NTT DATA

Transforming Network Operations to Deliver More Value

Introduction

In an era defined by AI-driven innovation and soaring demand for connectivity, traditional methods of network management and service delivery are no longer sufficient to meet fast-evolving market demands. To accelerate growth in the digital economy by offering faster, more reliable, and more intelligent services, CSPs increasingly recognize the need to embrace new ways of building, operating and managing their networks.

To achieve these goals, NTT DATA has for several years been working under the aegis of TM Forum with leading CSPs such as NTT and Telefónica and a broad ecosystem of technology partners on innovation-led projects that leverage the latest transformative technologies in areas such as AI, composable IT and autonomous network operations.

The use of advanced data analytics and AI in telco operations and service enables telcos to run their networks better and go beyond connectivity by unlocking new revenue streams and creating value-added services that meet the evolving needs of their customers. From personalized experiences to predictive maintenance, there are many potential applications of AI in telco operations. This innovation not only drives revenue growth but also enhances customer loyalty and satisfaction by delivering more tailored and proactive services.

The concept of composable IT is revolutionizing the way CSPs approach their infrastructure and service delivery. The Open Digital Architecture (ODA) provides a blueprint for the industry to build composable, modular software that reduces costs, enables rapid development of new services, and delivers improved customer experiences. A growing number of CSPs have adopted ODA, including NTT Group and Telefónica, to integrate a wide range of technologies and services seamlessly, fostering an environment where AI and other advanced technologies can thrive.

The complexity of modern networks is driving the interest in autonomous operations powered by AI and machine learning. These operations enable real-time network optimization and reduce manual intervention. This shift leads to higher operational efficiency, lower costs, and improved service reliability, maintaining telcos' competitive edge.

On the following pages, we highlight four projects that showcase some of the technologies mentioned above and where NTT DATA is either leading or participating as an industry partner within the TM Forum's Catalyst framework for innovation.

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| Catalyst Moonshot

AI-Powered Sustainable
Smart Farming

Project Champions: Telefónica, NTT, Vivo
Project Players: NTT DATA, BluePlanet, Matrixx Software, Compax, Agerpix
Project Leader: NTT DATA

Project Summary

This Catalyst Moonshot project aims to show how CSPs can harness new technologies such as GenAI, IoT and cloud computing within a B2B2X partner ecosystem to create more profitable and more sustainable business models, which they can leverage to increase revenues from specific vertical sectors. We demonstrate this approach applied to a particular use case, smart sustainable farming, which combines advanced wireless and computing technologies with third-party smart farming services to promote more efficient and sustainable agricultural practices to the agribusiness sector.

AI-Powered Sustainable Smart Farming

Project Description

This Catalyst Moonshot project expands on work undertaken in earlier project phases in the area of B2B2X collaboration by adding genAI capabilities and demonstrating how the architectural design of the platform can be easily adapted to specific use cases and vertical markets. For this phase of the project, we have chosen to implement a smart farming as a service solution.

Smart farming is a technically demanding use case as it requires a platform that can support a wide range of technological devices, such as sensors, harvesting robots, automated tractors, agricultural drones and computer vision software. These need to be connected and managed in the most efficient way possible, and different smart farming services will need to be activated and deactivated at different times, according to the stages of the crop cycle.

Advanced technologies such as IoT, 5G private networks, network slicing and edge computing are key to supporting the demanding QoS levels required by smart farming services.

The proposed platform adopts an architectural design based on a composable IT BSS stack that integrates GenAI capabilities via a familiar chatbot user interface, so making it easier for a farm operations manager without specialized training to configure, contract and deploy the different services and solutions offered.

This architectural design offers superior levels of scalability and flexibility and can easily be adapted to a wide range of use cases in addition to that of sustainable farming.

GenAI Revolutionizes Telecoms

The platform architecture provides key functionalities in these three main areas:

- A GenAI-Driven Product Catalog to commercialize smart farming solutions from third parties and allow customers to easily select the services they want;

- A Monetization solution to support economic flows and settlements between involved parties;

- An Orchestration solution to manage the deployment to network and edge capabilities, including settlements, monetization, and orchestration.

# Sustainable Smart Farming Supported by AI

Value Proposition for the CSP

By harnessing the new possibilities offered by AI, flexible cloud-based networks, private 5G networks and edge computing, CSPs can offer a variety of value-added services and customized solutions to farm businesses, and offer guidance on different smart farming technologies, which will typically be provided by small specialist providers and accessed via the Smart Farming as a Service platform.

This is the rationale for this Smart Farming as a Service use case. It provides a ready-made platform for CSPs to capitalize on the growing interest in smarter, more sustainable farming using specialist technologies and third-party service providers that can be delivered at scale by the CSP, so building closer ties with the agribusiness segment, which is a market that has been largely ignored by the telecommunications industry.
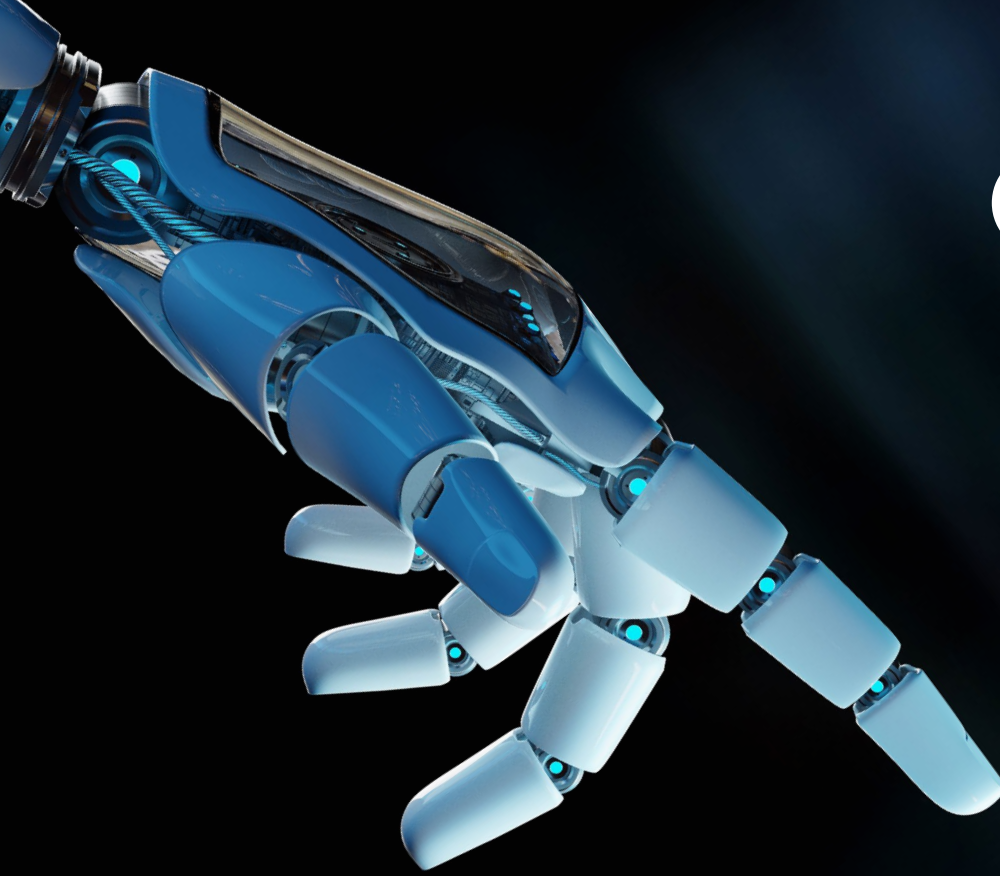
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| Catalyst

Autonomous CEI for Zero-Touch 5G and WiFi Networks

Project Champions: Telefónica, Elisa
Project Players: NTT DATA, Optare Solutions, Eliza Polystar, Medux
Project Leader: NTT DATA

Project Summary

The Autonomous Customer Experience Index (CEI) for Zero-Touch 5G and Wi-Fi Networks project aims to place the customer experience at the center of a CSP's network operations. By developing tools and techniques for monitoring and automatically rectifying network issues, the CSP can ensure customers enjoy consistently high service levels and a seamless experience irrespective of the service or network access technology used.

Autonomous CEI for Zero-Touch Networks

Project Description

This Catalyst Open Innovation project, now in its fourth stage, focuses on improving the end-to-end customer experience in domestic environments based on traditional fixed access technologies (FTTx, HFC, xDSL) or FWA by applying QoE, user equipment and network metrics.

Central to this project is the calculation of an objective and reliable measure of end-to-end service quality experienced by the consumer, called the Customer Experience Index (CEI). This is used to enable real-time, zero-touch automation and proactive maintenance, enabling CSPs to ensure a seamless experience everywhere, irrespective of the access network and anticipate customer pain points.

Wi-Fi technology dominates home and office connectivity consumption from mobile devices, computers and the growing range of smart devices found in people's home. Therefore, the CEI concept has been expanded in this fourth project phase to include performance metrics for Wi-Fi access networks, in addition to the CEI for 5G networks developed in previous phases.

Four new automation use cases have been developed to cover different aspects of customer experience on the access networks of Telefónica in Spain and Elisa in Finland. The goal is to evolve towards a zero-touch, customer-centric network using Artificial Intelligence (AI) and Machine Learning (ML) algorithms adhering to TM Forum standards.

- The first use case focuses on refining and deploying a CEI model to autonomously resolve issues in customers' Wi-Fi networks, which were omitted from earlier project phases. The CEI uses data from active probes, mobile apps (SDKs), crowdsourcing, and home routers (CPE Agent) to gather performance metrics.

- Building on the first use case, we then seek to automate the detection of problems and SLA breaches and enable their corresponding resolution based on CEI monitoring for the Wi-Fi segment complemented with an analysis of network indicators. We look at the typical issues that negatively affect customer experience, such as poor network or service performance, router capabilities or router configuration issues,

interference, congestion and poor radio coverage.

- The third situation we envisaged is an end-to-end CEI use case consisting of both a 5G broadband FWA connection and a customer's home Wi-Fi environment. A customer CEI analytic model will be developed covering not just 5G mobile broadband performance but also Wi-Fi performance at the customer's home.

- Finally, the fourth use case covers the convergent situation where the consumer has 5G service and Wi-Fi from the same CSP. A convergent CEI will be developed to monitor overall customer experience on a converged 5G and Wi-Fi network.

This new phase of this Catalyst project builds on many of the key technologies developed in earlier phases, such as the data fabric, digital twin, and AI layers. It also adds a decision intelligence layer, so the autonomous closed loop features are structured and enhanced according to the TM Forum's new DT4DI model.

As its contribution to this Catalyst project, NTT Data has further refined the digital twin technology, which provides a tool for monitoring and optimizing 5G and Wi-Fi networks. It uses real-time network data to create a virtual representation of the network, enabling strategic decisions and encouraging greater levels of automation.

By incorporating actual CEI data generated, the digital twin provides a real-time picture of how well the network is performing from a customer experience perspective.

A Seamless Experience Irrespective of the Access Network

Value Proposition for the CSP

Ensuring consistently high network quality has become crucial to the commercial strategies of network operators as they seek to differentiate themselves in a crowded marketplace, reduce churn and increase ARPU.

Voice call quality, which was once central to the marketing strategies of mobile operators, has declined in importance in terms of its impact on the overall customer experience. So operators are focusing efforts on improving how users experience data services.

But as the variety of devices, access networks and OTT services available at customer premises increases, detecting and addressing potential issues before they impact the customer becomes more challenging.

This project is designed to help CSPs proactively spot potential issues that could negatively affect the customer experience before the end user is aware of service degradation. It can potentially help reduce the opex associated with customer service by reducing calls to the contact center the need to send field support staff.

As well as incorporating tools to detect and rectify service degradation issues, this project aims to give CSPs greater visibility into the role service quality plays in the overall customer experience by integrate advanced analytics for decision intelligence focusing on the end-user.

| Catalyst Moonshot

AI-Driven Offer Lifecycle Management

Project Champions: Telefónica, Telefónica O2, Viasat, Verizon, Aussie Broadband
Project Players: NTT DATA, AWS, Hansen, AwareX, Prodapt
Project Leader: NTT DATA

Project Summary

This Catalyst project employs AI technology and the latest TMF standards to make it easy for CSPs to create automated, one-to-one marketing campaigns at scale, driving sales from both new and existing customers. By streamlining processes and adopting agile strategies and open technologies such as ODA, we make it easier for a CSP to launch new offers quickly and rationalize product catalogs.

Project Description

With this Catalyst, we seek to address two challenges facing CSPs that want to improve the management of the offer lifecycle in a world of mass customization:

1 The first need is to create real-time, personalized offers for new and existing customer using AI to dynamically assemble new offers and pricing based on a customer's context, needs, and other data, and then scoring offers on their potential for success.

2 In addition, our AI-based catalogue rationalization assistant uses AI to analyze all created offers based on their commercial success, offering recommendations to CSP product and marketing teams, so helping them rationalise their catalog for easier management across lines of business.

Both uses cases rely on commercial intent information, including customer context, needs and budget, offer scoring, and the CSP's business goals, such as target margin based on price and cost. This part of the project leverages the TM Forum's Intent Management API.

Other TMF standards used cover areas such as quote management, product ordering and inventory management and the product catalog API. The product catalog management component uses the TMF's Open Digital Architecture and is deployed on ODA Canvas.

We use the AWS Bedrock managed service to integrate and deploy generative AI capabilities behind the scenes, the AwareX voice assistant to guide customers through the offer personalization stage, and the Hansen Catalog as the product catalog.

Value Proposition for the CSP

By dynamically providing personalized offers and prices based on the context of an existing or prospective customer, the value proposition of the CSP is more likely to resonate with the needs and preferences of the individual.

The project seeks to enable automated, one-to-one marketing campaigns at scale, driving further sales with higher cost efficiencies.

By streamlining processes and adopting agile strategies, we make it easier for a CSP to launch new offers quickly, which is essential if the CSP is to respond to fast-changing market demand and stay ahead of its competitors.

By staying fully attuned to evolving customer demands and market trends, CSPs can proactively adapt and innovate, ensuring long-term relevance and sustained success by rationalizing their product catalogs to reduce overheads and time-to-market.

| Moonshot project

Network Service Monetization Through Standardized APIs

Project Champions: AT&T, China Mobile, China Telecom, China Unicom, Omantel, Orange, STC, Telefónica, TIM, Telia, Telstra, Vodafone
Project Players: NTT DATA, Accenture, Ericsson, minisait
Vertical Champions: Toyota, AECC, Autostrada del Brennero

Project Summary

This Moonshot seeks to show the importance of standardized APIs in helping CSPs generate new business opportunities with particular reference to the smart mobility market. Standardized APIs could help overcome the regulatory and consumer confidence issues holding back the development of remotely controlled vehicles and, at a more general level, they can help CSPs better monetize their network services in the context of a B2B2X ecosystem.

Project Description

CSPs increasingly work with enterprises to provide B2B2X propositions in a variety of sectors including transport, financial services and entertainment. These partnerships generally make use of APIs to share usage information and facilitate transaction settlements.

Earlier phases of this Catalyst explored the potential to use standardized APIs to increase network monetization, developing a reference solution that could be employed in the metaverse – interoperable virtual environments rendered in three dimensions. In this third phase, we plan to showcase interactions between stakeholders in the API monetization ecosystem across multiple processes.

These processes include onboarding, requests for API access, the consumption of network APIs and the sharing of revenue (by exposing usage management APIs). It will draw on APIs developed by TM Forum and CAMARA, the open source project for developers to access enhanced network capabilities, to create an end-to-end solution for monetizing network capabilities.

A specific use case showcasing the use of standardized APIs to enable remote control of vehicle functionalities is being developed with industry partners Toyota, Autostrada del Brennero, and AECC. The car API can be used to send commands to the car, to open doors for example, or to control charging in the case of an electric vehicle, as well as to exchange data on car's performance, location and driving patterns.

Most automotive OEMs have built APIs for their cars, but there is still a huge variety in sophistication and maturity, hence the importance of standardized APIs.

Leveraging the capability of operating API

Value Proposition for the CSP

Communication service providers (CSPs) have a myriad of opportunities in the mobility market due to the increasing integration of advanced communication technologies in the automotive industry. These opportunities will require the development of robust yet agile B2B2X ecosystems involving CSPs, OEMs and specialist third-party providers.

As well as offering high-speed internet services, CSPs can monetize the vast amounts of data generated by connected vehicles and offer specialized services such as vehicle tracking and diagnostics in conjunction with ecosystem partners.

Other promising applications include deploying edge computing infrastructure to ensure low-latency data processing for critical applications such as autonomous driving or cloud services for storing and processing vehicle data to supporting applications like predictive maintenance.