



How Should We Test AI-Native 6G?

Validation Before Prime Time

Dr Paul Harris — Senior Principal Wireless Architect, CTO Office, VIAVI Solutions

one6G Summit 2026 — Session 4



Agenda

How Should We Test AI?

- 01 AI From Above to Within: A Short History

- 02 Where AI Runs, and Why Generalization Is the Open Problem

- 03 VIAVI Generative Reality Digital Twin (GRDT)

- 04 How GRDT Works: Architecture & the GRDT Studio Platform

- 05 Who GRDT Is For, and Where It Applies

- 06 Takeaways

AI From Above to Within

The Progression of AI in Mobile Communications



4G

SON & Automation

Self-optimizing networks handle configuration and basic fault recovery automatically



5G

3GPP Standardizes AI/ML

First in the core, then RAN operations, then — for the first time — inside the air interface itself



6G

AI-Native

AI is a native part of the 6G architecture from day one

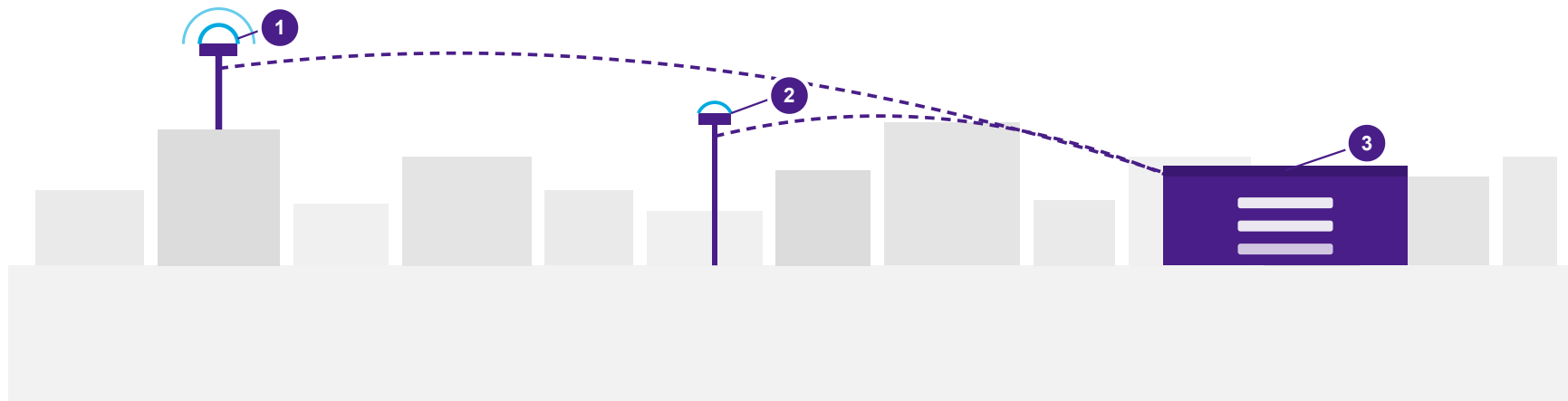


4G leveraged AI **above** the network, 5G started to bring it inside one layer at a time. 6G will be the first generation to design it in **from the outset** — a native architectural layer, not an add-on.

AI Across the Live Network

Increasing Layers of Complexity

VIAXI



1 📶 Air Interface

BEAM MANAGEMENT & CSI COMPRESSION

Steers beams and compresses channel feedback in real time — validate decisions hold up across real traffic and interference

2 📡 RAN / Edge

LOAD BALANCING & MOBILITY

Balances load and optimizes handover at the cell edge — validate under real mobility and congestion, not just simulation

3 🗄️ Core

NETWORK ANALYTICS

Feeds mobility, QoS, and slice-selection decisions from real network analytics — validate end-to-end impact before it reaches a live subscriber

The Core Problem: Generalization

Not whether an AI decision repeats — whether it holds outside validated conditions



Bounded by Design

Every model — and every test suite — is only validated against a bounded set of conditions, never the full space a live network can produce



An Open Axis, Not a Solved One

3GPP has treated generalization as its own axis, separate from raw performance, and it is a question not yet answered



Conditions Move, Continuously

Traffic, interference, and mobility patterns shift outside any bounded domain every day, in ways a fixed test plan didn't anticipate



The problem is not unpredictable AI. It's **proving a validated domain holds — and knowing the moment it doesn't**

What Conformance Testing Can Realistically Provide

What's provable today, and what's still open

✓ Proves Today

- ✓ Conformance to specs within defined and bounded test conditions
- ✓ Interoperability across vendors against a shared reference — e.g. RAN4's standard test decoder for two-sided CSI models
- ✓ Repeatable pass/fail benchmarks against a known, specified scenario set

⊕ Can't Prove Alone

- Behavior in conditions outside the validated domain — the generalization gap itself
- Drift as models keep learning and adapting after deployment
- What should happen when live conditions move outside that domain



RAN4 lists **generalization verification** as its own line item in AI/ML testing — separate from inference and lifecycle-management testing



How VIAVI Is Tackling the Problem

The Generative Reality Digital Twin (GRDT)

Continuous Testing with GRDT



VIAVI Generative Reality Digital Twin™ (GRDT) is a live, real-time digital replica of a network — one or more federated domains, trained on high-fidelity, live, real network data. It generates conditions that haven't happened yet, to see how the network responds

Only GRDT integrates these three essential functions to deliver a digital twin with unprecedented accuracy and scope



Trained on Real Data, Continuously Calibrated

High-fidelity, collected from and
continuously calibrated by live networks
under real conditions



Generative

Creates new conditions — incidents,
coverage failures, new AI traffic — to see
how the network responds before it
happens for real

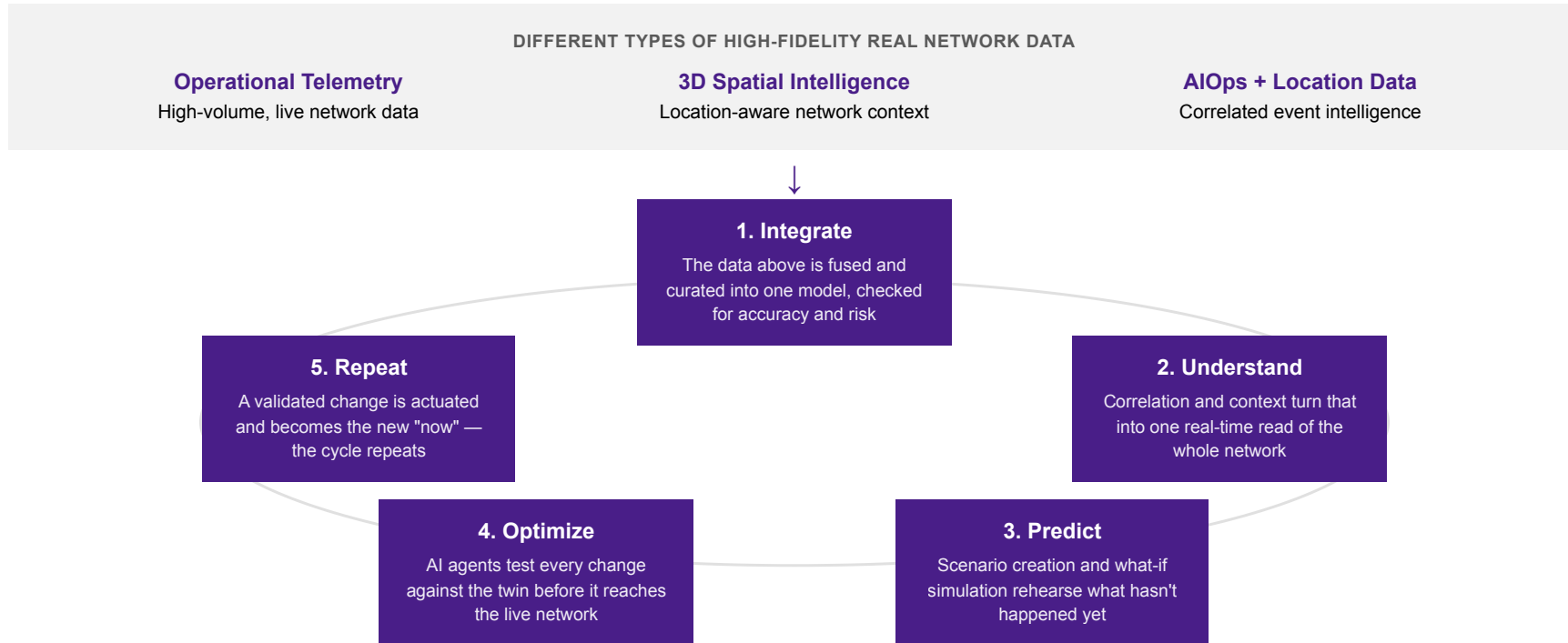


Federated Across Domains

RAN, IP transport, core, RF, NTN —
validated against a single shared body of
real data

How It Works

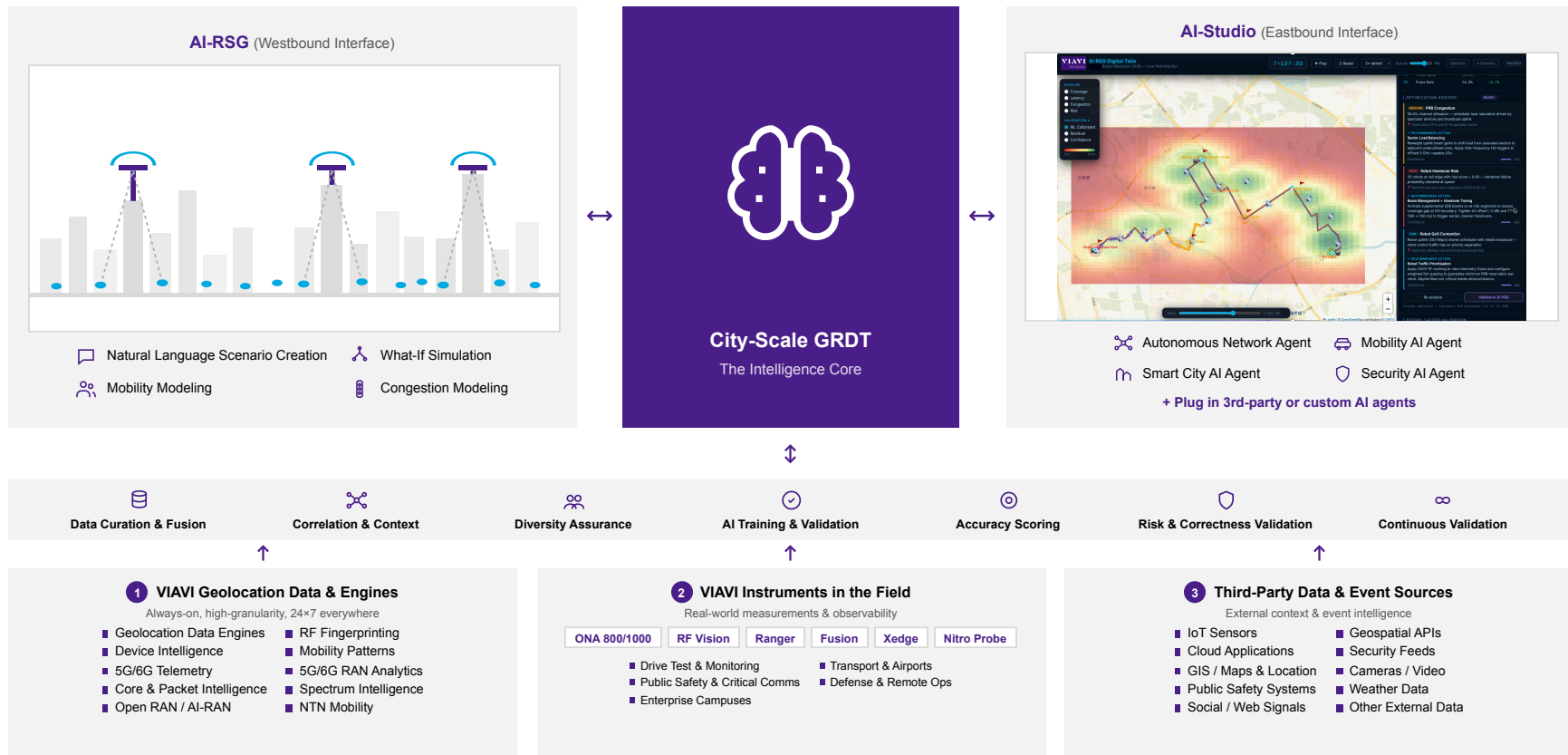
A digital twin must know what the network is doing **now**, and safely predict what it will do **next**. It all starts with the ground truth network data, curated & correlated into one live model:



VIAVI Generative Reality Digital Twin (GRDT)

Integrate → Understand → Predict → Optimize

VIAVI



GRDT Studio — The Control Centre

Robot Marathon at MWC Shanghai 2026

VIAVI



Who Is GRDT For?

Segment	What GRDT proves for them
 Service providers, operators	Every AI-recommended change is safe before it gets deployed in the live network
 Infrastructure NEMs	AI features and interoperability hold up in real network conditions, across every vendor they support, before they ship
 Chipset & OEMs	Silicon and devices validated at scale before tape-out, on training data grounded in real conditions
 Military & gov	Mission-critical resilience in contested, congested, and satellite conditions, with independent validation
 Anyone building toward 6G	Readiness against AI traffic that exists on no live network yet

Where Does GRDT Apply?

Where there is no tolerance for failures:



See the ripple effects before you make the change

Test how a change in one part of the network plays out everywhere else, before it goes live



Find the real cause, fast

Trace a problem to its source across the whole network, from radio to core



Catch weak points before they become outages

Surface risks that only appear under real conditions, and prove the fix before you deploy it



Rehearse the scenario before it happens

Emergency incidents, coverage failures, sudden congestion, new classes of AI traffic



Get ahead of 6G

Validate against traffic that no live network carries yet

01



AI Is Moving From Above the Network to Within

AI has lived above the network since at least 4G. 6G moves it inside by design.

02



Conformance Does Not Guarantee Generalization

Conformance testing proves behavior within a bounded, validated domain — not what holds once live conditions move beyond it.

03



GRDT Facilitates Deploying AI With Minimised Risk

The Generative Reality Digital Twin validates against real network data — before anything touches the live network.

If AI learns continuously, we must test continuously.



Thank You

Dr Paul Harris — Senior Principal Wireless Architect, CTO Office, VIAVI Solutions