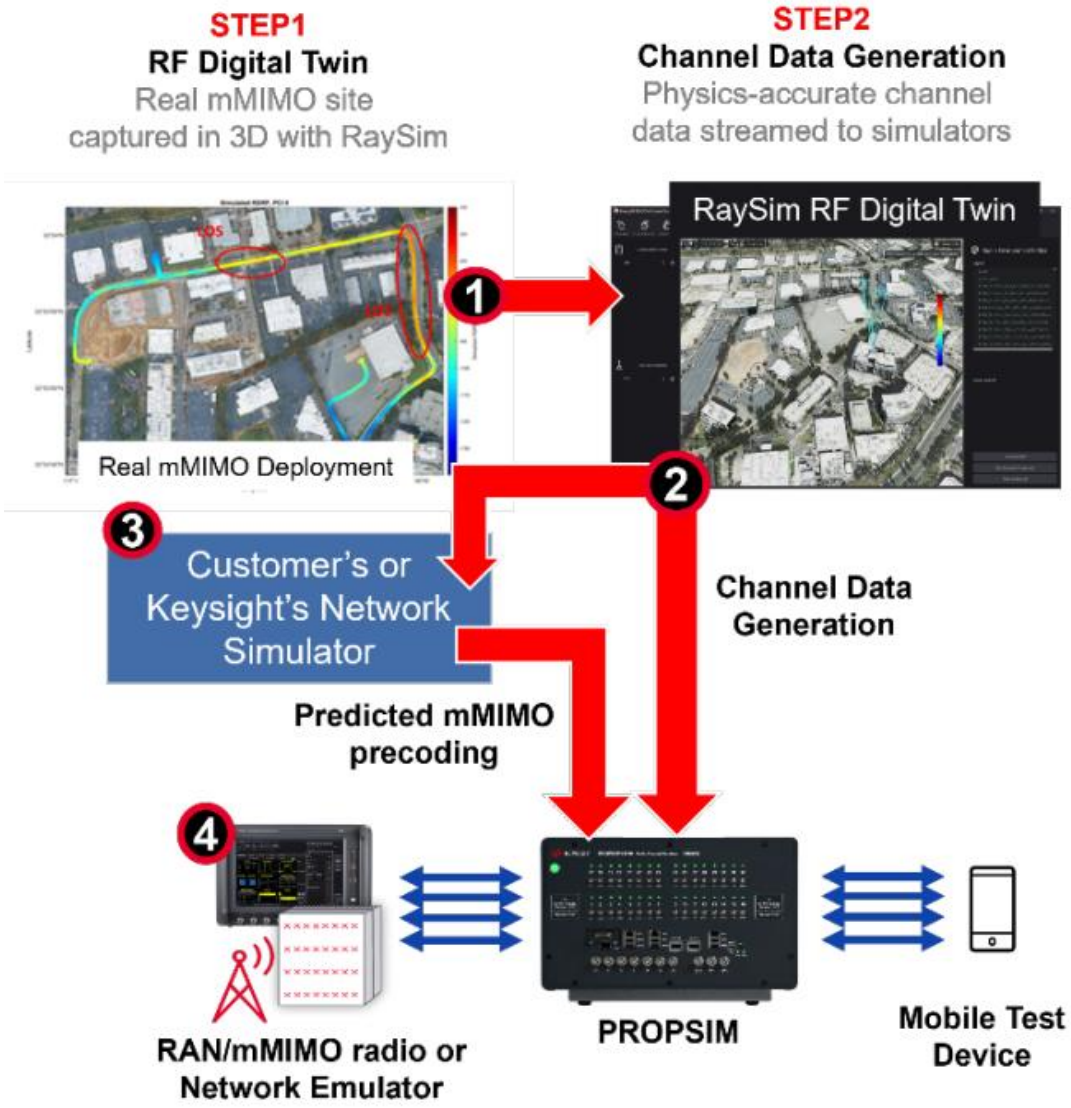




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Digital Twins/Network for AI-Driven mMIMO

- Bring 6G research to development faster with high-fidelity digital twin environments
- Create accurate channel modeling for simulation and emulation use cases
- Virtualization of real mMIMO deployments in site-specific 3D environments
- Generates physics-accurate channel data via deterministic raytracing



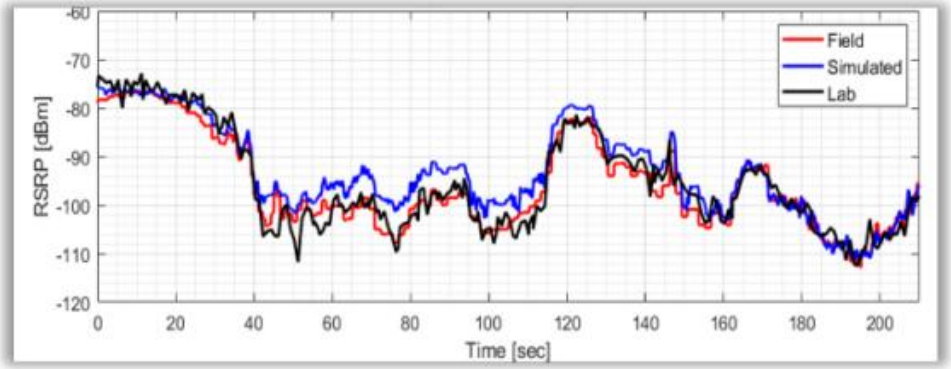
Digital Twins/Network for AI-Driven mMIMO

- From simulation to Emulation workflow for accurate mMIMO test in the lab
- Seamless integration into Software-in-the-Loop and Hardware-in-the-Loop workflows

STEP3
Network Simulation
Predict mMIMO precoding via Customer Network Simulator

STEP4
Real-Time Emulation
Real hardware test bed in the lab

Field OTA vs Lab Throughput (% Match)	
Rank 4	**124%**
Rank 3	**107%**
Rank 2	**105%**
Rank 1	**92%**

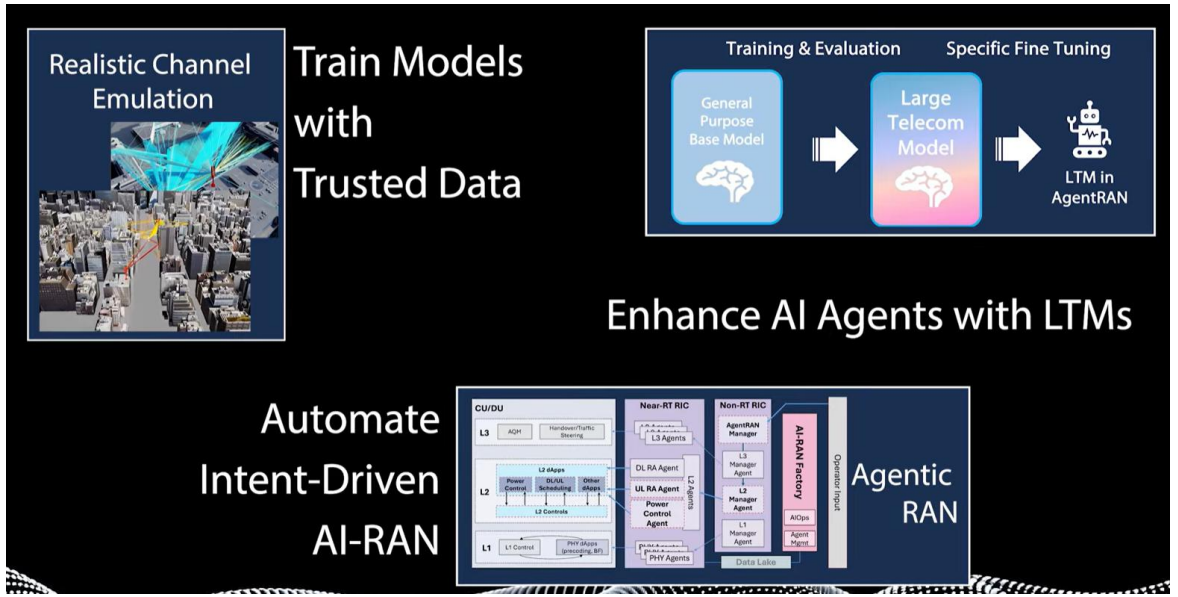


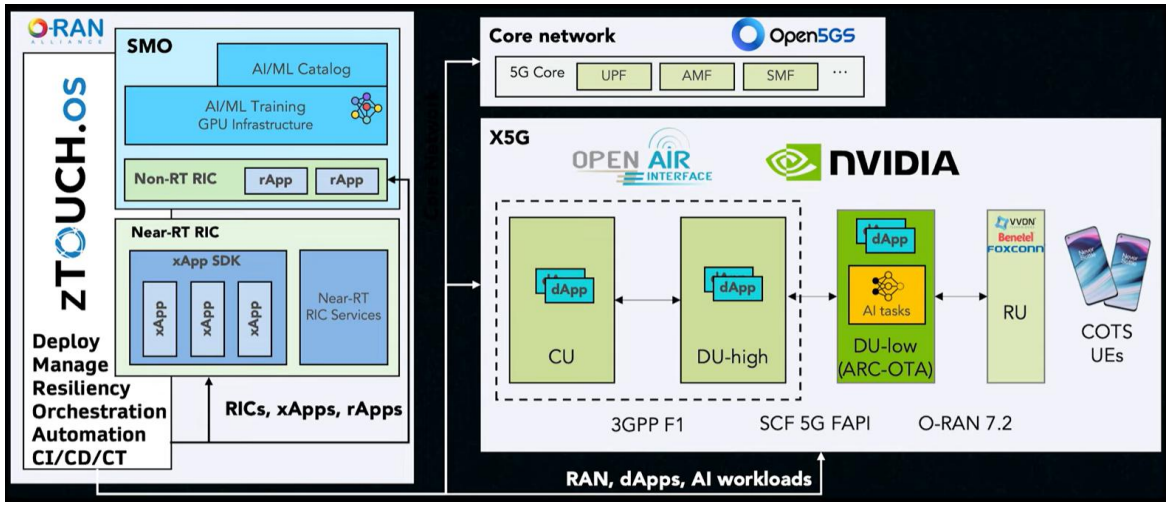
3.57 dB RMSE between field, simulated, and lab RSRP measurements-demonstrating industry-leading RF Digital Twin accuracy across the full simulation-to-emulation workflow

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The Agentic RAN

- **Automate data collection** on programmable open-source networks
- **Emulate high-fidelity wireless channels** with Keysight PropSIM
- **Inject time-varying interference** into the Agentic test bed
- Validate **Large Telco Models** under realistic propagation conditions





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부록 · Use Case Link

1 엣지 AI 모델 분할

UeSIM · Power Analyzer

2 ISAC 드론·사람 추적

S5040A · PROPSIM · SA

3 PUSCH 채널추정 AI

PROPSIM · SG · AI Sim Toolset

4 AI-and-RAN 오케스트레이터

RuSIM

5 SRS 채널추정 AI

PROPSIM

6 Agentic RAN · LTM

RaySim · PROPSIM

7 QCT 에너지 rApp

UeSIM · Power Analyzer

8 KAI-IB 추론 분석

KAI-IB

9 AI Scaling (DC)

DCA-M · INPT · FITS

10 AI RF 설계 (ADS)

ADS

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카메라로 스캔하면 각 사례의 공개 영상으로 연결됩니다


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