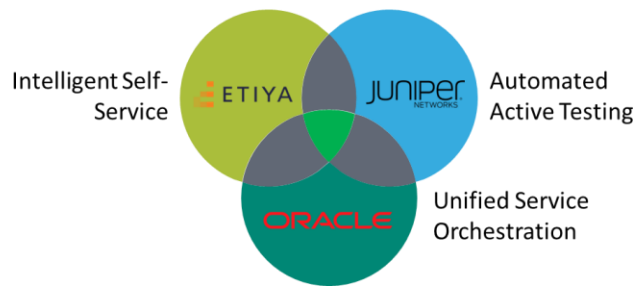


Project Whitepaper

# Experience Guaranteed Connectivity

Delivering **Experience-Guaranteed Connectivity** for mission-critical enterprise infrastructure



Authors:

- **Fahri Kerçek**, Head of Product Strategy, Etiya
- **Yusuf Ziya Atalay**, Product Owner & Solutions Architect, Etiya
- **Baris Akbulut**, Technical Team Lead, Etiya
- **Naz Yuva**, Senior Information Technology Business Analyst, Etiya
- **Andrew Baldock**, Senior Product Marketing Manager, Juniper Networks
- **Larry Byrd**, Senior Product Manager, Juniper Networks
- **Leonard Sheahan**, Senior Director, Product Marketing, Oracle Communications
- **Arvind Kumar Dwivedi**, Senior Product Manager, Oracle Communications

## TABLE OF CONTENTS

Executive Summary.....	3
Purpose .....	4
Required business capabilities.....	5
Functional Scope.....	7
Use Cases .....	10
Benefits .....	13
Conclusion.....	15
References .....	15

## EXECUTIVE SUMMARY

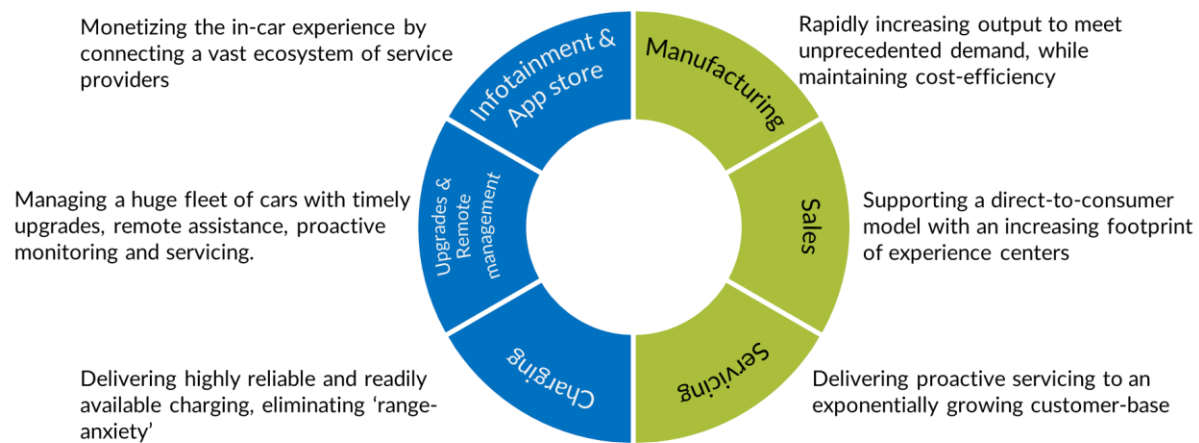
In today's fiercely competitive telecommunications landscape, the battleground for success centers on providing exceptional Quality of Experience (QoE). Sales teams within the Communication Service Provider (CSP) industry grapple with the challenge of delivering significant Return on Investment (RoI) by leveraging superior Quality of Service (QoS) offerings, all while navigating a fast-paced sales cycle. Yet, the prevailing method of estimating network capacity to deliver QoS often leads to vague sales projections, compromised quality, prolonged sales cycles, and untapped potential.

This whitepaper unveils a paradigm-shifting concept: "Experience Guaranteed Connectivity." This transformative approach harnesses the power of modern, experience-aware network automation. At its core is the deployment of on-demand automated service simulation — a revolutionary tool that proactively validates services before they are presented to potential customers. This validation extends from initial offering through service ordering, activation, and delivery. By precisely aligning service offerings with available resources and certifying quality in advance, CSPs can accelerate Time-to-Market (TTM) and meet Service Level Agreements (SLAs) with unmatched precision.

## PURPOSE

High-growth digitalized verticals require experience-guaranteed connectivity to scale. For example, today 20-40% of EV charging attempts fail<sup>1</sup> due to connectivity issues, contributing to a 20% churn rate<sup>2</sup>, thereby slowing growth, and impacting revenue. In addition, the buying journey for electric vehicles relies heavily on the experience of ‘test-driving’ vehicles and their in-car infotainment systems, with the typical consumer 3 times more likely to purchase an electric vehicle if they have experienced being inside and using one<sup>3</sup> (in particular, the features that are not typically available in other vehicle categories). This is especially challenging for growth companies that need to rapidly establish a network of sales & marketing locations, without relying on dealership franchises that extract value while diluting brand impact.

Driving accelerated growth therefore requires **experience-guaranteed connectivity**: on-demand flawless connectivity and immersive, flawless experiences in the buying journey, but undetected performance, capacity and connectivity issues can prevent CSPs, and their digitalized industry vertical customers from, delivering this.



**Figure 1:** The value-chain for mobility services providers, and the critical role of flawless connectivity

The purpose of this catalyst is to propose and demonstrate a unique approach to addressing this issue, by automating the verification of requested services before accepting an order, as well as by optimizing

<sup>1</sup> JD Power Charging Study, 2023: [2023 U.S. Electric Vehicle Experience \(EVX\) Public Charging Study | J.D. Power \(jdpower.com\)](https://www.jdpower.com/research/2023-us-electric-vehicle-experience)

<sup>2</sup> Nature Energy journal survey ‘Understanding discontinuance among California’s electric vehicle owners’

<sup>3</sup> JD Power Consideration Study, 2023: [2023 U.S. Electric Vehicle Consideration \(EVC\) Study | J.D. Power \(jdpower.com\)](https://www.jdpower.com/research/2023-us-electric-vehicle-consideration)

the proposed service configuration and site selection to optimize the business outcomes as expressed by the customer in the service request (the ‘Business Intent’). As such we propose certain enhancements to TM Forum definitions concerning the expression and delivery of business intent, in addition to leveraging certain existing TM Forum assets, detailed later in this document.

## REQUIRED BUSINESS CAPABILITIES

Although we use mobility ecosystem services as a focus to illustrate our solution, it applies equally to many digitalized verticals, since the value chain always has a critical dependency on high quality underlying connectivity.

Through our catalyst, we demonstrate the following capabilities, which contribute to realizing the overall objective of pre-validation of high performance connectivity:

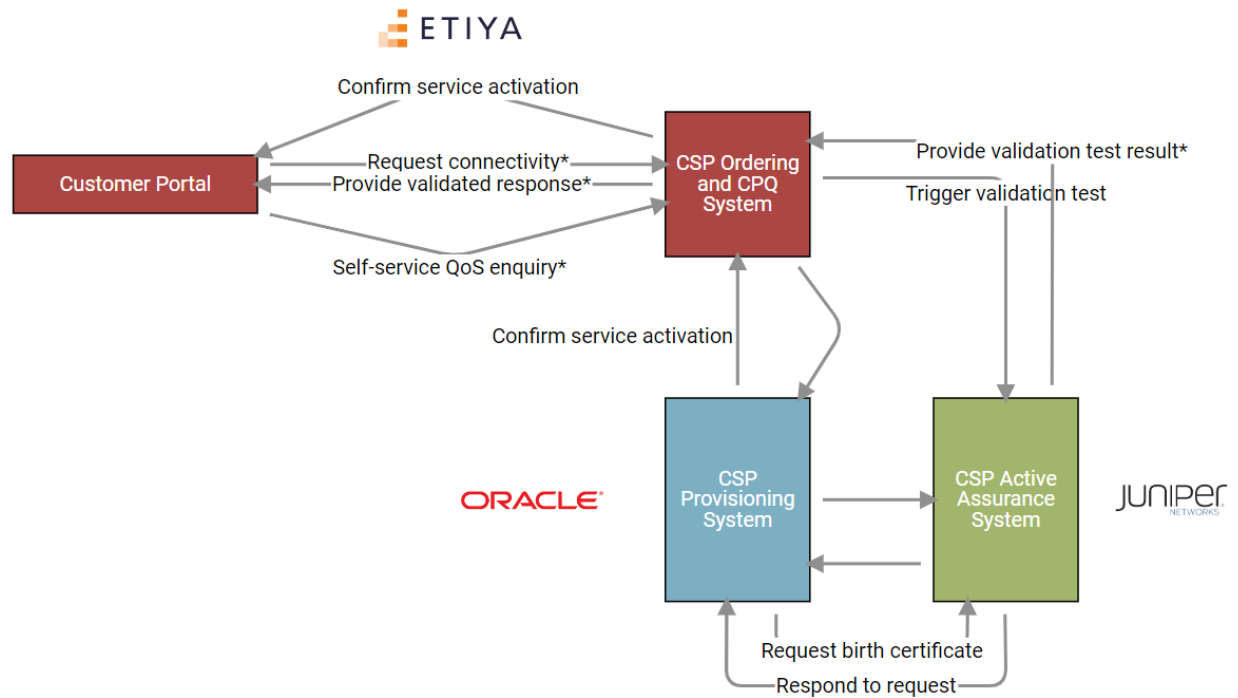
Concept / Solution	Measures of success
<p><b>Guaranteeing service quality will be delivered throughout the service lifecycle in the live network</b> using synthetic traffic, to measure perceived customer experience metrics, verify and load-test the network’s capacity to deliver a given business intent.</p>	<p>Metrics that apply generally:</p> <ul style="list-style-type: none"> <li>- Time to market (time to activation)</li> <li>- Service availability</li> </ul> <p>Metrics that apply in this catalyst:</p> <ul style="list-style-type: none"> <li>- Service turn-up times for charging points</li> <li>- Charging success rates</li> <li>- Added services revenue per charging point</li> </ul>
<p><b>Leveraging a new concept of ‘fleet-as-a-sensor,’</b> by installing virtual active test agents in the vehicles and gathering geospatial mobility insights in actual customer experience, complementing CSPs’ test agents built natively into their network.</p>	<p>We plan to demonstrate how this can enhance the approach to ‘Minimization of Drive-Testing’ specified in 3GPP<sup>4</sup>.</p>
<p><b>Enabling advisory role through automated business intent optimization:</b> By abstracting complexity away from the expression of intent by the enterprise and focusing on outcomes instead, the CSP can respond to requirements with options, each optimized for a given outcome (time, cost, performance for example) and provide options that further enhance outcomes.</p>	<p>Our second use case demonstrates how the CSP can offer added services that are experience-guaranteed in requested locations (such as live Q&amp;A, AR/VR, and broadcasting).</p> <p>Metrics that would apply:</p> <ul style="list-style-type: none"> <li>- Incremental improvement in outcome (e.g., revenue per location).</li> </ul>
<p><b>Supporting innovative B2B2X business models and simplifying ecosystem management</b> through flexible BSS augmented by network</p>	<p>In this catalyst, each use case addresses different business models (B2X, B2B2X). Flexible tools for CSPs to create innovative products &amp; services,</p>

<sup>4</sup> 3GPP Release 17, TS 37.320

<p>slicing and experience guarantees. Guaranteeing diverse service characteristics, including low-latency AR/VR and other immersive experiences.</p>	<p>backed by network slices that can be experience guaranteed. This empowers the NSaaS model to support diverse business requirements and provide flexibility to CSPs for generating different connectivity options per their enterprises.</p>
<p><b>Orchestration of both</b></p> <ul style="list-style-type: none"> <li>- <b>service qualification requests and</b></li> <li>- <b>firm order requests</b></li> </ul>	<p>Qualification during advisory negotiation between Togg and CSP includes network quality measurements using active assurance as well as integration to electric utilities to qualify power availability at target locations.</p> <p>These results are fed back during the negotiation / feasibility stage to allow Togg to select appropriate locations to turn up based on Togg's business intent.</p>
<p><b>Innovative integration of native active testing, advanced service orchestration and next-generation commerce with open standards.</b></p>	<p>By exposing active testing in support of business negotiation and end user promotions, alongside automated orchestration, we demonstrate the potential to blur the boundaries between network and business, enabling sales teams to validate services accurately and on-demand, without having to enquire manually with operations teams.</p>

## FUNCTIONAL SCOPE

(Refer to the team's CurateFX page<sup>5</sup> for more details)

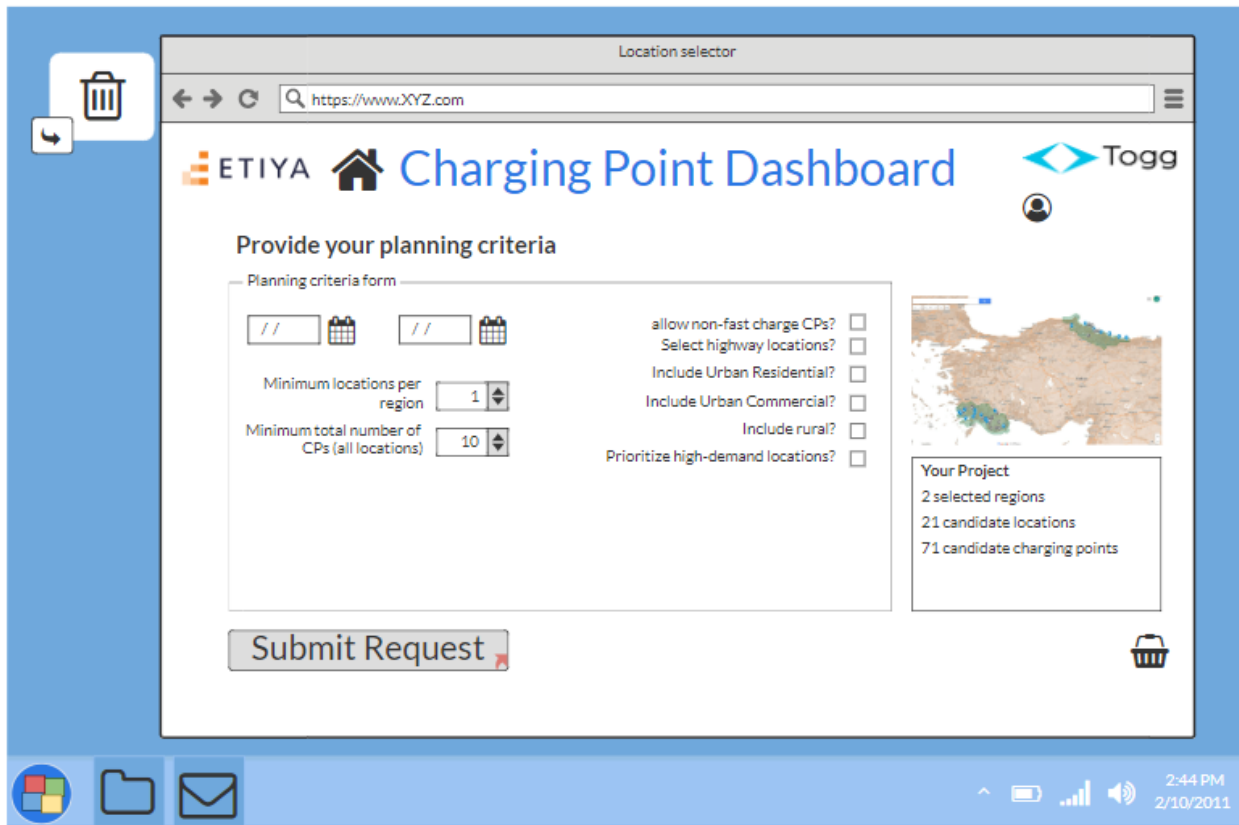


**Figure 2:** A high level functional overview of our proposed solution

The diagram above, taken from our CurateFX page, illustrates the high level set of functions and interactions that we are demonstrating in our catalyst. Of particular importance are the following:

1. **Requesting connectivity:** In this process, we propose to simplify the definition of business intent, so that the enterprise customer expresses their requirement in a way that represents the intended business outcome, rather than the intended connection speed, latency, or reliability. Instead, the function of translating a given request into connection performance criteria is done by the ordering system that receives the request and based on predefined model templates. For example, in the case of vehicle charging points, the customer selects the number of charging points in a given geographical area, and the ordering system defines the throughput, latency and reliability required based on a predefined model of a charging point, the minimum resource requirements, and the set of supporting services required.

<sup>5</sup> CurateFX page: Experience Guaranteed Connectivity

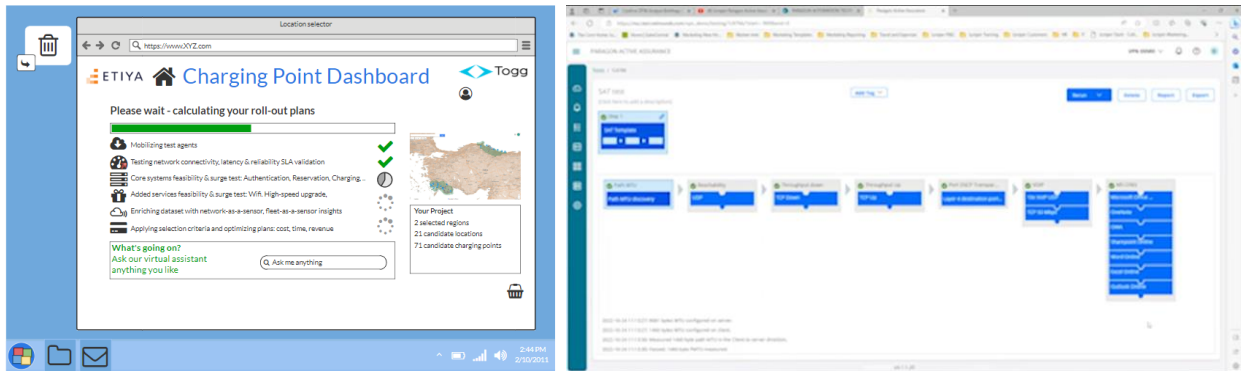


**Figure 3:** An example of a business intent request based on outcomes rather than connection characteristics.

2. **Validating a request:** In this process, we propose to introduce an ‘outcomes optimization’ step, in which the customer is delivered one or more proposals, each optimized for a given business outcome (such as time-to-activation or estimated ROI from additional ‘value-added’ services). This is done through the active testing of every available connection, and the calculation of an optimal combination of connections that, in addition to meeting the minimum performance requirements, are validated, and analyzed for additional business characteristics. Tests include:
  - a. **Core system connectivity tests:** Active data-plane tests that verify the connectivity and reliability for core services, such as authentication, billing, charging, reservations, and other systems critical to core functionality.
  - b. **Surge tests:** Active data-plane tests that inject synthetic traffic into the network to mimic high-demand scenarios.
  - c. **Added services feasibility tests:** Active data-plane tests that approximate a range of added services, such as high speed Wi-Fi, streaming video, rapid OTA software upgrades, diagnostics, and conferencing services.



Based on the outcome of these tests, connections are either disqualified, qualified but not recommended, or qualified and recommended.



**Figure 4:** (L) An illustration of the customer’s view of a test in progress, and (R) an example of an active test routine designed for site activation.

USE CASES

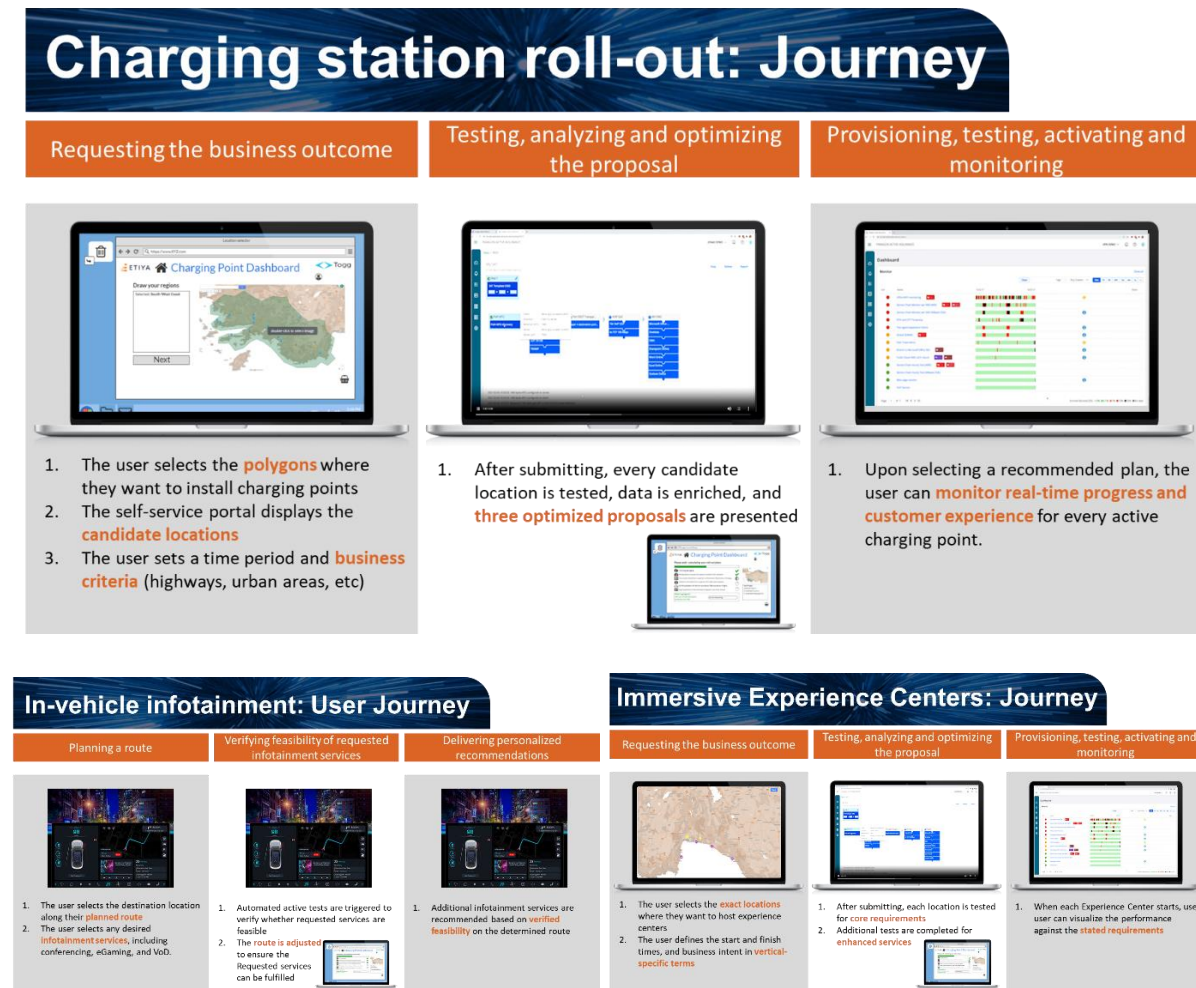


Figure 5: An illustration of the customer journey for each use case demonstrated in Phase 1 of this catalyst.

This catalyst demonstrates how CSPs can support accelerated business growth, by automating service quality testing, quickly responding to demand while guaranteeing customer experience, first time, every time, and increasing monetization. We illustrate this with a real mobility ecosystem services provider champion: Togg, with the following real-world scenarios:

- Rapid charging point roll-out:** Togg provides the CSP, via a self-service portal, its desired geospatial areas, with criteria (such as residential and/or highway coverage and per-location density) for new charging points in a given time period. The CSP ‘simulates’ and load-tests charging sessions throughout all available locations, and responds with three recommendations, optimized for time, cost and monetization potential.

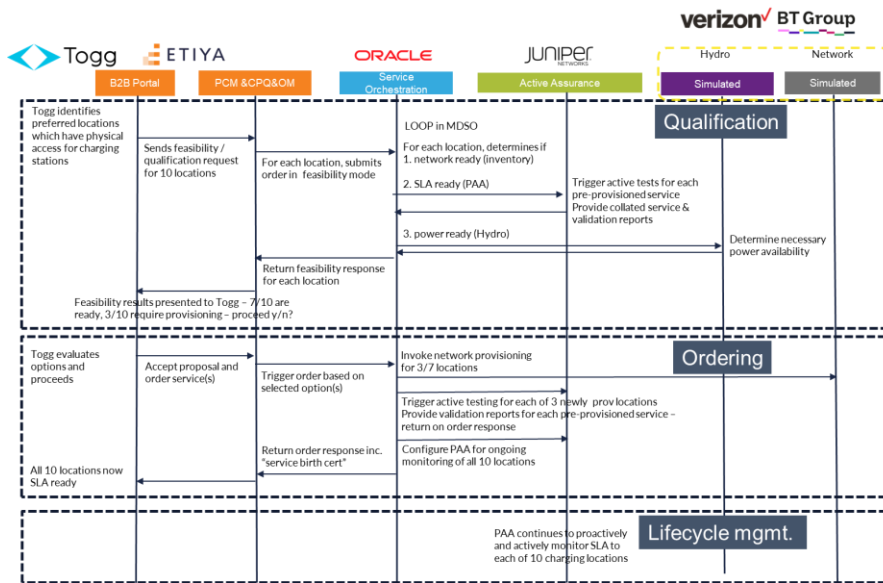


Figure 6: Use case ladder diagram for use case 1

- Immersive Experience Center Roadshow:** Togg provides desired locations, durations, and criteria for an experience center roadshow, not in terms of throughput/latency/density, but in business terms: expected peak visitors and number of demo vehicles. The CSP responds with an experience-guaranteed proposal, including optional experience-guaranteed add-ons that enhance immersive experiences with AR/VR, live remote Q&A, and live broadcasting support.

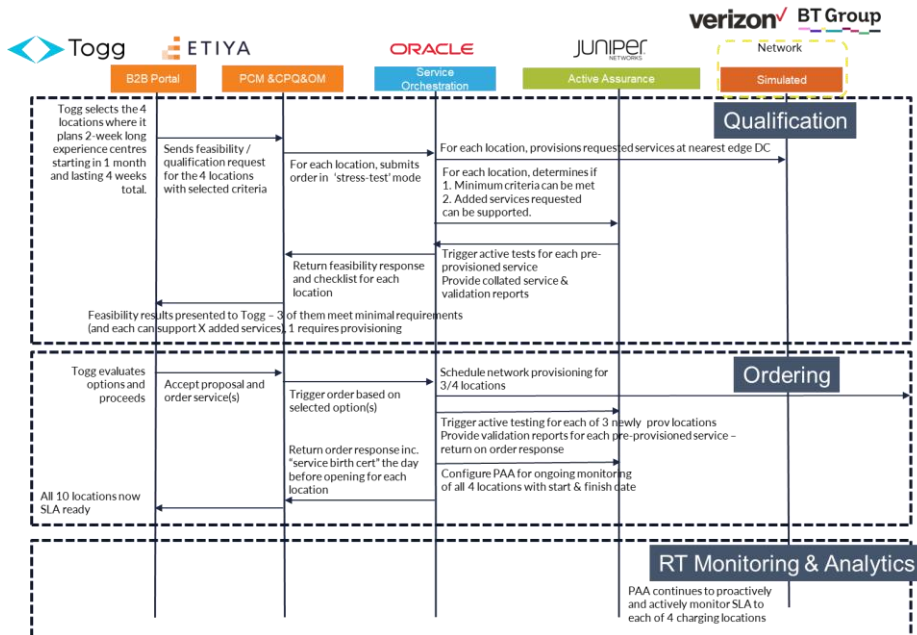


Figure 7: Use case ladder diagram for use case 2

3. **In-car experience optimization:** We demonstrate how drivers' infotainment experience can be guaranteed before starting a route, based on geospatial performance awareness augmented by continuous experience monitoring by the entire fleet. Building on the experience-aware 'network-as-a-sensor' concept available to CSPs, this enhances monetization with personalized recommendations and smart routing based on desired passenger services (e.g., VOD, conferencing, and gaming).

Overall, we demonstrate how modern, built-in network instrumentation, automatically provisioned, guarantees customer experience, increases agility, and ultimately better serves the leaders of tomorrow.

## BENEFITS

The catalyst team has drawn from publicly available data to estimate the potential benefits of the solution outlined above, which broadly fit into three high level categories:

### 1. **Unlocking new vertical revenue for the CSP by elevating it to trusted advisor status.**

Focusing purely on Mobility Ecosystem Services, CSP differentiation through experience guaranteed networking will enable an increased share of the estimated \$8.4bn global EV infotainment market size by 2028, by commanding a larger share of subscription fees, and capturing a larger share of total connections. Togg, one of our catalyst champions alongside Verizon and BT, is Turkey's new mobility services ecosystem provider and the first such organization to become a TM Forum member. Through its Trumore subsidiary and growing ecosystem of content providers, it plans to monetize in-car services such as conferencing, gaming, VOD, and streaming content. Delivering a seamless customer experience is vital to this, and CSPs that can provide differentiated, guaranteed experiences will win the largest share of this opportunity.

Our catalyst will demonstrate how this can be achieved by elevating the CSP and enterprise interaction from transactional to advisory, providing recommendations that not only deliver guaranteed experiences, but also support optimized rollouts and immersive experiences.

### 2. **Reducing CAPEX while accelerating scale-out for new industry verticals**

The estimated CAPEX for mobility infrastructure roll-out is \$40bn over the next 10 years in the US alone. And governments globally are applying more regulatory pressure on the industry, for example the EU has mandated that by 2026, there will be at least one charging location per 60km of highway. The UK has legislated a minimum of 99% charging point reliability by 2023. Even a 1% improvement in cost-efficiency would translate to significant savings on a global scale, and automating connectivity experience validation will enable both faster roll-out and improved service reliability.

### 3. **Accelerating progress to net-zero emissions**

Although our catalyst focuses on mobility, many other verticals rely on connected infrastructure roll-out to drive energy efficiency. Our champion, Togg, is a clear example: every charging point in its network is powered by renewable energy, as is its manufacturing plant. Its vehicles are 100% electric. Logistics, Utilities, and public services such as smart lighting are other examples where connected infrastructure roll-out is essential to driving energy efficiencies. Our catalyst will show how any kind of connected infrastructure roll-out can be accelerated and experience-guaranteed, to help deliver the digitalization needed to achieve government targets to net-zero emissions.

## Key Highlights

**Autonomous Networks:** A cloud-native architecture, driven by experience-aware network automation, empowers CSPs to ensure service proposals align seamlessly with network capabilities. By replacing reactive measures with proactive validation, this approach enhances accuracy, reduces risk, and boosts customer satisfaction.

**Business Assurance:** The concept of business assurance takes center stage, revolutionizing sales strategies. By certifying carrier-grade performance during service offering, negotiation, and provisioning, enterprise sales teams can guarantee exceptional customer experiences. This not only accelerates sales cycles but also cements CSPs' reputation for delivering on promises.

**Network as a Service (NaaS):** At the core of "Experience Guaranteed Connectivity" lies Network as a Service (NaaS). Through cloud-native, experience-aware automation, CSPs can tailor connectivity solutions to meet specific customer needs. This customization is grounded in accurate resource assessment and advanced service quality certification, transcending conventional offerings, and enhancing monetization potential.

### Benefits and Future Prospects:

- **Elevated QoS Assurance:** Proactive validation ensures consistent adherence to QoS commitments, strengthening customer trust and loyalty.
- **Streamlined Sales Cycles:** Precise service feasibility assessments expedite sales cycles, positioning CSPs at the forefront of market competition.
- **Resource Optimization:** Accurate identification of resource-compatible markets curtails underutilization and optimizes revenue streams.
- **SLA Excellence:** The proactive certification of service quality elevates SLA compliance, bolstering CSPs' reputation in the industry.

As the telecommunications landscape evolves, the imperative to differentiate through unparalleled customer experiences becomes increasingly pronounced. "Experience Guaranteed Connectivity" heralds a new era in QoS certification and sales cycle acceleration. By harnessing the potential of modern network automation, on-demand service simulation, and business assurance principles, CSPs are empowered to redefine industry norms. This approach propels CSPs towards accelerated Time-to-Market, the realization of Service Level Agreements, and an industry leadership role in the pursuit of experience guaranteed connectivity.

## CONCLUSION

The competitive battleground for CSPs is today focused on QoE differentiation. Sales teams face intense pressure to deliver ROI by monetizing superior QoS with a faster sales cycle. Today, every sales opportunity relies on estimating the network's capacity to deliver QoS. However, there is no precise way to certify service quality until it is too late. This leads to imprecise sales planning, sub-standard quality, long sales cycles, and unmonetized capacity.

This Catalyst demonstrates how modern, cloud-native, experience-aware network automation breaks this paradigm. On-demand service simulation can automatically validate services before offering them to a given customer, and throughout ordering, activation, and delivery. This means CSPs can precisely identify markets where services can be supported by available resources and certify service quality before activating services. This is vital to accelerating TTM and delivering SLAs.

Our catalyst demonstrates a practical solution that enables CSPs to meet this challenge, introducing automated active assurance to support ordering and CPQ. This provides enterprise sales teams the ability to quickly and easily certify carrier-grade performance while offering, negotiating, and finally, provisioning experience-guaranteed services.

## REFERENCES

1. [Special Report: Is 99% EV charger reliability possible? \(fastcharge.email\)](#)
2. [Taking charge: the electric vehicle infrastructure strategy \(publishing.service.gov.uk\)](#)
3. [Car-recharging stations should be available every 60 km, say MEPs | News | European Parliament \(europa.eu\)](#)
4. [Public Charging Issues May Short-Circuit EV Growth, J.D. Power Finds](#)
5. [JD Power: Electric Vehicle Consideration Study 2023](#)
6. [IEA Global EV Outlook 2023: Demand for electric cars is booming, with sales expected to leap 35% this year after a record-breaking 2022 - News - IEA](#)