NEC Aspire Technology

To perfect the connected world through software & services for any customer, on any network, anywhere, at anytime

27/11/2024

Agenda

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- Portfolio

Slobodan Vukić

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Milutin Davidović

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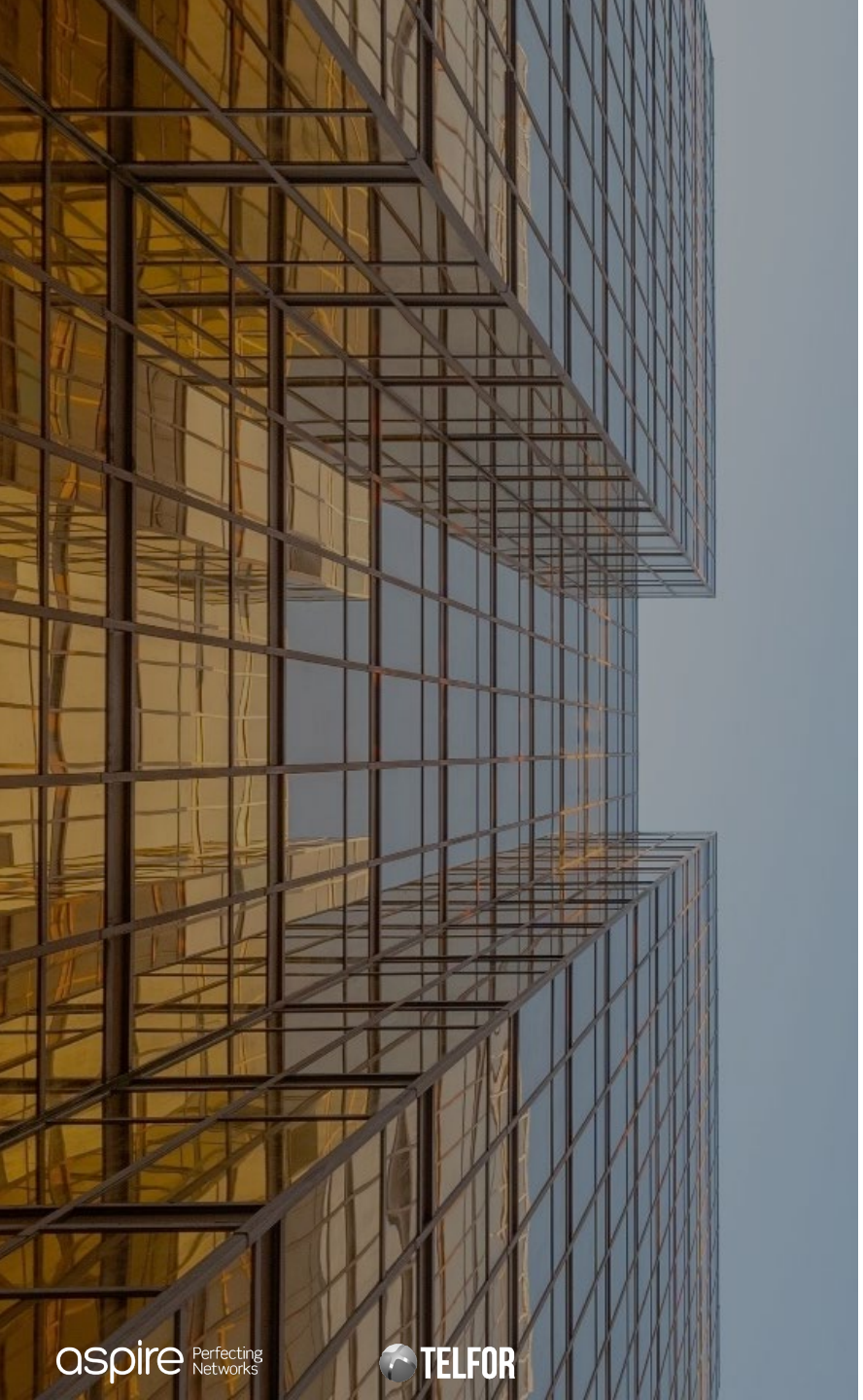
- AI/ML Anomaly Detection
- Energy Saving (NetZero)
- Gen AI Knowledge base copilot

Milan Stanković
Kristina Đurić



Company introduction

About Aspire

Expertise

Portfolio

About Aspire

- Aspire, a subsidiary of NEC Corporation, provides specialized network services and software solutions
- Clients are fixed and mobile operators, large enterprises, vendors, system integrators, and other technology partners
- Expertise spans all network domains and technologies, including Telco and IT Cloud
- Offers end-to-end, multi-vendor solutions across the entire networks' lifecycle
- Delivers projects globally with an international team of network and software engineers
- Utilizes an Open Lab in Europe with over 30 vendors across Cloud and NFV, along with NEC Labs globally

Perfecting fixed, mobile, and private networks with Aspire Automation Platform and AI-powered applications

Our portfolio segments and solutions

NETWORK SOLUTIONS

NETWORK PLANNING & DESIGN
NETWORK ROLLOUT
NETWORK OPTIMIZATION
NETWORK OPERATIONS & SUPPORT
ENERGY EFFICIENCY

Multi-vendor, end-to-end & realizing the value of automation

Aspire provides next-generation end-to-end network services, leveraging automation and AI. Our software engineers have decades of experience combined with real-world telecoms knowledge.

We are a one-stop shop for multi-vendor automated network rollout & transformation, AI-assisted network design and optimization, network support, and managed operations.

OPEN NETWORKS

OPEN NETWORKS LAB
RESEARCH & DEVELOPMENT
INTEGRATION & VERIFICATION
TELCO CLOUD & ORCHESTRATION
PRIVATE NETWORKS

Integrated, high-performing & accelerating ecosystem development

Our team has supported the development and testing of networks from 2G to 5G, and we now bring this experience to open disaggregated networks.

Our references span the open network lifecycle, including Traffic Application, Telco Cloud, Server hardware, and Service Management & Orchestration, Kubernetes, ONAP, and OSM open standards.

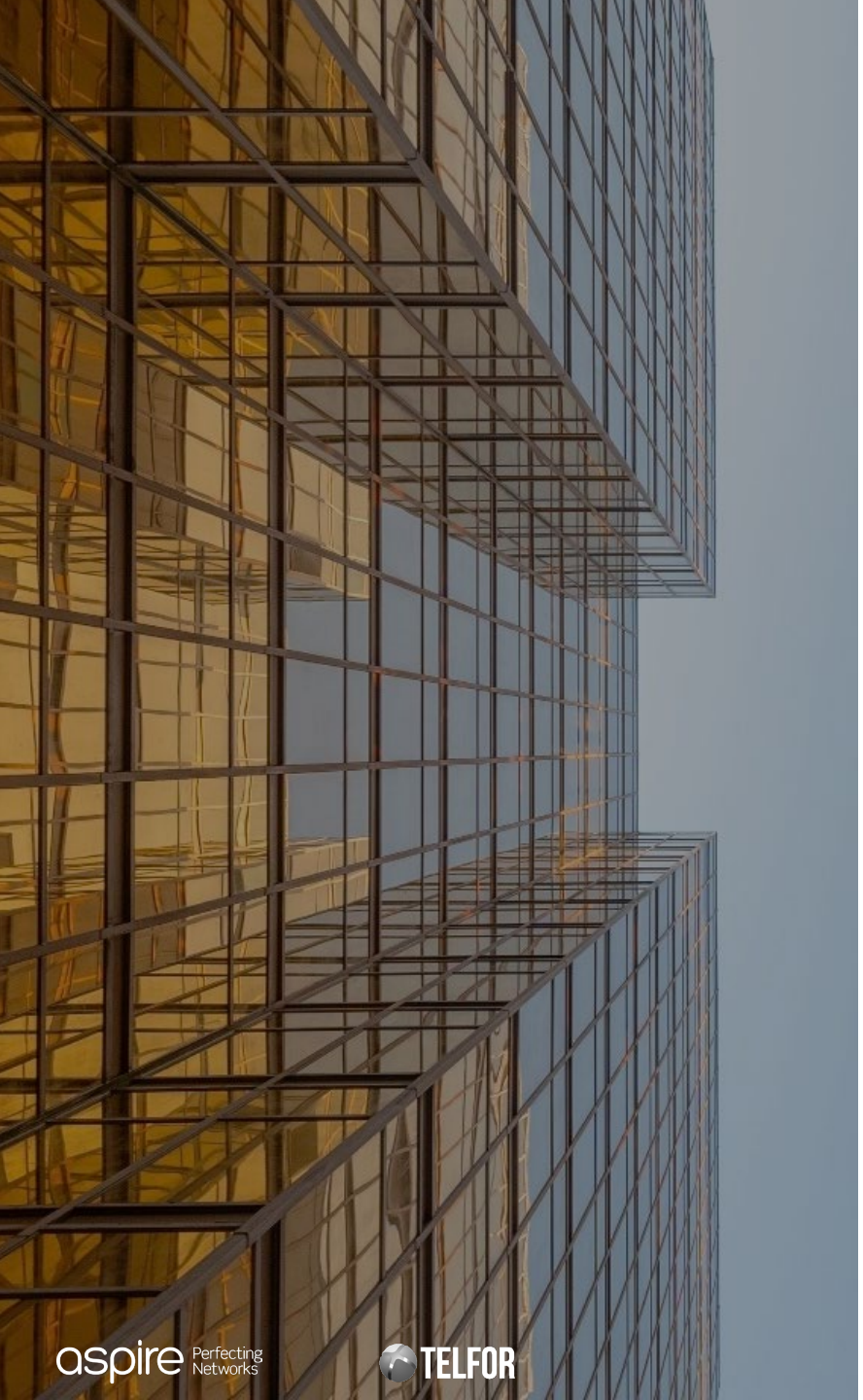
CONSULTING

TECHNOLOGY STRATEGY
NEW TECHNOLOGY INTRODUCTION
PROCUREMENT STRATEGY
CAPEX OPTIMIZATION
OPERATIONAL EFFICIENCY

Independent, business-aligned & realizing the value of your network

Our consultancy team is ready to assess your organization and challenges and to help you choose the right technology strategy for your business needs.

Our team of consultants audits your practices and network performance and offers solutions that reduce costs, re-engineer processes, and help you truly realize the value of your network.



Holistic coverage and capacity RAN planning

Solution Overview

Cell/Band Performance Signature

Coverage and Capacity Planning Sinergy

References

Solution Overview

Problem/Cause

- 4G/5G/6G deployment on higher frequencies, challenge to meet coverage requirements
- Persistent traffic load growth, limited spectrum assets, and increasing user experience requirements put pressure on mobile operators to deliver target performance at optimal TCO
- A holistic approach for coverage and capacity planning is needed, to secure high-accuracy

Solution

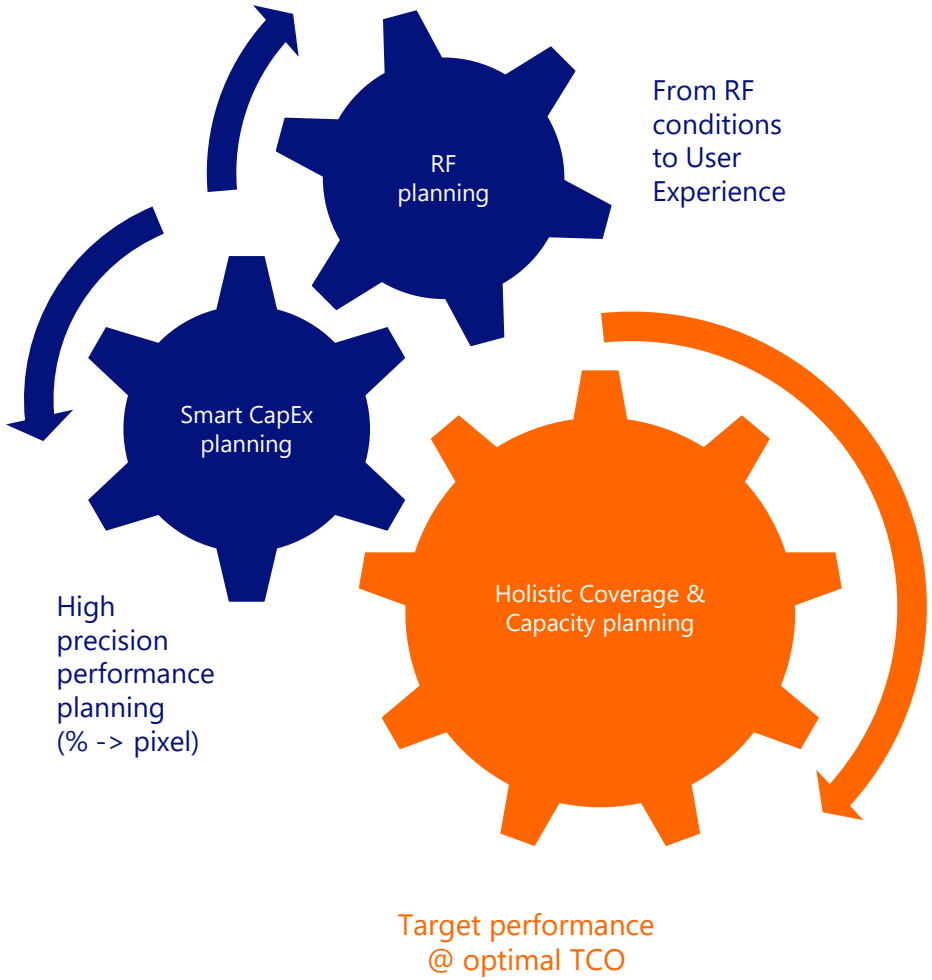
- Planning framework based on advanced modelling methodology implemented as combination of state-of-the-art RF planning tools and Aspire innovative Smart CapEx (Cell Performance Signature) solution
- Top expertise in network performance modelling, based on years of multi-vendor experience and vendor independence

Unique Features

- Full synergy between RF modelling (State of the art tools like Atoll, RanPlan…) and Aspire's innovative Smart CapEx planning solution
- Advanced performance modelling, from RF conditions and network assets/utilization to user experienced downlink/uplink throughput
- Support for performance evolution for customized traffic growth and network load increase, with sector-based advanced traffic forecasting
- Capacity planning evolution, from traditional network segment (cluster/area based) performance planning to pixel resolution

Benefits

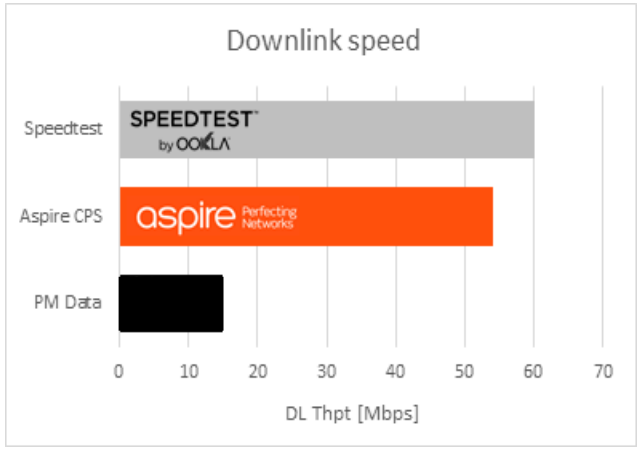
- High accuracy user experience planning (with pixel resolution)
- Vendor independent network design based on optimal solutions
- Meeting target performance (regulator/license obligation or business driven segmented user experience) at optimal CapEx
- Support for predictive planning with on-time bottleneck detection
- What-If analysis for assessment of different network deployment scenario performance in growing network load circumstances, including impact of potential network topology changes



Cell/Band Performance Signature

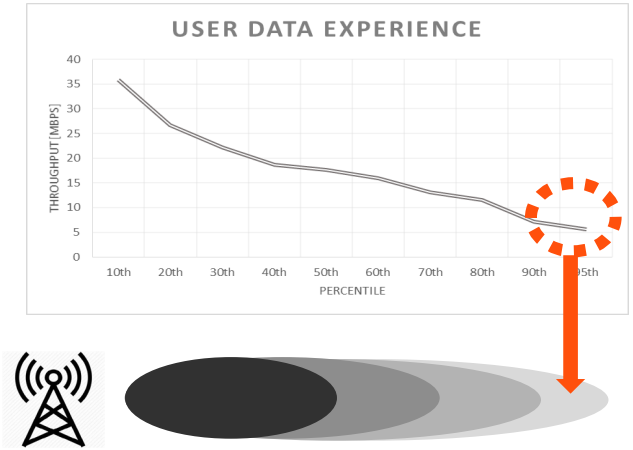
Benefits of Advanced Analytics

1
Improved throughput estimation accuracy



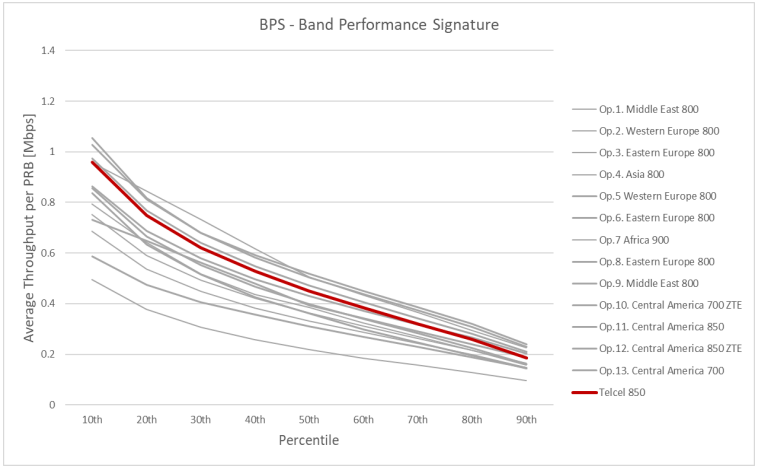
- Bursty-chatty type of traffic cannot utilize full LTE/5G potential, lower amount of scheduled data during TTI causes pessimistic throughput values.
- Problems with CA due to PDCP/RLC counters being pegged only in the Primary Cell.
- **CPS-based throughput estimation showing a good match with drive test measurements, crowdsourcing data, etc.**

2
User experience assessment from close to antenna to cell edge



- Standard PM-based throughput KPIs provide only average values in cell/sector.
- At the same time, the main goal is to provide good performance on the cell edge, especially in situations when the regulator defines minimum performance to be achieved.
- **CPS-based throughput insights provide information about user experience in different parts of the cell, from close to the antenna to the cell edge.**

3
Spectral efficiency assessment & insights

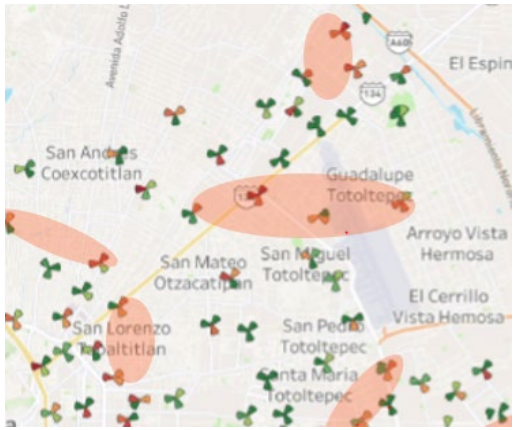


- In a situation when data traffic is growing, and spectrum assets are limited spectral efficiency becomes one of the most important KPIs to focus.
- Aspire solution is based on deep dive to link adaptation performance, bypassing traffic characteristics impact.
- **BPS-based spectral efficiency assessment provides information on achieved layer performance in different parts of a cell.**

Cell/Band Performance Signature

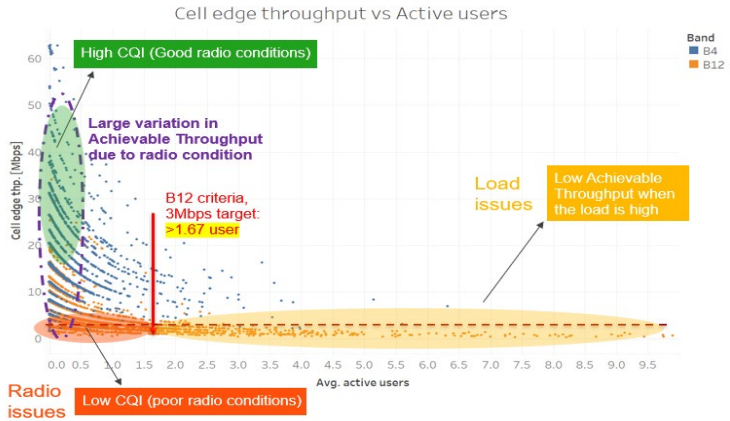
Benefits of Advanced Analytics

4
Underperforming sectors detection



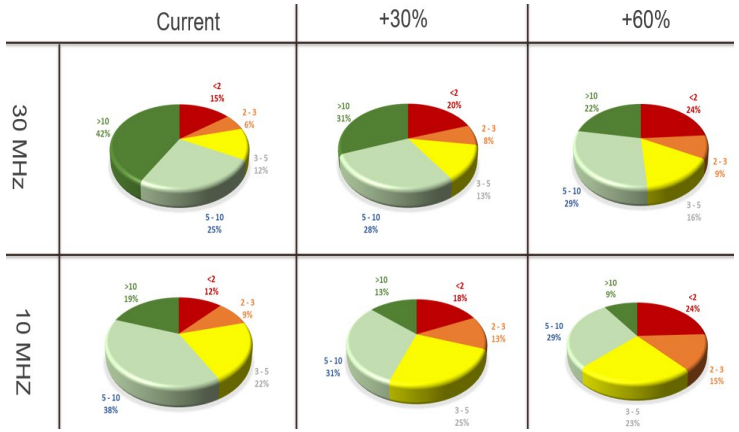
- Performance on the cell edge is the most critical criteria for underperforming sectors detection.
- **CPS-based user experience estimation on cell edge has proven to be a good tool for the detection of underperforming sectors.**

5
Low performance problem segmentation



- Capacity expansions will not solve problems caused by poor signal. It is important to segment problems caused by insufficient capacity from others caused by poor radio signal quality.
- **CPS supports RCA and segmentation of problems between capacity-related and radio quality driven.**

6
Performance prediction for traffic growth



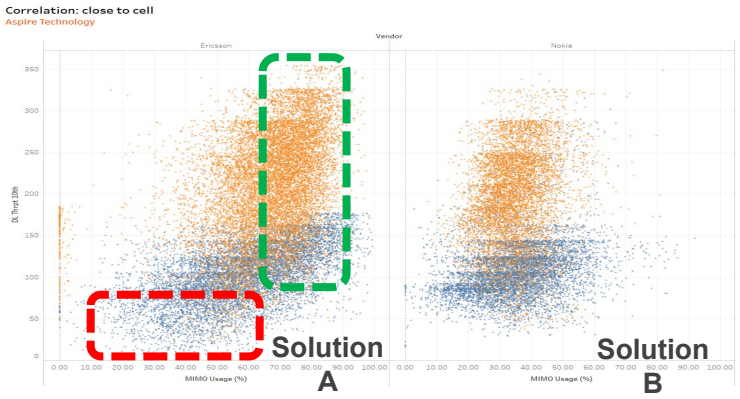
- Moving from reactive capacity expansions to predictive performance planning is a key to securing good quality of service and high NPS.
- **CPS-based user experience model is capable of predicting future performance in growing traffic and load conditions and supporting predictive planning.**

Cell/Band Performance Signature

Benefits of Advanced Analytics

7

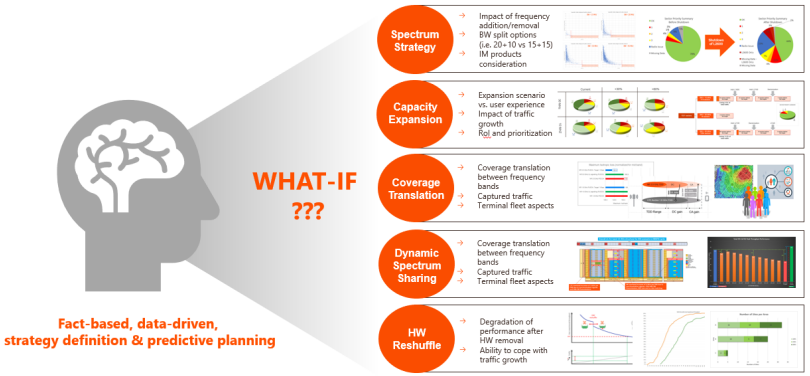
Performance benchmark - vendor, solution or area



- **CPS supported Benchmark of performance of different vendors leads to TCO improvements.**
- **CPS supported analysis of different solutions for better investment decisions and maximized RoI.**
- **CPS supported dashboards for executive advanced observability of different markets.**

8

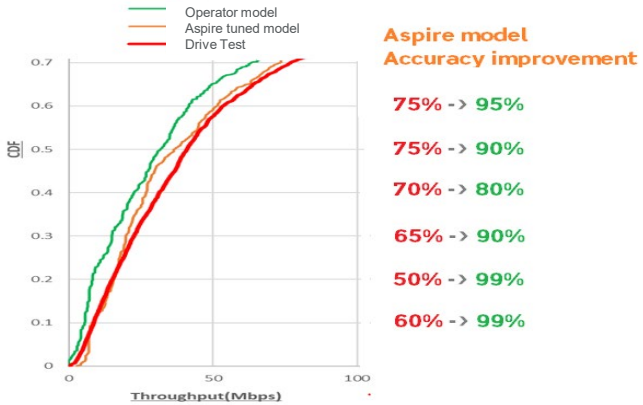
What-If analysis for various scenarios assessment



- CPS supports with various WHAT-IF analysis for different scenarios and use cases evaluations.
- **CPS enables fact-based, data driven strategy definition and CapEx planning, through assessment of different spectrum scenarios, expansion plans, HW reshuffle projects, advanced solutions implementations.**

9

High accuracy modelling



- Sometimes it is of the highest importance to model cell edge throughput with high accuracy (i.e. high pressure to deliver target performance on cell edge or to identify low-performing micro zones).
- **In synergy between CPS-based methodology and State of the Art RF-Design tools, user experience modeling with high accuracy may be achieved.**

Network Planning in RF Design Tools

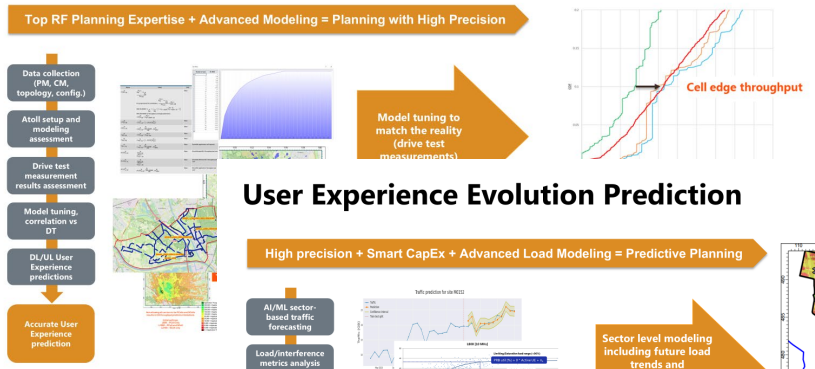
Benefits of Advanced Modelling and Tuning

Advanced modeling and parameter tuning in planning tools followed by good Drive Test calibration/tunning will lead to **high-accuracy User Experience pixel-level modeling.**

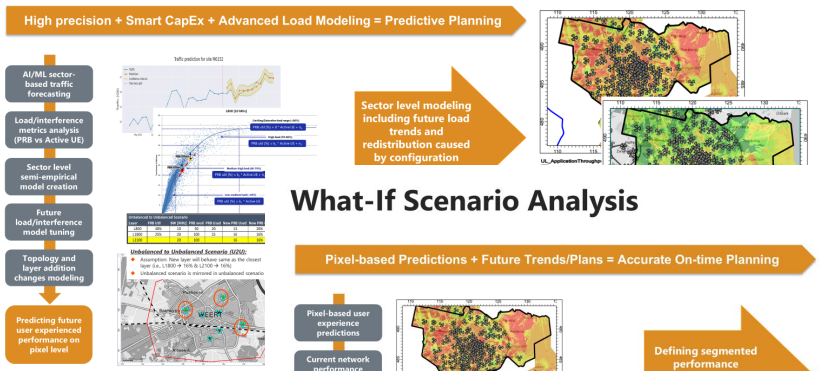
Current/future load modeling with real network data combined with pixel-level predictions opens opportunities for **predictive User Experience based planning.**

Various types of **what-if analysis** including topology, configuration, solution, and load changes available as well as **network compliancy for different/segmented performance targets and expansion planning.**

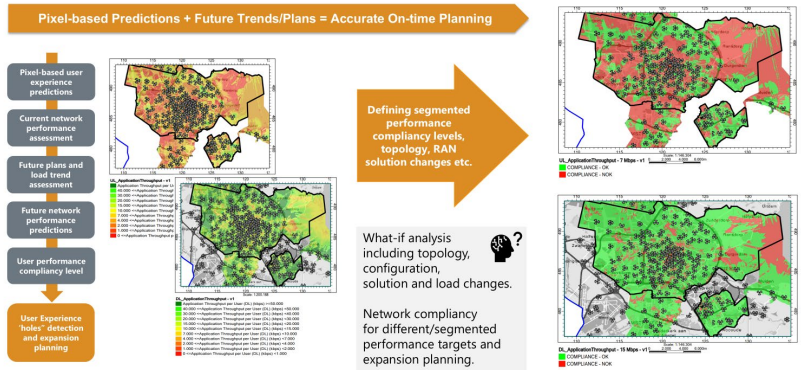
Advanced modeling for High Accuracy



User Experience Evolution Prediction



What-If Scenario Analysis



The usability of planning tools can be greatly expanded from basic Coverage to high accuracy Holistic Coverage and Capacity Planning Methodology

Coverage and Capacity Planning Sinergy

Network Coverage Planning

RF Propagation Modeling (from link budgets to high accuracy) + **User Experienced Modeling** (from RF conditions to throughput) = **Advanced Coverage Planning**

Shift from RF conditions based to User Performance based Coverage Planning

Benefits

1. User experience instead signal level
2. Spectrum scenario vs User experience
3. Immense modelling accuracy

Network Capacity Planning

Smart CapEx planning (from NW utilization to user experience) + **High Precision Planning** (from percentiles to pixels) = **Advanced Capacity Planning**

Shift from performance probability to pixel-based Capacity planning

Benefits

1. Pixel based capacity planning
2. New site / topology changes modelling
3. Immense modelling accuracy

References

European Operator

4G and 5G link budgets revision, site planning and pixel level Uplink and Downlink performance modelling in RF planning tool, with focus on cell edge throughput for meeting regulator defined performance target. Introduction of traffic growth modelling and its impact on user performance. Model calibration for improved accuracy based on comparison versus drive tests. Capacity and Coverage planning on municipality level. Aggressive drive of 3G sunset with automated performance management. Supporting the operator Digital Transformation.

- Planning process audit and improvement
- Prediction reliability improvement
- Holistic planning methodology development
- Drive testing need reduction
- Process and reports automation

Middle East Operator

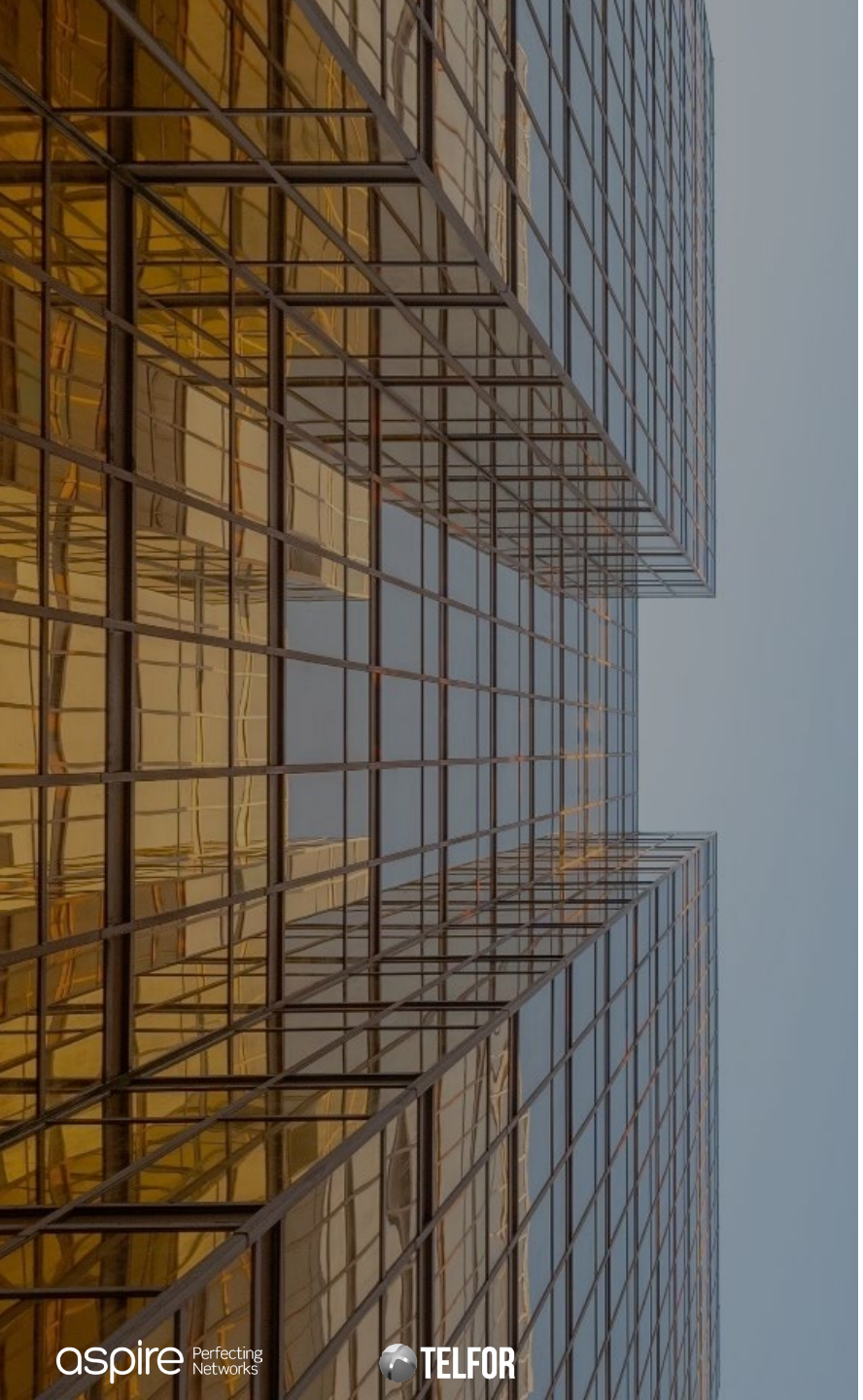
5-year Managed Service including capacity planning & CapEx Optimization, network dimensioning, 4G/5G radio network design, RAN vendors performance benchmarking, technology sunset strategy definition, Open RAN dimensioning, automation enabling digital transformation for use cases like Capacity and Coverage planning across all RAN technologies, mater database, RAN Configuration Management, AI/ML based RAN Traffic forecasting and prediction, Transport Network and Core Network performance dashboards.

- CapEx optimization
- Expansion planning methodology development
- Planning process automation
- AI/ML based traffic predictions
- Capacity dashboards development
- Yearly expansion planning

Central America Operator

Full Coverage and Capacity planning of selected area including advanced analytics such as user experience assessment (from close to antenna to cell edge), spectral efficiency assessment, identification of underperforming sectors, RCA and problem segmentation Capacity vs Coverage, what-if analysis for capacity addition, L850 densification & re-design. RF planning tool setup audit and parameter tunning for performance modelling. Predictive analysis of different re-design options (tilting, site, sector, layers addition) impact on current coverage, capacity and sector/site/area user performance (based on pixel level predictions).

- Planning process and tool audit
- Short and Mid-term planning and re-design recommendations
- Long-term planning process revision and holistic coverage and capacity planning methodology introduction



AI/ML solutions for Telco

AI in telecommunications

Use cases

ML-based traffic forecasting

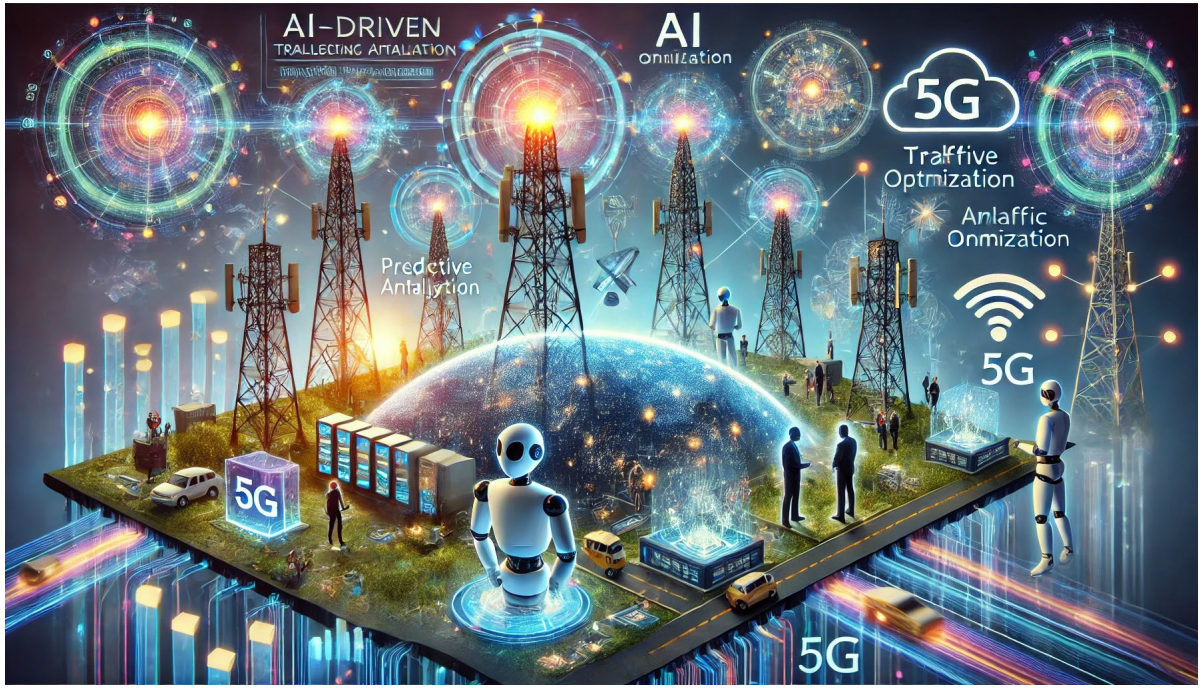
AI/ML Anomaly Detection

Energy Saving (NetZero)

Gen AI Knowledge base copilot

AI in Telecommunications

- The telecommunications industry is evolving rapidly, with artificial intelligence (AI) playing a pivotal role in shaping its future, particularly with the emergence of generative AI.
- AI is being leveraged to enhance customer experiences, automate processes, boost productivity, and optimize network operations.



Use Cases

Personalized Offers and Marketing

- Analyzing customer usage patterns and preferences to deliver tailored offers and promotions, enhancing customer retention and revenue.

Customer Experience Enhancement

- Chatbots and virtual assistants powered by NLP/GenAI for resolving customer queries, troubleshooting issues, and providing recommendations.

Energy Efficiency

- AI predicts traffic patterns and optimizes network elements' energy consumption by activating sleep modes during low usage periods.

KPIs Anomaly Detection

- Identifying and addressing anomalies in key performance indicators (e.g., throughput, latency) using AI-driven monitoring tools.

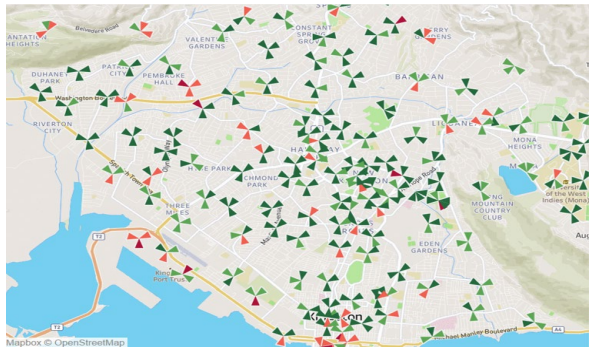
ML Based Long Term Traffic Forecasting

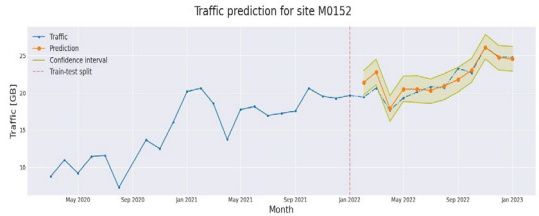
CHALLENGES

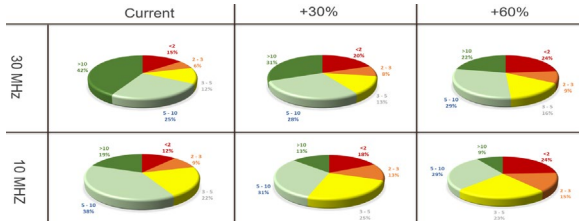
- Each sector has its own traffic profile
- Linear forecasting does not take into account geographic dynamics
- CAPEX planning needs precise traffic forecast to minimize investment

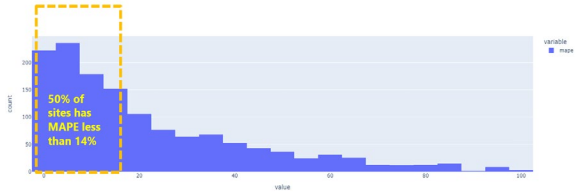
SOLUTION

Web-based application for multiyear traffic forecast that utilizes a customized AI ML algorithm for sector-based forecasting. It takes into consideration the yearly evolution and the seasonality of each sector. High accuracy leads to better planning of future investments.







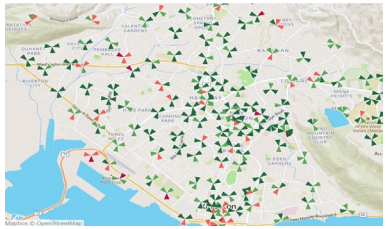


BENEFITS

- Sector-specific traffic forecasting
- ML-based forecast takes into consideration seasonality and geographic dynamics
- Multi-year forecast with precise accuracy enables more precise CAPEX planning

ML Based Traffic Forecasting

Building with precision, site level traffic prediction

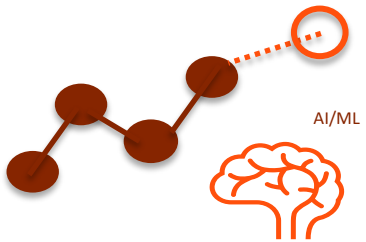


- Each site/sector has its own traffic pattern
- NW/area-based traffic forecasting do not provide satisfying results
- For building with precision site/sector level traffic prediction recommended

What?

How?

- Advanced state of art ML models
- Customized models for MNO's use cases

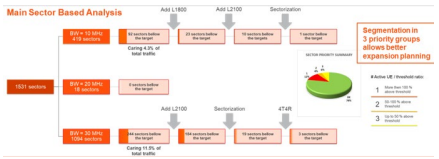


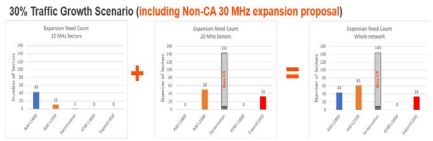
Value!

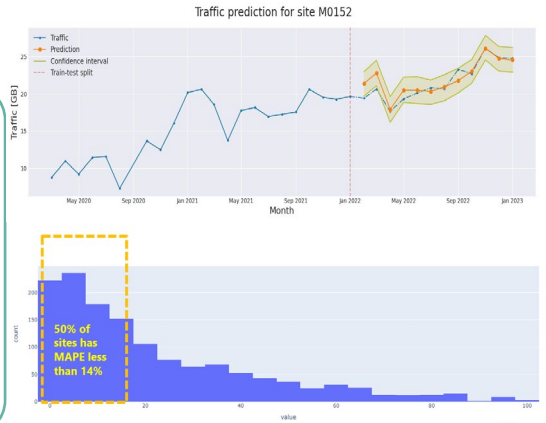
- Automated predictive expansions planning
- Site based RAN expansion
- TN capacity expansion (known topology + aggregation)
- Core NW Licenses expansion (payload -> Active #UEs)

Result

- Good accuracy achieved (50% of base station with MAPE<14%)
- Ability to predict with good accuracy in complex traffic mix & deployment scenario







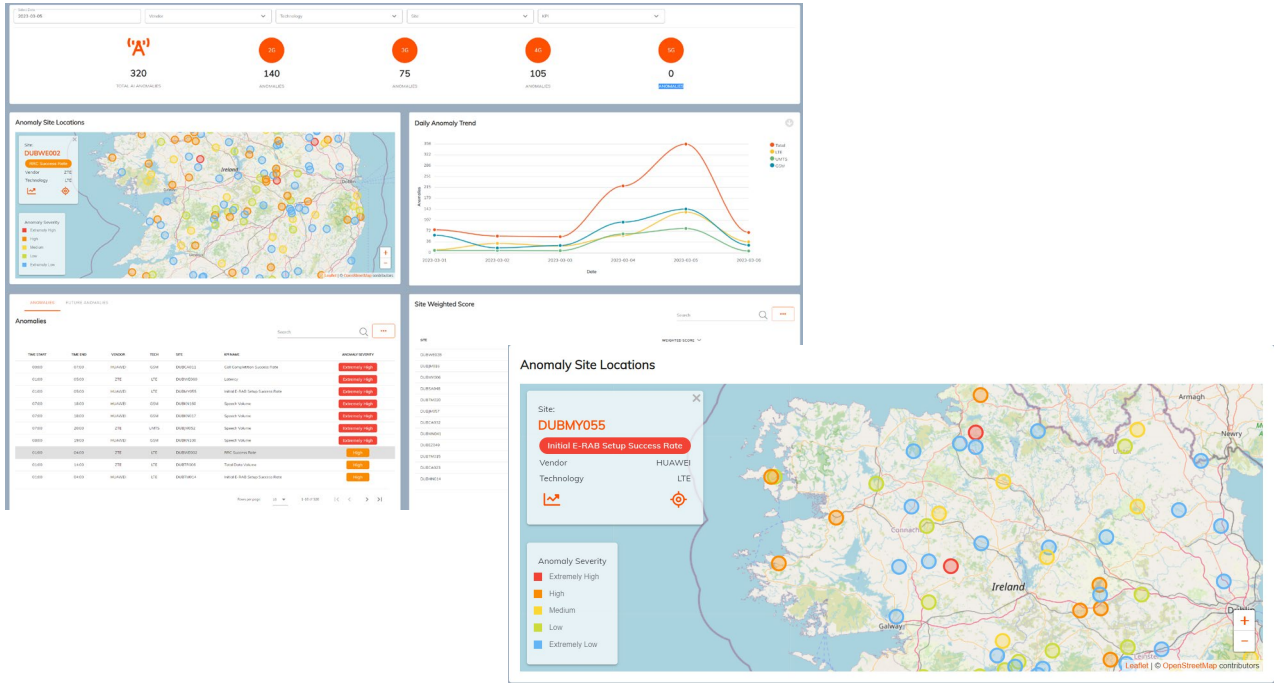
AI/ML Anomaly Detection

CHALLENGES

- KPIs degradation affects user performance, needs to be quickly detected
- Inability to be proactive
- Inability to distinguish KPI degradations severity

SOLUTION

A web-based application that uses AI/ML to automatically detect, categorize and prioritize anomalies in RAN network performance for multiple vendors and technologies



BENEFITS

- Quick and automatic detection of anomalies, that occur in the past 24h.
- Proactive detection with the forecast of potential future anomalies in the next 12 hours using AI/ML
- Anomalies sorted by severity levels (e.g. extremely high, high, medium, etc).

Energy Saving (NetZero)

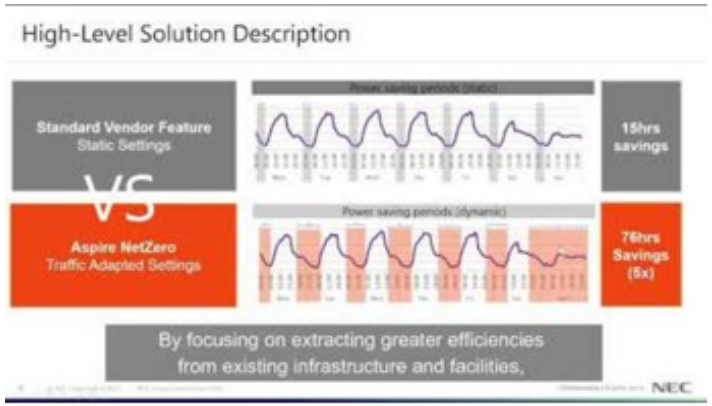
CHALLENGES

- RAN power consumption puts pressure on OpEx and CO2 emission targets
- Vendor features are static and don't take into account the specific cell traffic patterns
- Typical AI based solutions don't take into account the service impact of sleep features

SOLUTION

Application with a complex patented algorithm that can orchestrate in close-loop the vendor parameters on a per cell basis based on AI/ML traffic forecast, maximizing savings while maintaining service quality.

NetZero module demo



BENEFITS

- Significant energy saving gains on top of existing solutions.
- Dynamic algorithm that adapts sleep window to cell traffic profile and KPI performance according to AI/ML predictions
- Close-loop, fully automated. Zero manual workload

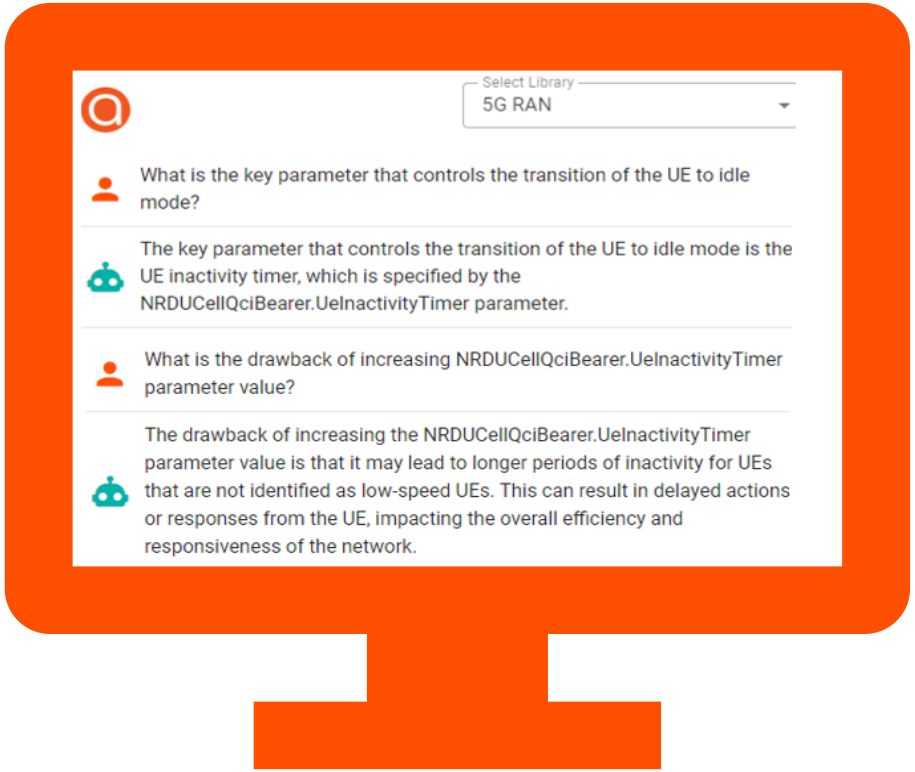
Gen AI Knowledge Base Copilot

CHALLENGES

- Searching technical documentation is frequent and time-consuming task for engineers.
- Required information is scattered over multiple documents.
- Miss interpretations due to reading multiple documents leads to errors

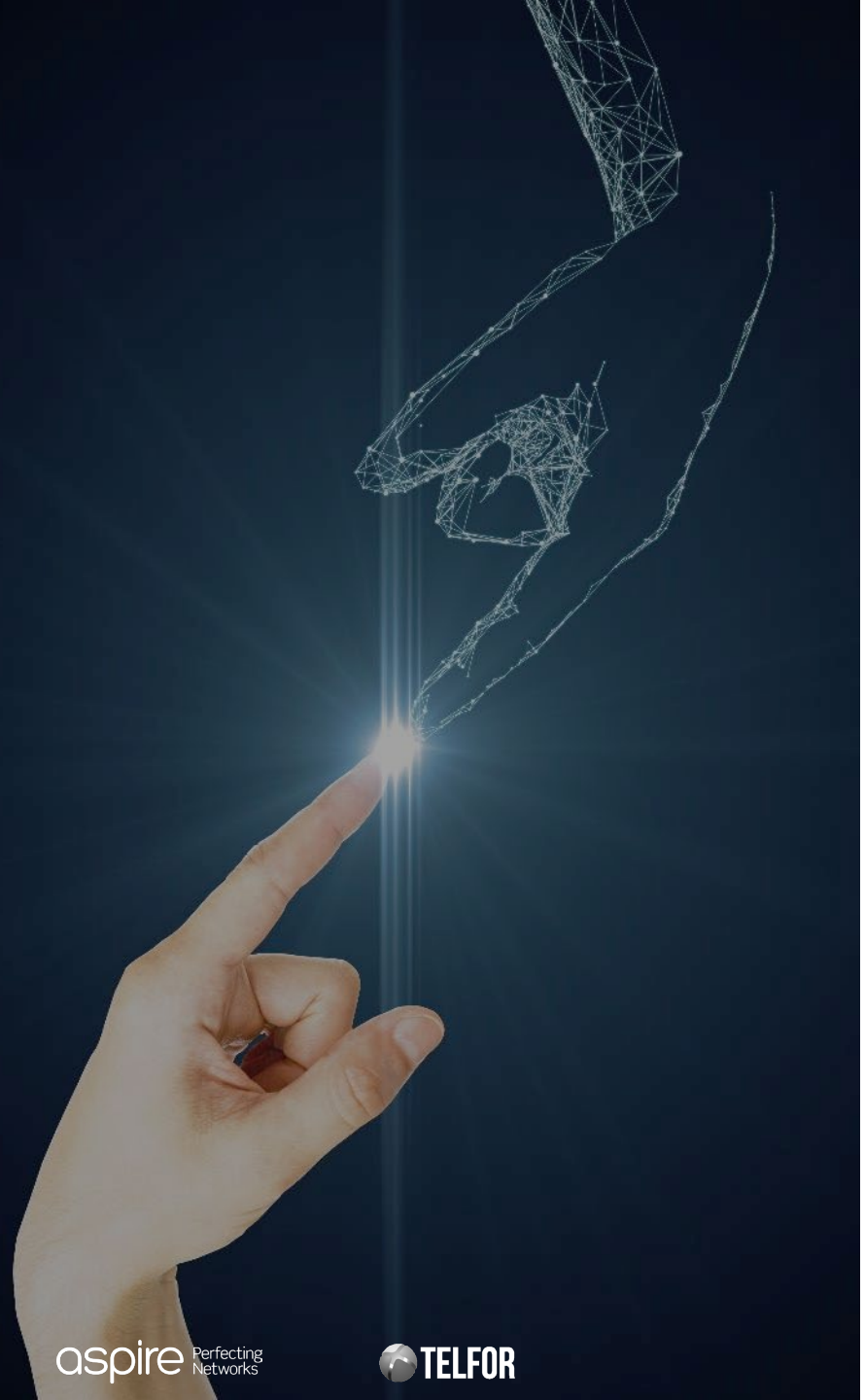
SOLUTION

Generative AI knowledge base chatbot that serves as a copilot to streamline documentation search tasks for engineers. The application is customized to operator needs and existing documentation. Operates in the local environment, risk-free.



BENEFITS

- Rapid search through huge available standards and product documentation
- Single platform for documentation search
- Intelligent context aware chatbot that explains in detail the documentation and clarifies any doubt



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aspire
Perfecting
Networks