

# Telecommunications

Product information



# Telecommunications Goals

## Efficient Network Operations

Achieve network excellence by automating the detection, diagnosis, and action recommendations for network performance and operational issues, streamlining the process of identifying and resolving network problems, and ensuring optimal network performance and reliability.

## Customer Satisfaction

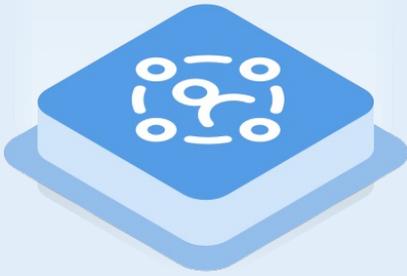
Proactively address technical customer complaints even before they happen, using predictive analytics to identify potential issues and resolve them proactively, leading to improved customer satisfaction and loyalty.

## Manage Data Overload

Collect network and customer data from multiple sources, usually stored in silos, to perform cross-correlated advanced analytics, providing a comprehensive view of network performance and customer behaviour, and enabling more informed decision-making.

## Reduce Energy Cost

Dynamically maximize power savings while guaranteeing Quality of Service, using AI to optimize energy usage based on network demand, leading to significant cost savings without compromising on service quality.



# AI Care

**Reacting much quicker to Customers' issues, Even before they complain**

**AI Care** automates the expert engineering process. All data sources are integrated, and specialized logic is used to determine the most probable cause behind a complaint.

**AI Care** provides a natural language response that includes recommendations for the CS agent and a technical description for the engineering and operations teams.

**AI Care Proactive** mode monitors the subscriber's experience in near real-time to detect service impacting issues. When an issue is detected, it creates a virtual ticket and, when possible, resolves the issue. When the issue cannot be resolved immediately, action recommendations can be forwarded to engineers for final decisions.

## Use cases

### Location specific

Site maintenance	Site performance	Leakage problem
Mobility problem	Coverage problem	Indoor device issues

### Provisioning

Provisioning conflict	Idle profile
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### Service configuration

Missing service	Revenue holes	Restricted services
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### Device problem

Application installed issues	Device missing bands
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## Key benefits

### AI Care

- **Digitalizes your expert knowledge.**
- **Scales and enhances engineering knowledge** through AI as operations grow.
- **AI automates Root Cause Analysis and action recommendations** through simple User Interface (UI) screens.
- **Faster response to customers results** in increased customer satisfaction.
- **More comprehensive root cause analysis** helps prioritize the fixes in the network.
- **Saves effort (time)** in troubleshooting Engineering cases.

### Proactive AI Care

- **Happier customers.**
- **Improved response time** to issue resolution.
- **Increased 1st call resolution** with virtual tickets that pop up when customer calls.
- **Improved efficiency and prioritization** of engineering tasks.
- **Improved QoS and enhanced perception** of brand.

## Key features

- **Automated Health Index:** 360-degree view of customer and network performance at the time of the complaint.
- **Auto-Close:** World's first closed-loop automation for technical customer issues; accuracy training by the best engineers.
- **Natural language output:** Including recommendations for CS agents to share with end-customers and detailed technical recommendations for engineers.
- **Action Manager:** Capable of triggering automated actions, defined together with the customer engineers. Additionally, it generates or escalates service requests.

### Proactive mode

- **Virtual customer complaint system:** Creates virtual tickets for customers experiencing problems. The system monitors virtual tickets and depending on the type of issue and resolution, will either take action or continue to monitor the customer's experience.

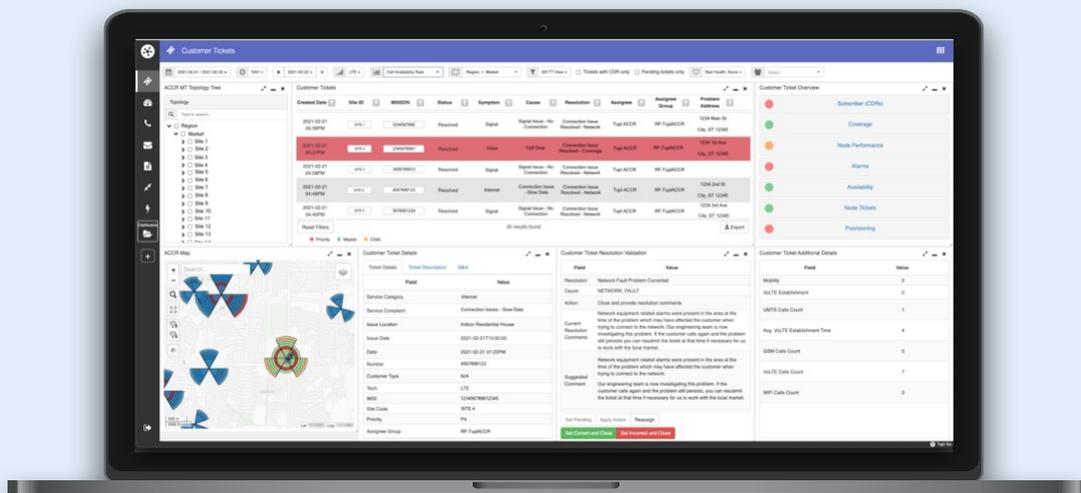
# Business impact

## AI Care

- **4 x more accurate** – reducing the number of Customer Complaints closed as “No Trouble Found” or “Not Enough Info”.
- **100 x faster response to the customer** – providing the root cause in minutes vs 45+ hours.
- **90% of complaints resolved** automatically in closed-loop operation and with a reduction of engineering time in at least 50% of the remaining cases.
- **100% consistency** – reduces dependence on the different experience and skill levels of various engineers.

## Proactive AI Care

- **Churn prevention:** Catching churn-risks and taking appropriate actions in advance, potentially creating enormous value.
- **Fewer customer care calls:** Significant reduction as they are solved prior to complaints.
- **Customer Care time savings:** Increase first call resolution in customer care and decrease mean holding time.





# AI Care NOW

## Resolve customer issues during the First Call Resolution (FCR)

**AI Care NOW** improves **FCR** (First Call Resolution) by enabling care agents to behave as telco experts and resolve customer issues immediately within the first call.

All data sources are integrated, and **AI Care NOW** provides an instant solution to customer issues together with a recommended response using natural language and a technical description for the engineering and operations teams.

**AI Care NOW** analyzes the customer’s recent activity and within fifty seconds provides first line employees or store personnel with a root-cause and a potential resolution.

The solution leverages **TupIOS – MLOps** platform to develop hyper-automation applications with a fast time to market.

## Use cases

### Location specific

Site maintenance	Site performance	Leakage problem
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### Provisioning

Provisioning conflict	Idle profile
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### Service configuration

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### Device problem

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## Key benefits

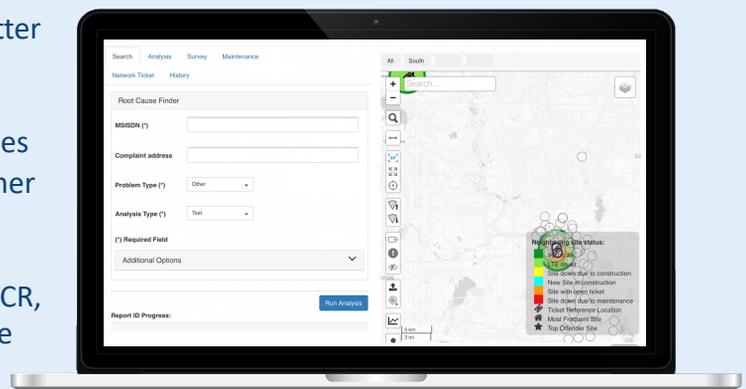
- Improves **customer satisfaction** and **NPS**.
- **Reduces customer churn**.
- **Prompts first-line employees with expert knowledge** during the first customer call or store visit.
- **Provides L1 and store personnel with a root-cause** and potential solution within 50 seconds.
- **Reduces the workload** of level 2 support engineers dramatically.
- **Provides a more comprehensive root-cause analysis** and better **prioritization of network fixes**.

## Key features

- **Root cause finder:** Immediate data analysis (customer's identity, location, and type of problem) and recommendations based on the root-cause of the issue.
- **Ticket analysis:** Additional information helps provide detailed recommendations to a customer, identifying the most likely cause of the issue.
- **Customer's survey:** Direct feedback form within the application for your care agents to fill out.
- **Automated Health Index:** 360-degree view of the customer and network performance at the time of the complaint.
- **Auto-Close:** Accurate and fully automated resolution of any technical customer issue.
- **Natural language output:** Recommendations for CS agents to share with end customers, and more detailed ones for engineers.

## Business impact

- **+5% First Call Resolution** – up to 50 seconds instead of hours resulting in better customer satisfaction and NPS, thus reducing operational costs.
- **78% Ticket reduction** – drastically reduces operational costs for your level 2 customer support team since many tickets are contained within level 1.
- **+10% Device upselling** – due to better FCR, cross and upselling interactions are more likely to happen.





# Power Saving Advisor

Save energy without impacting network quality

Tupl's **Power Saving Advisor (PSA)** solution is designed to maximize the efficiency of RAN Vendor's Power Saving features in the network while minimizing the impact on the end-users by using advanced machine learning (ML) algorithms.

**PSA** leverages Tupl's MLOps capabilities together with an Action Manager component to minimize time-to-action. It constantly computes energy consumption at multiple aggregation levels and tracks changes in the **PSA** configuration.

*"I needed a transparent system where my engineers can verify the AI-based decisions, a system to provide anomaly detection on any deviations on KPIs and customer experience, and automatic actuation scripts for activation/deactivation of the PS features. One key part of the process was to enable a monthly benchmarking, when for one day all Power Savings are off, providing logical baselining for KPIs and Power usage".*

**Mr. Valentin Neacsu**  
Former CTO at Kyivstar (VEON Ukraine)

## Key benefits

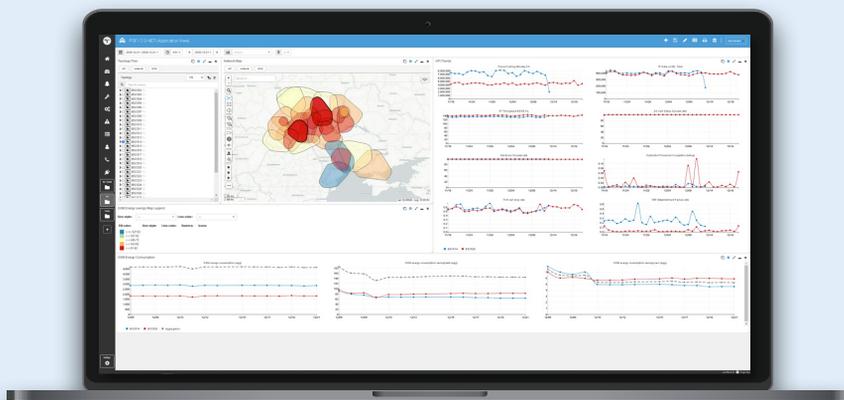
- Achieve a **significant amount of energy savings** while maintaining a positive customer experience.
- **Flexible and easy to expand**, ML model can be modified in a cost-effective fashion.
- Digitalizes your **expert knowledge**.
- Scales and enhances engineering knowledge through AI as operations grow.
- **Go beyond vendor's energy-savings fixed rules**: Power saving management is generally operated by only one vendor as a black-box process.

## Key features

- **Automatically monitors** Key Performance Indicators and network energy consumption evolution over time **at cell level**.
- Automatic **measurement of energy savings** at cell levels and its aggregations up to network level.
- **Automatic Anomaly Detection: Identifies KPI degradations** and correlates with Power Saving Features changes by detecting any deviations on KPIs.
- **Automatically proposes next best action** to improve KPIs and energy consumption based on a **Machine Learning** core.
- **Automates script creation** for recommended actions (Open Loop).
- Provides **customized views for quick analysis & validation** on recommended actions.
- **Provides dashboards and Energy Consumption reports** at multiple network elements aggregations (Cell, Site, TAC, Region, Network).

## Business impact

- **25% more Energy Savings** compared to Vendor's managed service, resulting in a 6-10% reduction of the electricity bill.
- **100% Customer Experience:** Maintain Quality of Service (QoS) for your subscribers with energy savings actions.
- **90% Manual effort reduction:** Utilizes operators' MOPs to generate scripts automatically reducing errors and manual efforts.
- **100% Control:** Operators maintain full control over the energy savings process and allows insourcing of managed services.
- **100% Consistency:** Eliminating manual script creation processes that are prone to errors





# Network Advisor

## Trustworthy and actionable AI for Telecom Networks

Decades of technology investments by Telecom Operators to address the ever-increasing traffic demand and customer expectations have led to a complex context with multiple technologies, where data needs to be gathered and correlated from multiple sources.

Award-winning **Tupl Network Advisor** helps network engineers unlock the power of AI to automate processes and digitalize cumulated engineering knowledge for scaling, speed, and consistency. A powerful AI system that adapts to your own environment and processes.

### Use cases

#### Customer Experience

Low 4G Throughput

VoLTE Drop Anomaly Detection

#### RF Optimization

UL Interference

Leakage Anomaly

UL SINR

RTWP Anomaly Detection

3G or 4G Imbalance

#### Performance

Network Access Failures

Congestion

#### Equipment Management

Sleeping Cells Anomaly Detection

Power Saving Advisor

## Key benefits

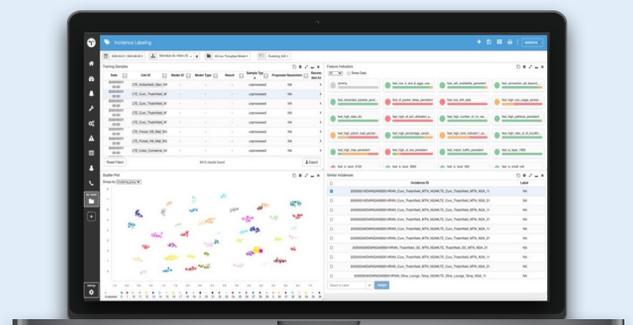
- **Digitalizes** your expert knowledge.
- **Scales** and **enhances engineering knowledge** through **AI** as operations grow.
- **AI automates Root Cause Analysis and action recommendations** through simple User Interface (UI) screens.
- Can **integrate with other workflows** or tools such as NOC, field services, or even SON.
- **No coding** required!
- **Maximum accuracy, consistency, and speed** for optimum level network performance.

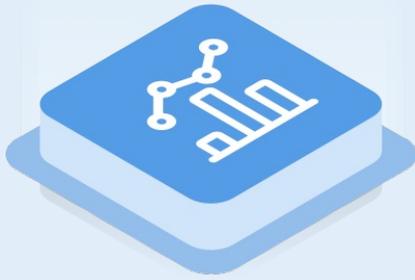
## Key features

- **AI Engine:** Based on open-source Big Data and Machine Learning libraries, Tupl's ML Toolkit is at the core of Network Advisor. It provides the ability to train and run multiple-stage root cause analysis and action recommendations in a live network.
- **Machine Learning UI:** Simplified Machine Learning model creation, training, and evaluation through a simple UI which experts can use without prior coding knowledge.
- **Multiple source data integration:** Correlate and process multiple data sources for complex problems through TuplOS data and cloud architecture.
- **Feature Engineering Editor:** Create the most suitable features as inputs for maximum ML model performance.
- **Multi-model, multi-user management:** Easy solution integration across large and heterogeneous organizations with a diversity of operational responsibilities.

## Business impact

- **90% classification accuracy**, powered by both supervised and unsupervised learning.
- **100% consistency** – Operators can draw network-level conclusions with confidence.
- **Up to 90%-time savings** – by dramatically reducing the time from investigation to action.
- **Discover unseen issues** with unsupervised learning.





# Unifier PM

**Performance Management tool with multi-cloud support and integrated automation**

Managing telecom networks can be a daunting task. It requires integrating data sources from multiple third-party solutions, while there is a need to access all parts of a network in one location.

On top of that, legacy **Performance Management (PM)** tools are typically not flexible or scalable and often don't work across multiple vendors.

**Tupl Unifier PM** ensures native integration between the AI-based automation solution and your **Network Performance Management** system, which is a key practical element for successful automation.

It also acts as a single window into all your network and customer data, storing it quickly so that you can easily perform cross-correlated analysis.

## Use cases

### Network Performance Optimization

Performance Management	Configuration Management
Mobile Quality Agents	FM Alarms
Geolocated Traces (GEO)	Coverage Predictions

### NOC Supervision

Performance Management	Configuration Management
Mobile Quality Agents	FM Alarms
Geolocated Traces (GEO)	Coverage Predictions

### Engineering Customer Support

Voice & Data CDRs	Customer Tickets	Provisioning Records
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## Key benefits

- **Simplified access to data:** A single window into data.
- **Built-in Big Data analysis:** Network Performance and Status Health flags.
- **Powerful analytical tools:** Multi-dimensional radar, top offenders, trends, geographical correlation map.
- **Automation:** Network status workflow, problem investigation, and resolution.
- **Operational use cases:** Real-time for fast MTTR; Smart prioritization of needed actions.
- Small hardware footprint and cloud support to **reduce TCO** (Total Cost of Ownership).

## Key features

- **KPI Editor:** Design your own KPIs in just a few seconds, with time-spatial-custom aggregation.
- **Alert Editor:** Alerts for a combination of metrics, based on static and dynamic thresholds.
- **Anomaly Detection:** ML-based; it generates smart alerts based on variations compared to previous periods, with no need to predefine any thresholds.
- **Dashboard:** Online dashboard, with user selected views.
- **Unifier PM Correlation View:** See Area Analysis and Network Problem Resolutions.
- **Specialized Views:** Network performance, alarms, configuration parameters; geo-location, call performance, service performance, etc.
- **Cloud and multi-vendor support.**

## Business impact

- **Save valuable engineering time** – Tupl Unifier PM brings all your data into an interactive dashboard for nationwide, regional, and cluster-level visibility, with a comprehensive top-to-bottom view and synchronized data in one location so you can focus on the health of your network.
- **Save up to 50% of investigation time** with immediate access to all data.
- **Collect data from 20+ synchronized data sources** into one clear unified view.
- **100% Data anomalies check** – get automatic notifications when there are anomalies in your data.
- Tupl Unifier PM brings a more **structured & visible workflow**.
- **Reduce Total Cost of Ownership.**





# NOC Automation

## Towards zero-touch automation in your network operations

**MTBF** go up, but still, equipment can fail unexpectedly. With ever-growing network complexity and customer demand for uninterrupted services, it is challenging to meet expectations unless you do things differently.

Significant manual repetitive work still happens to tackle critical alarms.

**Tupl NOC Automation** resolves this dilemma with the help of AI. After integrating relevant data sources, the Tupl ML toolkit enables the extraction of existing root cause information, performs commonly identified automated actions, and creates tickets with detailed analytics.

### Use cases

#### Self-clear

- No Trouble Found
- Power-Related Issues
- Transport Issues
- Environmental Issues

#### Automated dispatch

- Standardized Reporting
- E-Bonding

#### Automated resets

- Fast Detection and Execution
- Analytics

#### Chronic issues

- Repeat Offenders
- Anomaly detection

## Key benefits

- **Extracts best practices** and turns them into digital knowledge.
- Consistently **analyzes more data than manually possible** for the most accurate decisions.
- **Executes agreed actions automatically** and **creates work orders** with deep analytics. Powerful, analytical tools: multi-dimensional radar, top offenders, trends, geographical correlation map.
- **Reduces Tier-1 work** to an absolute minimum.
- **Improves Tier-2 and Tier-3** performance and efficiency.

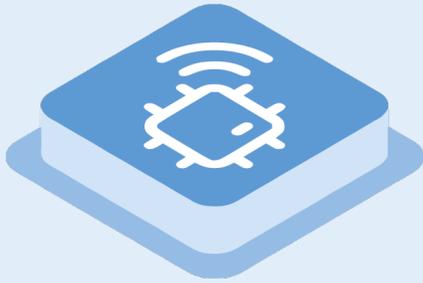
## Key features

- **Tupl's ML Toolkit is based on open-source Big Data and Machine Learning libraries.** It provides the capability to train and run multiple-stage root cause analysis, action recommendation models, and selected automated actions.
- **Multiple data source integration:** Multiple data sources can be easily correlated and processed for complex problems through TuplOS data and cloud architecture, ensuring the most accurate decisions and prioritization.
- **Action Engine:** Certain action categories - such as equipment restarts, can be automated to achieve maximum efficiencies and recovery speeds.
- **Trouble ticketing automation module:** Reduces errors, missing data, and inconsistencies in work orders to field engineers.

## Business impact

- **>90% classification accuracy** – powered by both supervised and unsupervised learning.
- **100% consistency** – operators can draw network-level conclusions with confidence.
- **Up to 100%-time savings in Tier-1 operations** and estimated 50% efficiency gains in Tier-2 and Tier-3.
- **Discover unseen issues** and patterns with unsupervised learning.
- **Faster field actions** thanks to more systematic processes and quick time to resolutions.





# IoT Assurance

## Zero-Touch automation agent for predictive maintenance of IoT networks

**Tupl's IoT Assurance** solution is a zero-touch automation agent that increases efficiency through automation to handle customer failures. It provides a full and fast automated analysis and auto-response for closed-loop notifications, including impact. It also applies anomaly detection and RCA (root cause analysis) to different IoT devices to open tickets proactively even before the customer notices.

**Tupl's IoT Assurance** solution works by analyzing the network flow and detecting any potential issues that may arise.

It can predict problems before they occur, or even automatically solve them without requiring a notification. For example, it can predict power outages at a power station that would cause the IoT devices to lose signal.

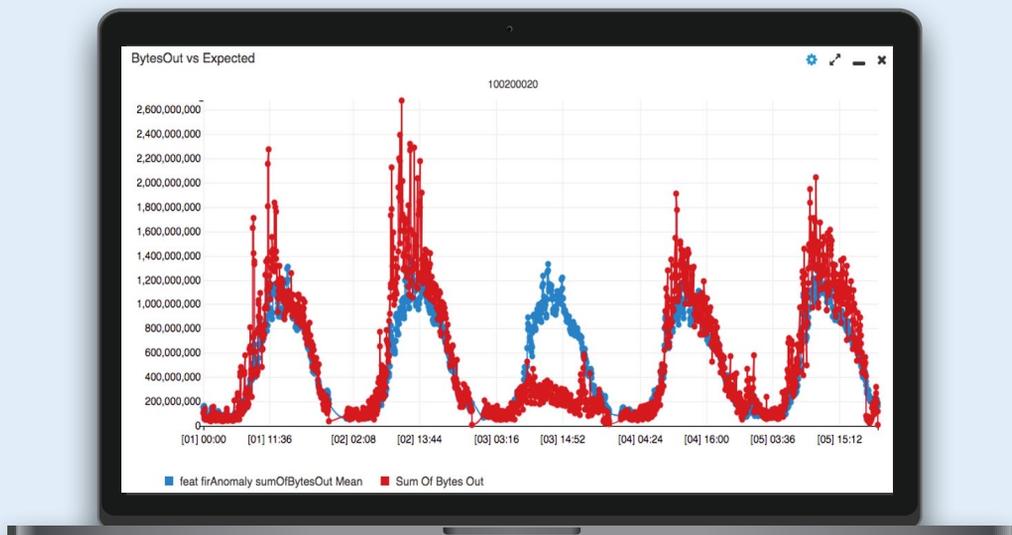
The solution classifies potential issues by analyzing communication protocols, payload usage, and device configurations. It employs machine learning for auto-detection of anomalies, grouping them into incident tickets and master tickets for efficient issue resolution.

## Key benefits

- **Closed-loop automation:** 100% in zero-touch automation, including failure detection, impact analysis and email response.
- **Faster MTTR:** ~100% improvement in response time to end-customers.
- **Better quality:** 100% consistent and human error-free.

## Key features

- **Data Integration:** It integrates diverse data sources, including "Radius CDRs", "Diameter CDRs," mobile broadband, AI interface data, and SMS CDRs, providing a comprehensive overview of IoT device interactions.
- **Granular Analysis:** It analyzes IoT devices' interactions classifying potential issues based on communication mechanisms, payload usage, and various configurations, ensuring granular insights into network behavior.
- **Auto-Detection of Anomalies:** It employs machine learning for real-time auto-detection of anomalies, categorizing them into incident tickets and master tickets, streamlining the identification and resolution of network issues.
- **Root Cause Analysis:** Utilizing machine learning, the solution offers insights into incidents allowing the auto-closing of resolved issues and collaboration between operations teams and customers for further investigation.
- **Visualizations and KPI Analysis:** It provides visualizations, including real-time anomaly graphs and customizable views for analyzing KPIs, enhancing the understanding of network performance and potential issues.





# Open RAN Toolkit

## Bringing the power of MLOps and Automation to ORAN

**Tupl Open RAN Toolkit** optimizes and manages **ORAN** networks by flexibly collecting data from any source and applying advanced analytics following the **SMO** and **non-RT RIC ORAN** standards.

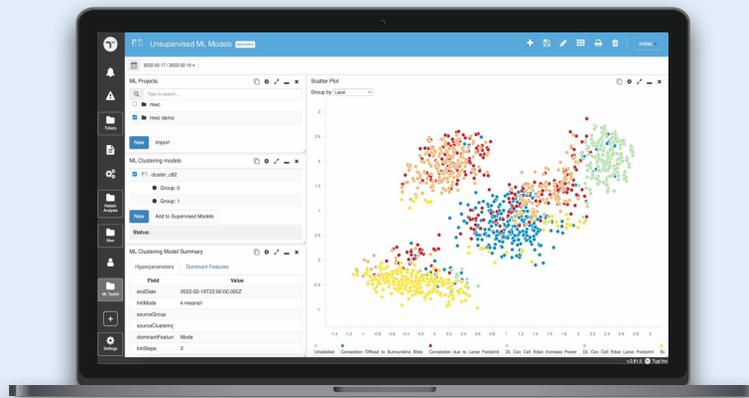
With **Tupl Open RAN Toolkit**, **Communication Service Providers (CSPs)** can leverage advanced technologies such as ML and AI to optimize network performance, improve operational efficiency, and enhance the overall user experience.

The solution provides tools and frameworks for network optimization, fault detection, configuration management, and root cause analysis.

**SMO and non-RT RIC** drive value through RAN automation apps (r-Apps). The **r-Apps** empower **CSPs** to automate service policies, adapt to customer needs, and optimize network control and availability.

## Open RAN Architecture

- **O1, A1, R1 interfaces**
- **More flexible connectors** to other network data sources and actuators provided by TuplOS®
- **Advanced analytics** ecosystem for KPIs, Anomaly detectors, ML features, ML model definitions
- Automatic **orchestration of actions**
- **Unified viewer to visualize all aspects of your network**



## Key benefits

- **Fast integration** thanks to compatibility with your ORAN network and its standard O1/A1/R1 interfaces.
- **Manage your legacy network** with the same approach thanks to the flexible interface definition to communicate with any available data source and network actuator.
- **Automate optimization actions** to achieve higher network availability, improved network performance, and higher overall efficiency.
- **Accelerate r-App deployment** with a minimum level of effort (LOE) of r-App development to react faster to your customer needs.
- **Manage more and more complex networks better.**

## Key features

- **Any-Data Collection:** Collect data from any type of network source with flexibility.
- **Advanced Analytics:** Boost the power of use case creation and knowledge digitalization with AI-leveraged analytics.
- **ORAN Standard Support:** Connect TuplOS using the O1, A1, and/or R1 standard interfaces to start making the most of your open network now.
- **Automatic Network Optimization:** Enhance your network performance and efficiency with always-on supervision, network forecasting, and optimization.
- **DDD r-Apps:** Design, develop, and deploy r-Apps all in one place. Outperform your competitors: let your Subject Matter Experts make the highest impact by automating their data-based decision-making.
- **Visualize it all together:** One Web User Interface based on customizable widgets to visualize it all.