

NumoData Ontology:

The semantic intelligence layer that unlocks L4-L5 network autonomy for telecom

The state of AI in telecom

CSPs and private network operators are under growing pressure to deliver seamless digital experiences. [Gartner expects over 60% of organizations to abandon AI projects through 2026](#). Yet many CSPs continue to leverage legacy toolsets to collect vast amounts of disconnected data with little shared context, leaving operations unprepared for AI and advanced autonomous networks.



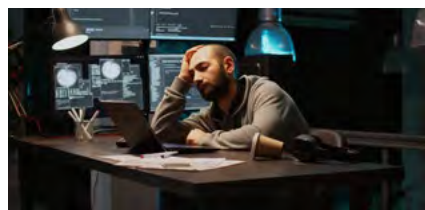
Fragmented view:

Each network layer runs siloed tools and data, so no one sees the full picture.



Broken data:

Misaligned, stale multi-domain data blocks higher autonomy and AI readiness.



Reasoning burnout:

Engineers manually stitch spreadsheets, diagrams and tickets, slowing root cause identification and extending resolution cycles.

NumoData Ontology gives network operations an accurate and up-to-date semantic model of the network so they can see impact, plan optimal service paths, and pinpoint root cause quickly. Downstream, Ontology is the foundational source of truth for automated and AI-driven decision-making processes, empowering CSPs to move fast and deliver confidently.

Are your AI initiatives stalling?

Forward-thinking CSPs are trapped in a web of physical and virtual infrastructure, from cloud-native cores and 5G standalone to partner ecosystems and domain tools that all speak different languages. This complexity causes alarm fatigue, slow and inaccurate fault detection, fragmented data analysis, stalled AI initiatives, and operational fatigue that often lead to higher customer churn, increased costs, and missed revenue opportunities.

The answer? NumoData Ontology.

Ontology is a living semantic digital twin of your network and services that become the single, AI-ready source of truth. It reconciles fragmented, misaligned, and missing data, recognizes patterns, reasons intelligently, and resolves proactively within your telecom network end-to-end by establishing the relationships, dependencies, and attributes that are shared by the different elements and layers within your network. This enables you to turn raw events into purpose-driven insights that any assurance tool, AI agent, or workflow can consume.

Achieve total network understanding with Ontology. Here's how.

Ontology transforms raw network data into actionable understanding. It fuses the scale of a knowledge graph with deep network understanding and contextual intelligence, so teams can see what is happening, why it matters, and what to do next.



Graph infrastructure:

A telecom-specific knowledge graph that stores and traverses relationships across cross and multi-functional domains to reflect real-world topology end to end.



Semantic modelling:

Encodes telecom concepts, relationships, attributes, dependencies, and rules to understand meaning, not just connections. Ontology doesn't just show teams context; it guides action.



Operational intelligence:

Feed automation and AI with complete, up-to-date, high-quality data, helping it understand customer impact, pinpoint root cause, drive remediation workflows, and close the loop end-to-end. Ontology nearly eliminates LLM hallucinations and democratizes network intelligence across teams.

AI Ops starts with Ontology



1. Data quality management:

A semantic intelligence engine continuously recognizes, reconciles, reasons over stale or inconsistent data across systems, ensuring that downstream processes are powered by trusted, AI-ready data.



2. Service impact analysis:

Calculate in seconds which services and customers are affected by changes, issues or upgrades, prioritizing at-risk SLAs and failed services.



3. Change impact analysis:

Simulate planned changes to network elements and paths so you can see which services and customers will be affected before execution and adjust the plan safely.

**4. Automated root cause analysis:**

Cut through the noise of alarms during network degradation to correlate, prioritize, and identify the right root cause.

**5. Enterprise and Transport service planning automation:**

Optimize service paths and routes using a live semantic model to streamline order-to-cash processes and optimize deployments, helping you deliver faster, right-first-time activations.

**6. Security:**

Continuously monitor your network and compare “as-designed” vs “as-deployed” configurations to discover policy deviations and exploitable vulnerabilities. Ontology helps teams understand and trim their attack surface quickly with prioritized, actionable insights, making it easier to enforce standards and reduce risk.

Ontology technical specifications

Area	Specifications
Data sources and domains ingested	While Ontology can connect to any BSS or OSS data source, the most popular data sources include: • Operations support system (OSS) • Element management system (EMS) • Network management system (NMS) • Cloud inventories • Network planning tools • Configuration management database (CMDB) • IT service management (ITSM) • Customer service management (CSM) • Customer relationship management (CRM) • Cybersecurity tools (ex. XDR, SIEM, Vulnerability Management)

Ontology technical specifications

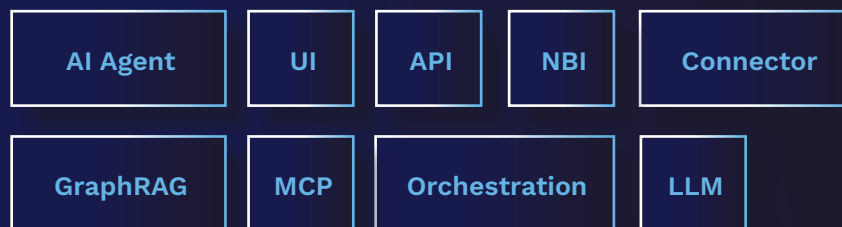
Area	Specifications
Data collection & integrations	How does data flow in and out?
	Connectors to OSS • NMS/OSS and inventories for topology and configuration. • FM/PM systems for alarms, events, anomalies and performance KPIs. • ITSM / ticketing / CSM tools for incidents, changes and customer data.
	Ingestion method • Streaming: Network events and telemetry ingestion via Kafka or similar message buses for alarms, performance metrics and near real time changes. • Batch: REST/JSON APIs and file based loads, directly connect to a database, from inventories, planning tools, CMDB and other reference systems.
Deployment methods	Deployment options: Cloud-native: Deployed in a Kubernetes-based environment using containerized services that connect with on-prem OSS/BSS tools via secure APIs and message buses. Bare metal: Deployed on the operator's servers alongside existing OSS/BSS, NMS and inventory tools managed by the CSP.
Performance & scale characteristics	• 60% improvement in Mean Time to Understand (MTTU) • 80% faster Mean Time to Resolve (MTTR) • 25% reduction in customer churn • 75% improvement in root-cause accuracy • 1370+ person-days saved in network planning by Tier-1 operator • Faster, targeted responses to security incidents *These are the general benchmarks observed across real-world Ontology customer deployments.
Standards & specifications alignment	Built on an RDF-based semantic model, Ontology fully aligns with W3C Semantic Web standards such as RDF, RDF Schema and SPARQL, ensuring interoperability, and standards-compliant data exchange.

Architecture



Architecture

Decision Intelligence



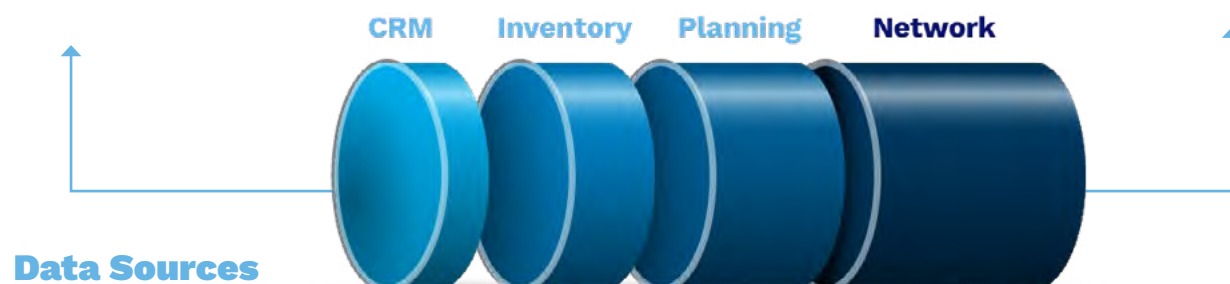
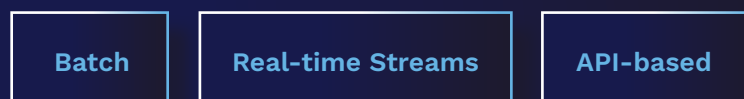
AI & Analytics



Semantic Modelling



Data Fabric



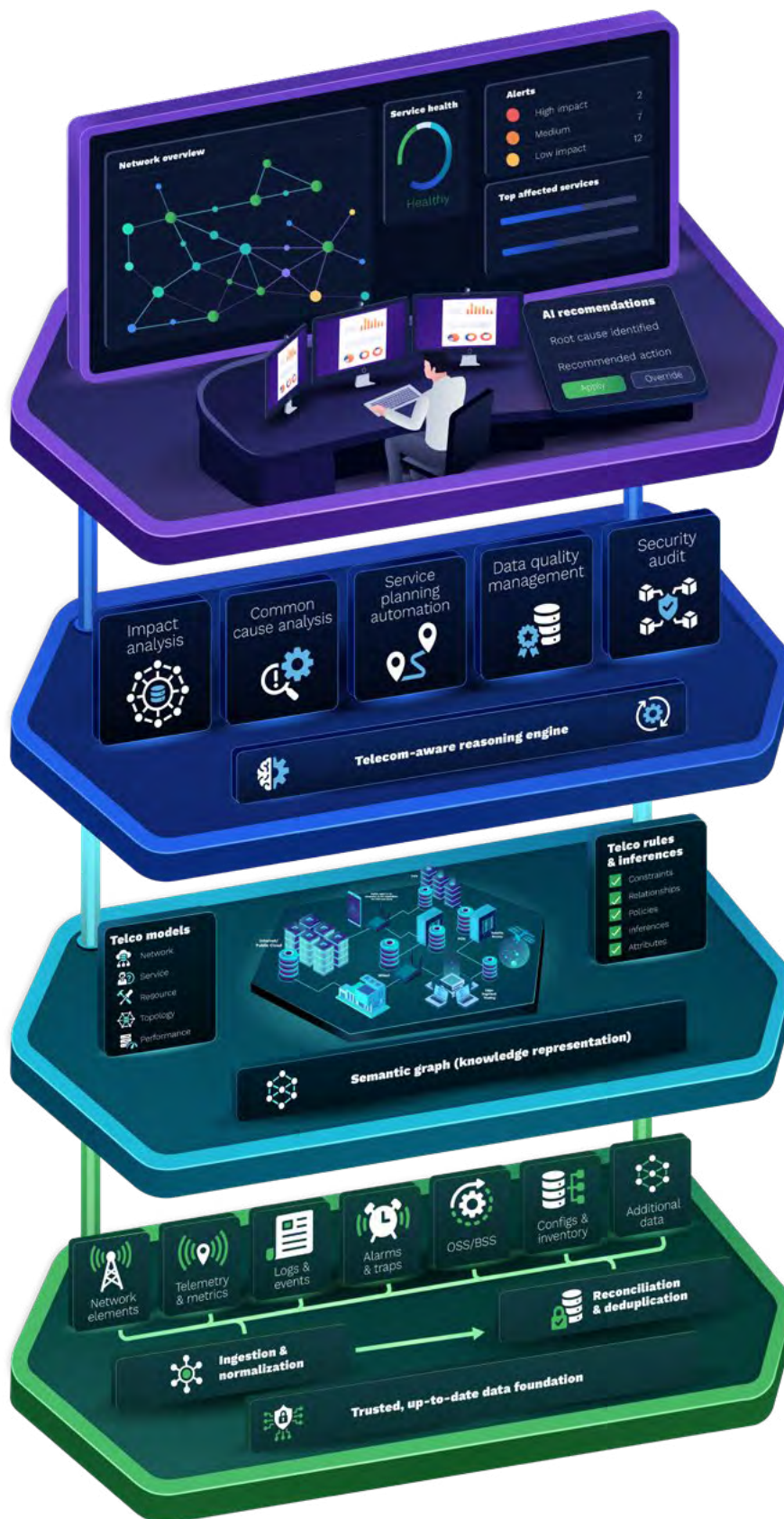
Architecture

Decision Intelligence

AI & Analytics

Semantic Modelling

Data Fabric



Why should you power your autonomous network with Ontology?

Dimension	NumoData Ontology	Inventory & OSS tools	Generic graph databases
Primary purpose	Semantic digital twin for telecom network assurance and autonomy	Record of inventory and basic topology	General purpose data infrastructure
Architecture approach	Unified ingestion and inference from data to use cases	Split data streams with filtered, incomplete data compromise downstream processes	Graphs are deployed on top of data assumed to be correct
Telecom semantics	Pre-built telco Ontology and rules	Very minimal; custom per project	Must be built from scratch by CSPs
Inference engine	Built-in inference engine that reconciles and infers missing links	No native inference; depends on manual data cleansing and static rules	No telecom inference, any reasoning must be hard coded into apps
Time to value	Implement initial use cases within 90 days	Requires lengthy and expensive bespoke integration effort	Takes multi-year cycles of modelling before realizing operational value
AI-readiness	Agentic and Gen AI ready with AI-ready intelligence directly embedded	A set of scripts and rules running over static and stale data	Must also build a semantic layer and application logic to integrate with the knowledge graph
Flexibility	Vendor and domain agnostic platform	Often tied to specific vendor, domains, and hardware	Vendor and domain agnostic, but no telco-specific rules or models

See Ontology in action. Hear from your peers.

“With Ontology, we are well positioned to fulfil our digital transformation strategy of making our network ‘zero-touch’ via automation.”

Senior Manager, Network Engineering. Vodafone.



Vodafone Germany utilizes NumoData Ontology’s semantic digital twin to enhance end-to-end network visibility, data quality, and zero-touch automation across assurance, fulfilment, planning, and optimization.



MTN leveraged NumoData Ontology to federate inventory, standardize naming and modelling, and understand change and vulnerability impact analysis. This optimized their OPEX across RAN, core, and transport, helping them deliver on customer promises.

Want to learn more?

Discover how NumoData Ontology boosts security, visibility, understanding, and advanced automation to streamline operations and accelerate proactive network issue resolution.

Schedule a meeting »

About NumoData

NumoData is a global software company delivering AI-powered network intelligence, AIOps, and analytics for CSPs and enterprises. We are a trusted partner that helps your organization augment existing systems with generative AI, predictive analytics, advanced autonomy, and end-to-end monitoring across mobile, broadband, and private 5G, enabling superior operations and customer experiences.