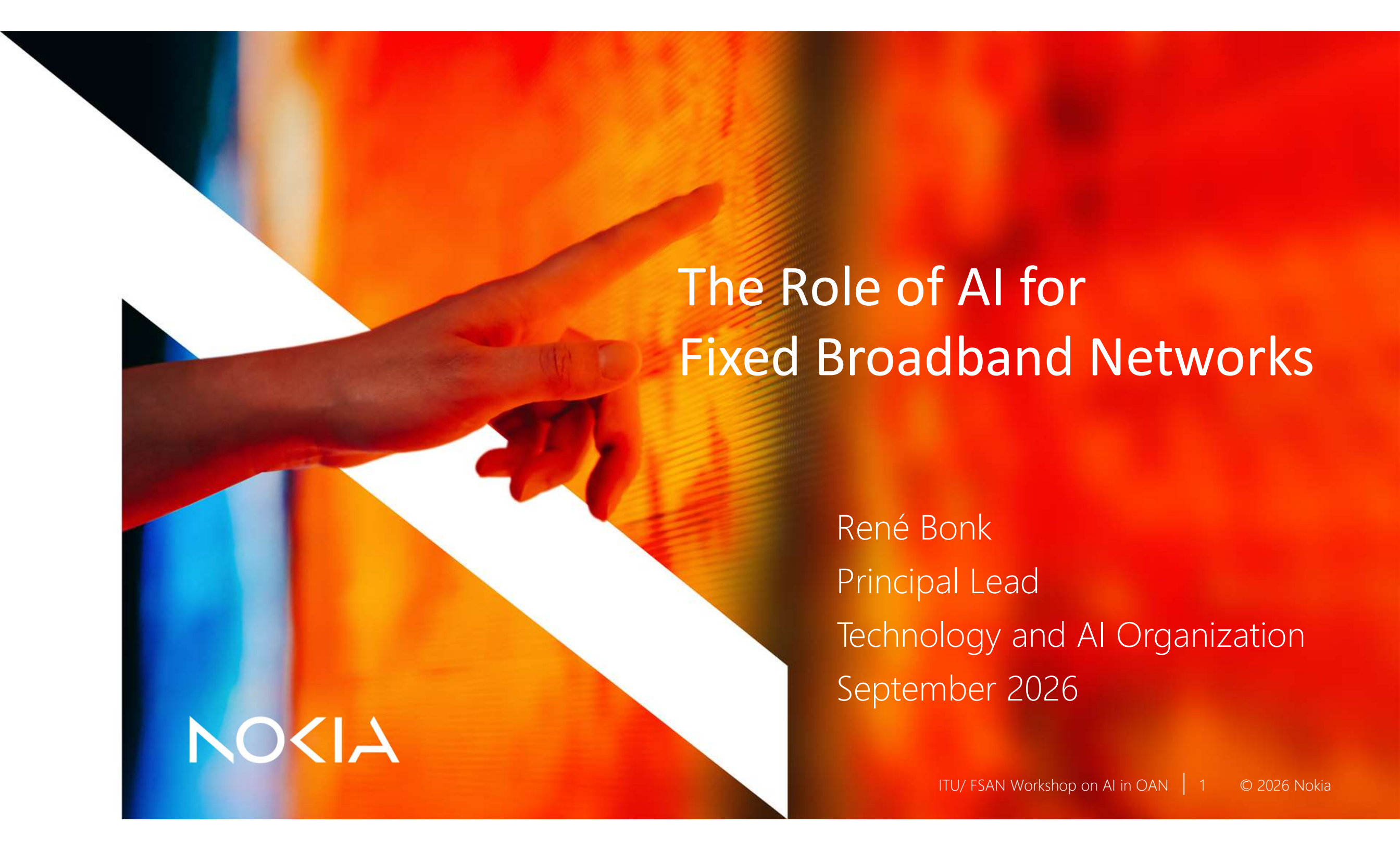




The Role of AI for Fixed Broadband Networks

René Bonk
Principal Lead
Technology and AI Organization
September 2026

NOKIA

AI in Fixed Broadband Networks

Broadband networks for AI

AI drives new network demand

AI applications are starting to modify network demand and can accelerate this shift

→ Lower latency, higher uplink & towards guaranteed QoE

AI for broadband networks

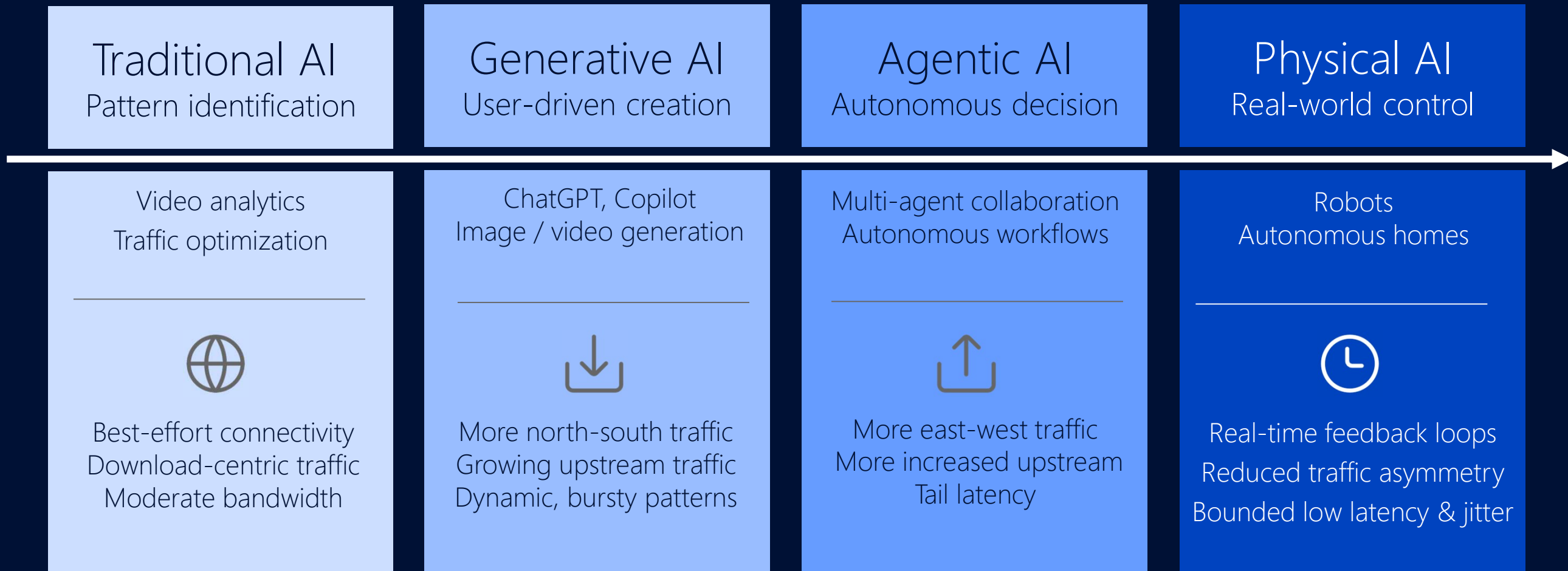
AI optimizes network operations

AI already enables automation and will further optimize network operations

→ Lower OPEX & improved QoS

- **These two forces occur in parallel — with potential to drive both growth and transformation**
- **AI has the potential to reshape how value is generated in broadband networks**
- **The scale and timing are still evolving — but the direction of change is emerging**

Impact of AI on the Traffic Pattern for Broadband Networks



→ AI is not only increasing bandwidth demand, but it is also driving a shift toward uplink-intensive traffic patterns and connectivity requirements that are increasingly sensitive to latency, jitter and reliability performance.

The AI Compute Continuum: From Cloud to Edge to Device AI

Snapshot September 2026

							
Feature / Requirement	AI Cloud Factories	Edge Cloud Compute	Residential Gateway	Home Devices - Entertainment	Game Consoles	Smart / AR Glasses	Smartphones (high-end)
Compute [TOPS]	10m-10b+	100s to 1000s	Few 10s	Few (e.g. 20 w NPU)	Very few 10s (e.g. 300 w GPU)	Very few (on-device)	Multiple 10s
Primary AI Workload	Training	Low latency inference	Network optimization, Local inference	Video enhancement	Interactive AI Agents	Context awareness	Personal assistants
Key driver	Scale	Latency	Privacy	Experience	Responsiveness	Real-time	Personalization
AI models	Frontier LLMs (>100B)	Multi-tenant inference (10B-200B)	Mid-size (3-7B)	Small task-specific (0.5-2B)	Mid-size (3-7B)	Offload required (≤1B)	Medium (5-10B)

→ AI is evolving from a centralized cloud paradigm into a distributed compute continuum spanning cloud, edge, home, and device domains, with workload placement driven by scale, latency, privacy, power and personalization requirements.

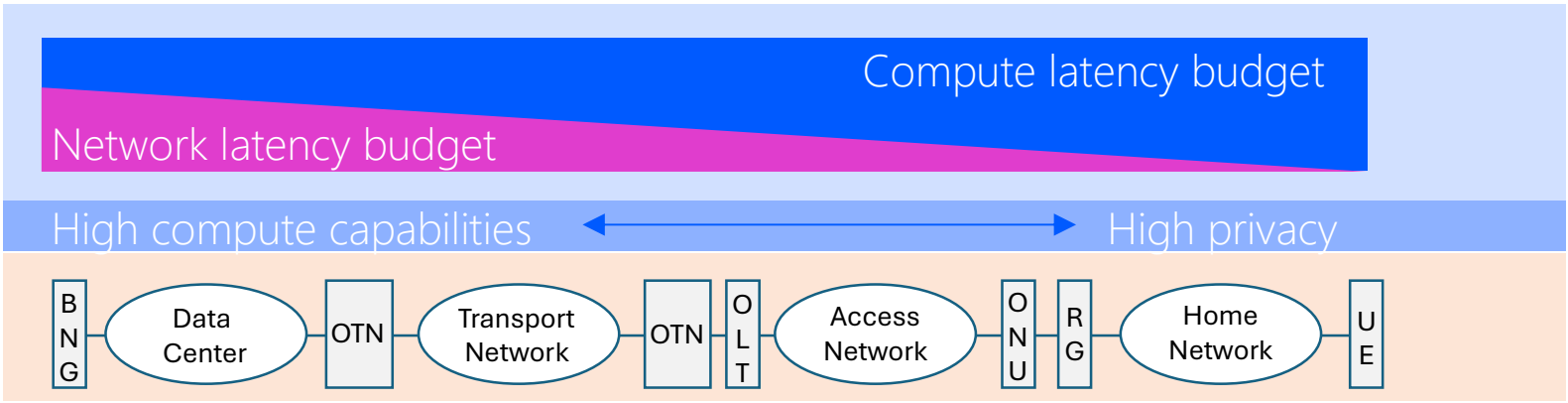


AI Workload Placement is Shaped by Compute and Connectivity

End-to-end latency budget
= Network + compute for AI inference

Privacy & Compute capability

Communication network elements



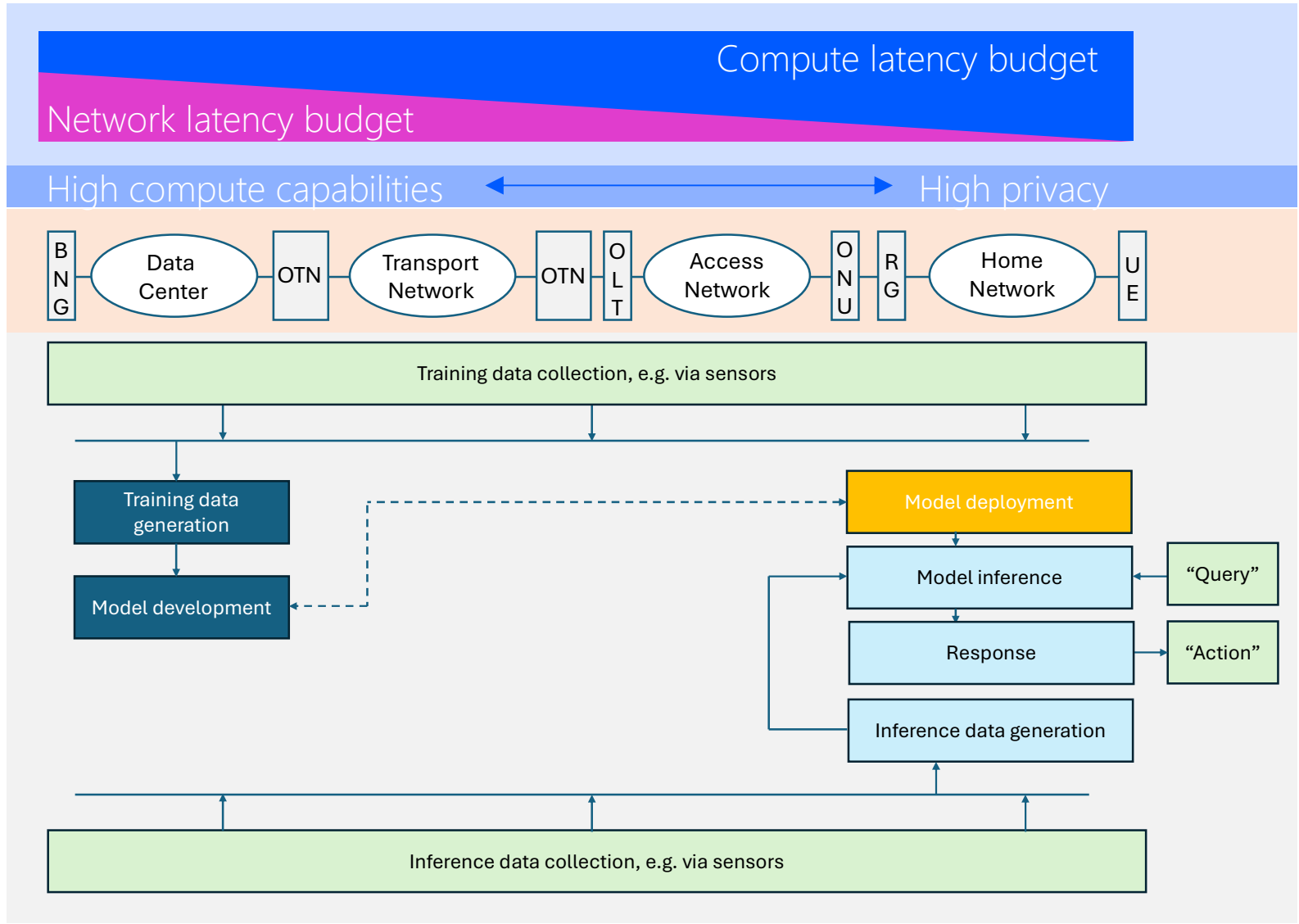
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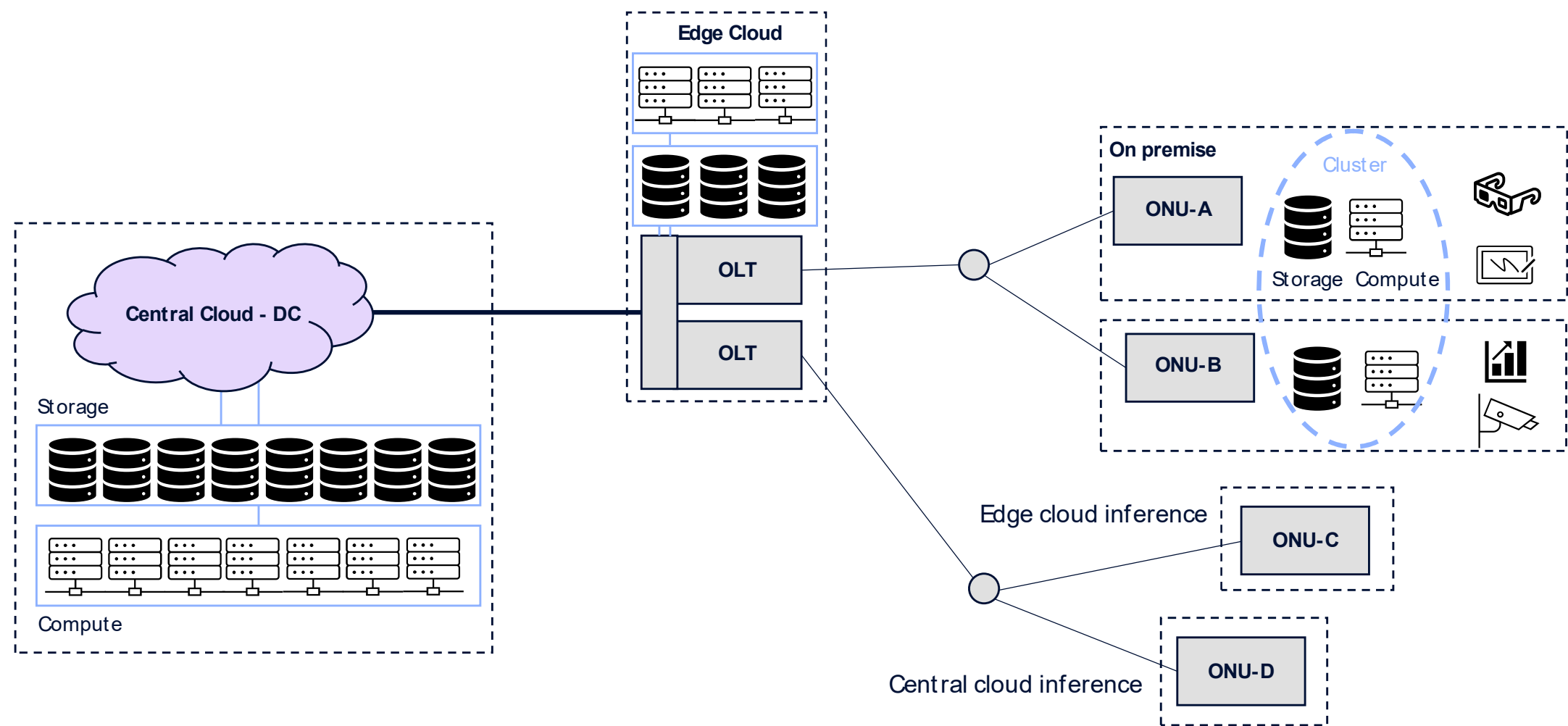
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Communication network elements

AI lifecycle across the compute continuum
AI training and inference flows
(an exemplary mapping)



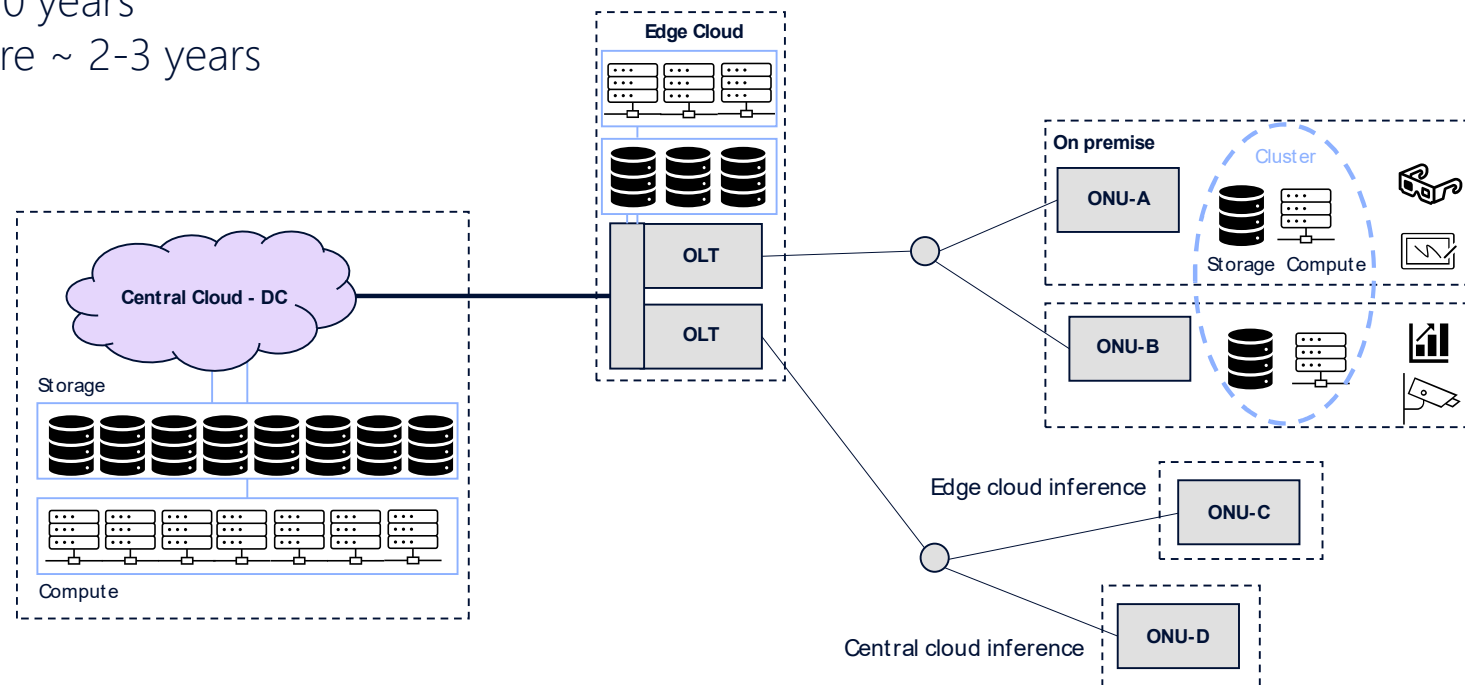
PON as the Interconnecting Fabric for Distributed AI Resources



PON as the Interconnecting Fabric for Distributed AI Resources

AI and telecom operate on different innovation cycles:

- Consumer devices ~ 3-5 years
- Enterprise compute ~ 5 years
- Telecom optical ~ 10 years
- AI GPU infrastructure ~ 2-3 years



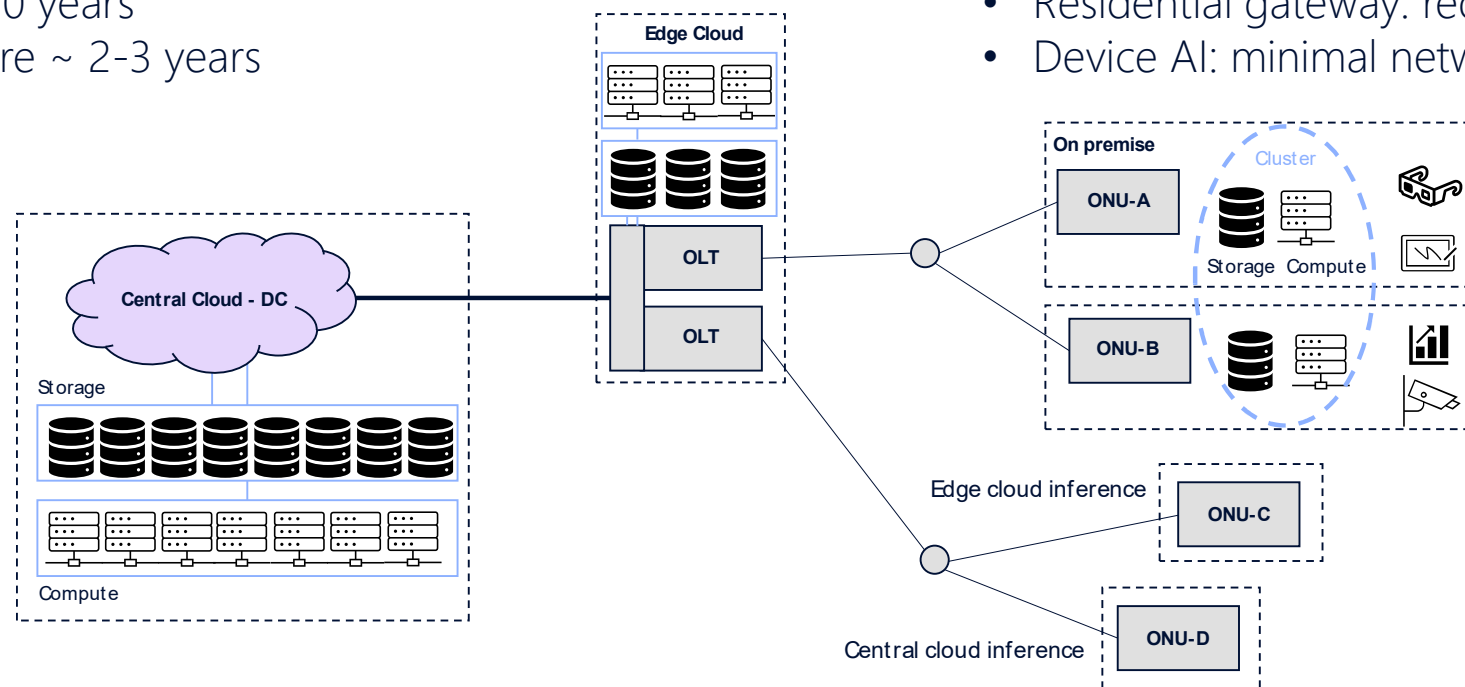
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AI processing location and network impact:

- Cloud AI fabric: high transport demand
- Edge cloud: lower latency, traffic localization
- Residential gateway: reduced AI backhaul traffic
- Device AI: minimal network dependency



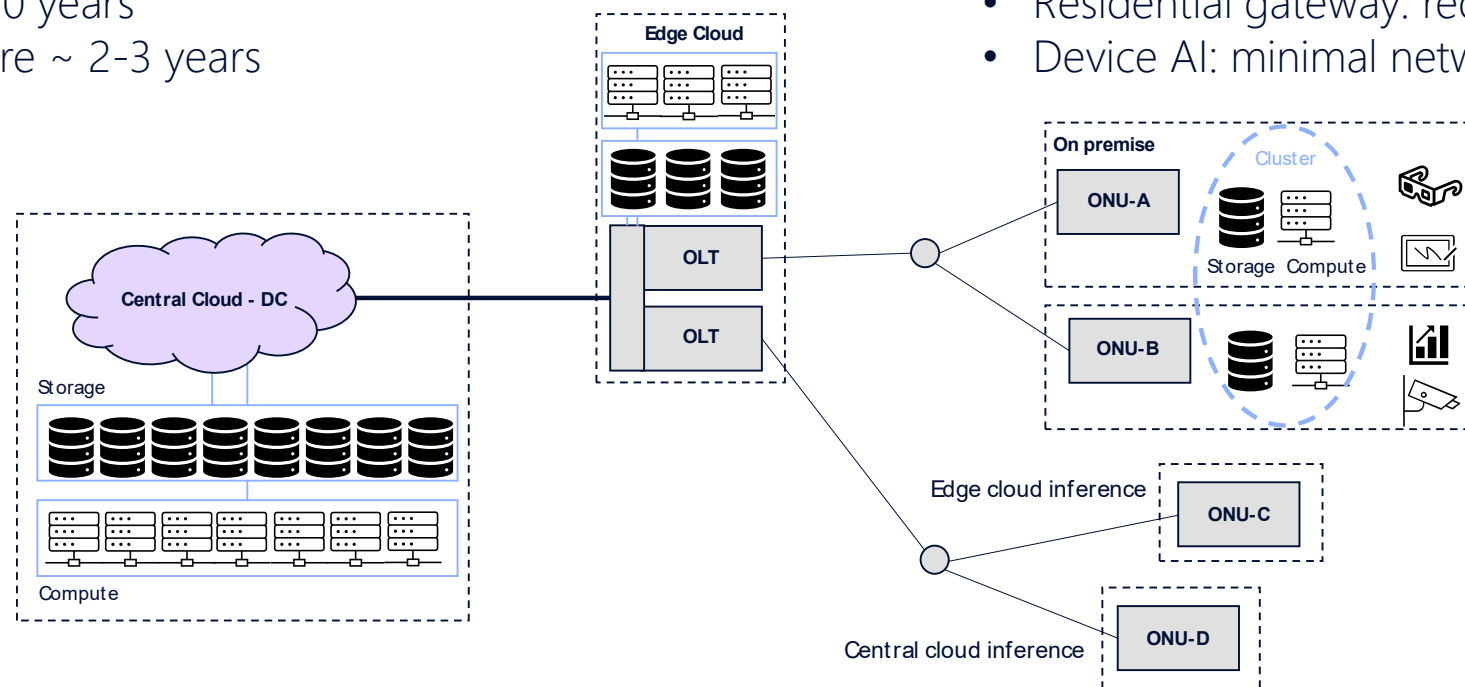
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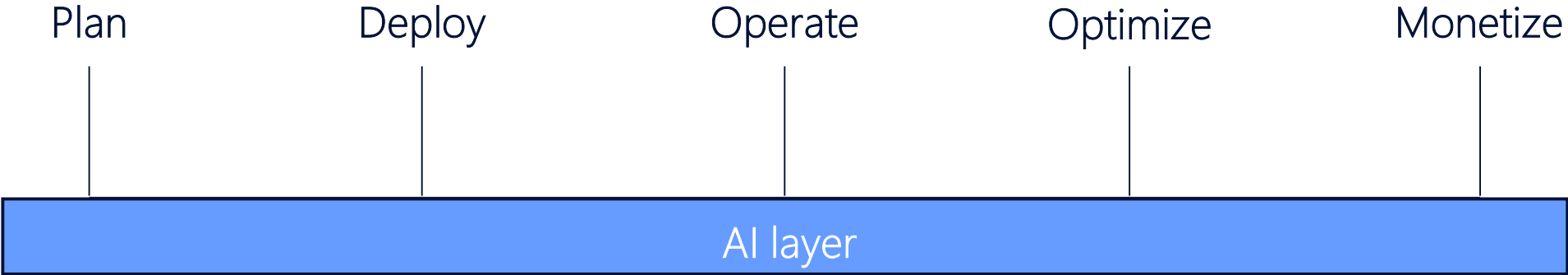
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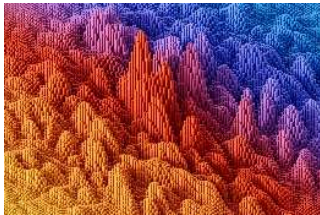
Key PON capabilities for distributed AI workloads:

- Traffic and flow isolation
- Elastic bandwidth allocation
- High availability and reliability
- Predictable latency and jitter

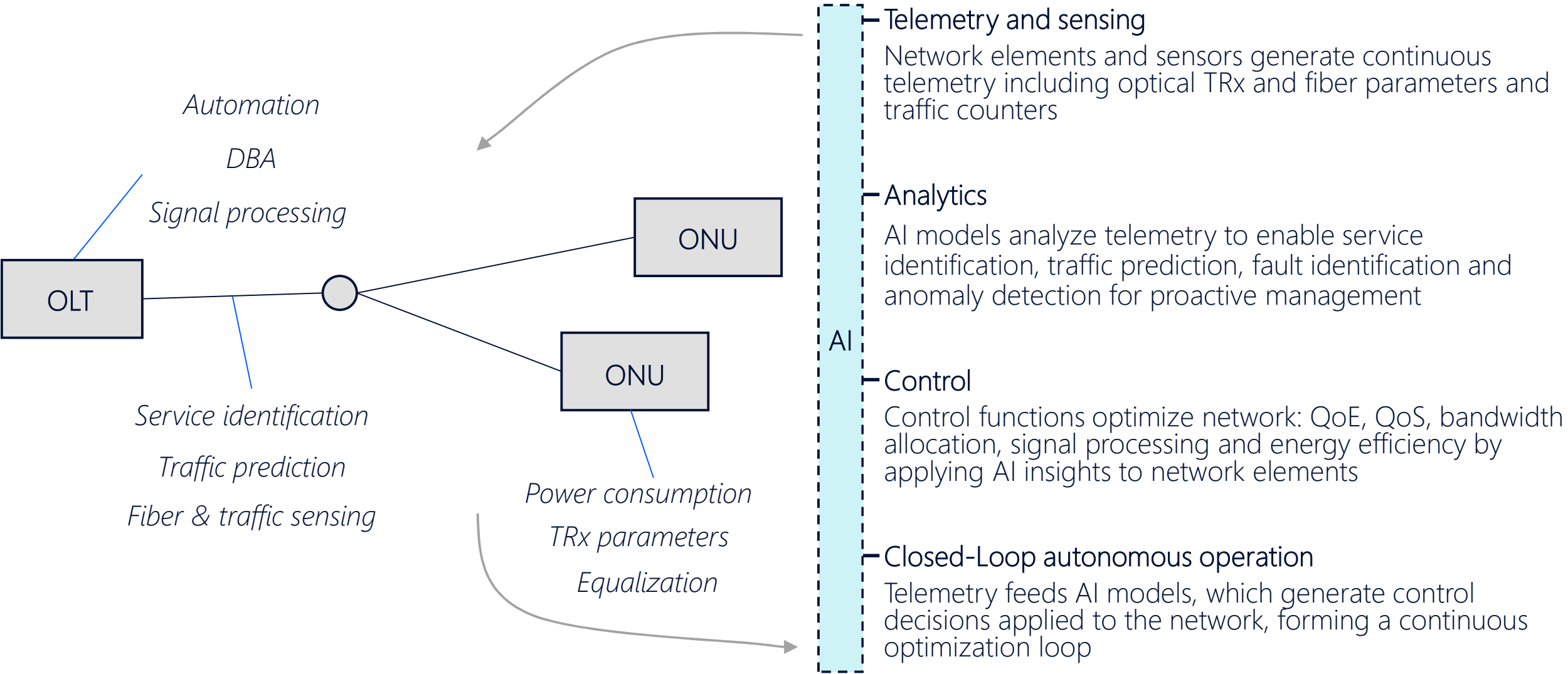
AI Can Deliver Value Across the Entire Fixed BBN Lifecycle



- | | | | | |
|---|--|--|--|--|
| <ul style="list-style-type: none">• Fiber infrastructure• Service planning | <ul style="list-style-type: none">• Verification• Guided installation | <ul style="list-style-type: none">• Predictive faults• Autonomous | <ul style="list-style-type: none">• Traffic prediction• Alarm correlation | <ul style="list-style-type: none">• AI-aware service classes• Personalized services |
|---|--|--|--|--|

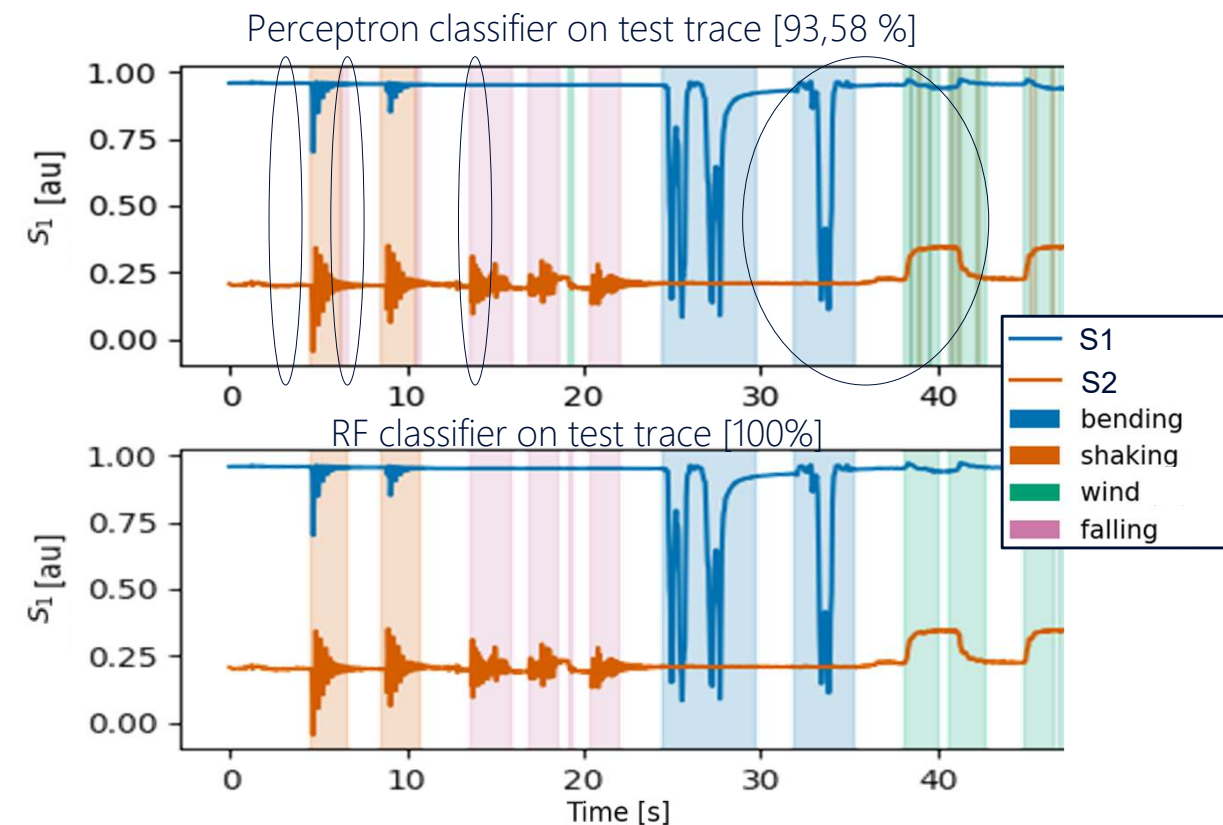
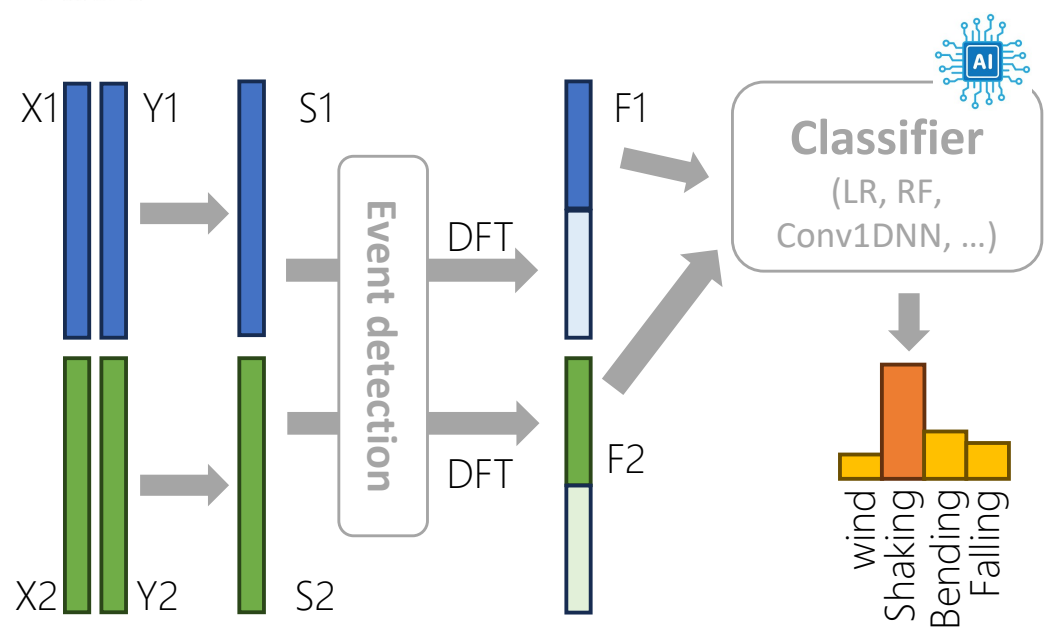
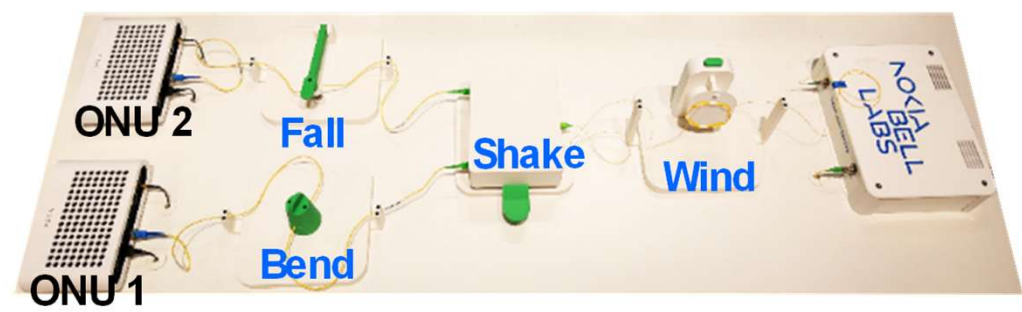


AI Enables Closed-Loop Optimization in Fixed BBN



AI-Enabled Fiber Sensing to Protect the Infrastructure

State-of-polarization sensor for IM-DD systems

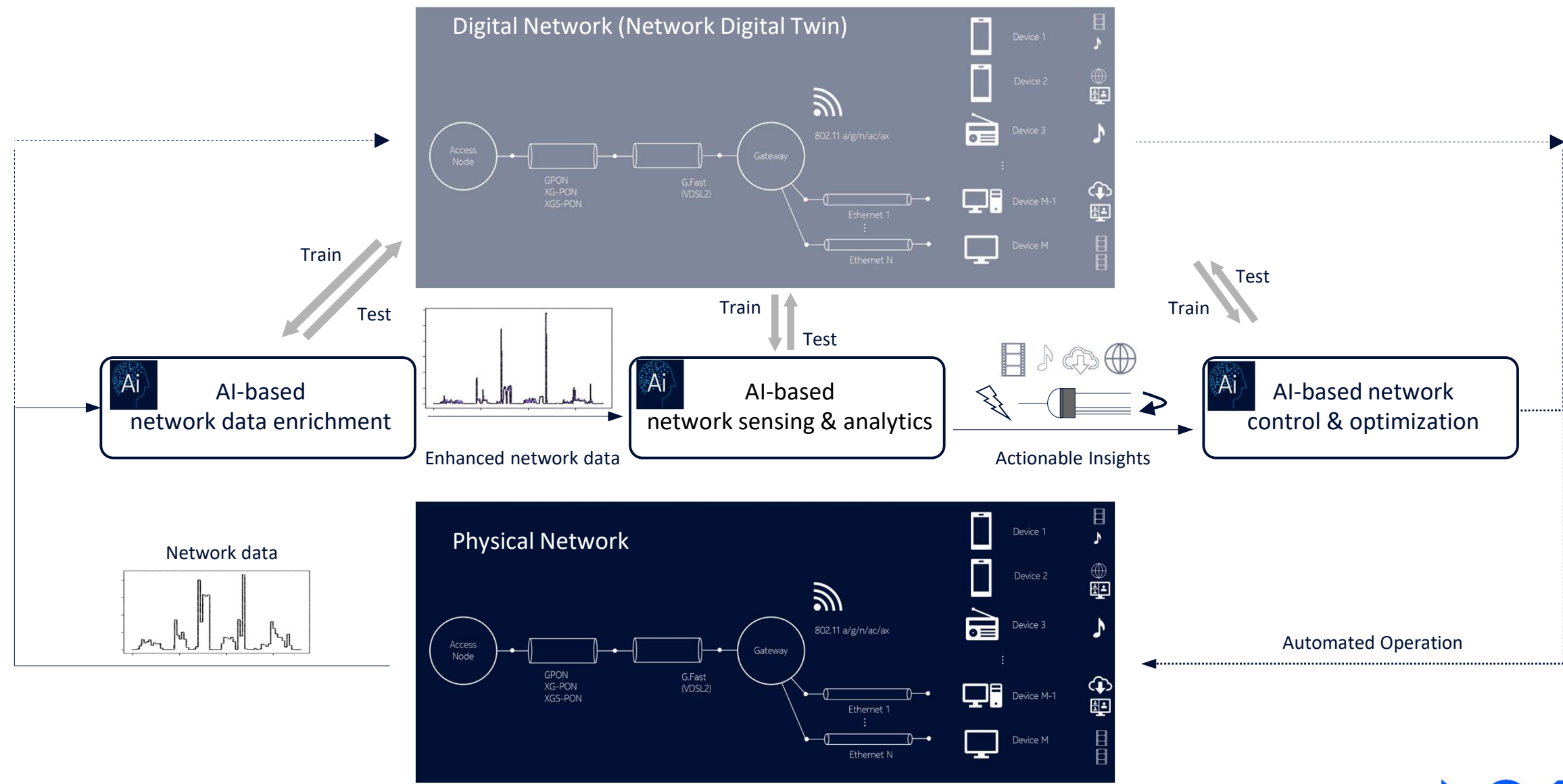


R. Van Rompaey et al., OFC 2026, paper Th2A.36

→ AI can transform optical telemetry into actionable insights, enabling proactive protection and maintenance of fiber infrastructure.



AI-Enabled Closed-Loop Network Automation



AI and Broadband Networks: Key Takeaways

AI is changing broadband traffic

- Increased upstream demand
- Lower latency requirements
- More predictable performance requirements

AI compute is becoming distributed

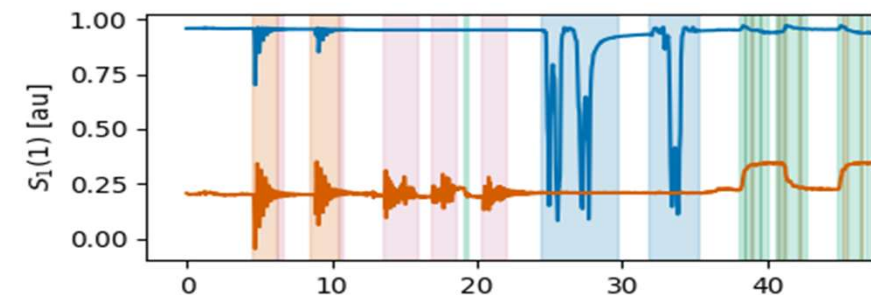
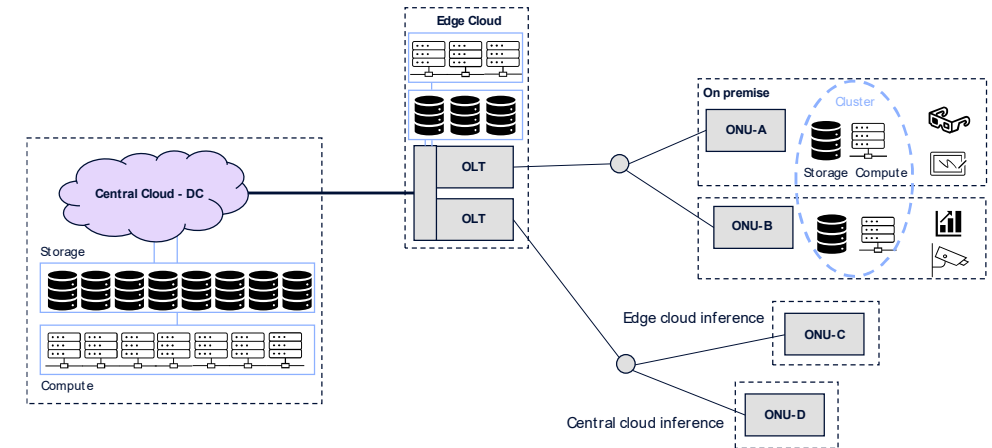
- Cloud → Edge → Home → Device
- Placement driven by upgrade cycles, latency, privacy, scale and cost demands

PON becomes part of the AI execution fabric

- Connects distributed AI resources
- Must support diverse workload placements
- Requires elasticity, reliability and traffic isolation

AI improves broadband networks

- Infrastructure sensing & predictive operations
- Network optimization & closed-loop automation



NOKIA Connecting
Intelligence