

Unlocking Revenue and Guaranteeing Operational Efficiencies: AI-Infused Assurance for 5G

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Introduction

5G has become a critical enabler of the digital age. However, the foundation for an operator's 5G success is delivering an enhanced customer experience while at the same time generating new revenue streams and optimizing costs. The key to achieving this goal is the right approach to data analytics. The customer experience is everything today, but operators need to make money while delivering on the promise of 5G, and data analytics powered by AI/ML are the foundation for ensuring this.

AI-infused assurance

AI-infused assurance enables operators to fulfill traditional automated assurance use cases focusing on the network and leverage analytics focusing on the business side. Operators can then turn the network and subscriber-based data into gold (or, at least, the operator's local currency). Generating new revenue streams and savings costs. This same data also drives network automation, which further improves operational efficiencies.

This new type of AI-infused assurance acts as the operator's co-pilot, helping them navigate the challenges of transitioning to 5G. As more and more operators transition to 5G SA, these insights will become even more critical to keeping operators agile and competitive by being the foundation for generating revenue and creating new business models. For example, as more private networks are implemented, operators can offer specialized analytics services to enterprise customers using multi-tenant assurance that lets operators view all their network offerings while only allowing an enterprise customer to see their data.

This white paper explores how AI-infused assurance can work in 5G to take network operations to the next level and enable real business value for operators and their customers (subscribers and enterprises), creating new services and use cases. Data and analytics are not enough on their own, but when used correctly, they can be a significant enhancer that operators will need to leverage to build 5G into a thriving commercial platform for all parties.



The Midas touch

Unlike in the story of King Midas¹ from Greek mythology, who could turn everything he touched into gold, only some things in the telco world can be turned into gold, and It's essential to understand that data alone is not gold. It is the insights generated from that data. For operator use cases, a lot of telco-domain expertise is required to take the correct raw data, process, analyze, and correlate it, apply AI/ML, and turn it into insights that can drive the business, save costs, improve processes, generate revenue, and enable automation.

As 5G advances, data collection and analysis will drive a significant amount of future service offerings, with data-driven operators being able to activate analytics with the power of AI/ML to generate new “business-to-business-to-X” (B2B2X) revenue opportunities, where enterprises who purchase services from operators can further customize and add value to their services to their end-customers.

Despite the potential within their grasp, this data also needs to be used responsibly, with data privacy a growing concern and efforts to develop robust regulatory frameworks underway in several regions. The European Union has introduced General Data Protection Regulation (GDPR), which gives users the right to protect their data.

This means operators need to be attentive to how they handle customer data. The GDPR and similar regulations give users greater control over their data, including exporting it, withdrawing consent, or requesting access. So, privacy concerns need to be a top priority, and part of the process should be anonymizing and aggregating the data to ensure subscriber identifiers are not included. The overarching principle is that operators must be transparent about data used to protect their brands' reputations and secure consumer trust.

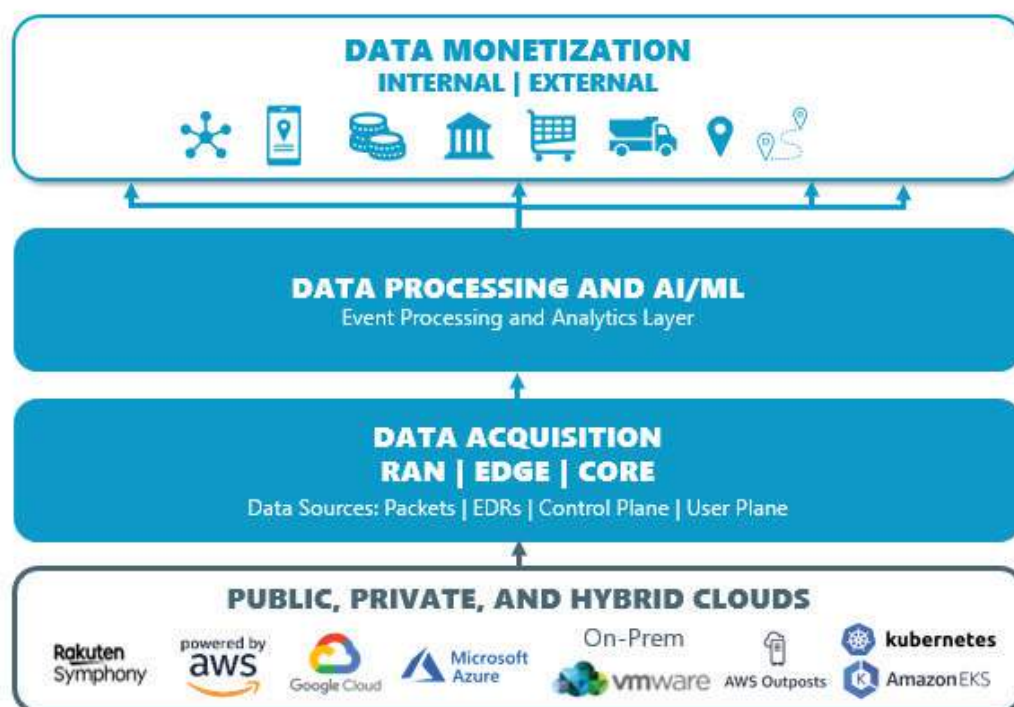


Figure 1 - AI-infused assurance offers quality assurance and data monetization insights

¹ https://en.wikipedia.org/wiki/Midas#Golden_Touch

From raw data to analytics-as-a-service

Ai-infused assurance provides a wealth of data across many dimensions. It enables many use cases, from proactive service assurance to cost optimization and data monetization, providing operators with various ways to drive significant CAPEX/OPEX savings while generating new revenue streams. The services provided by data monetization can be split into three main categories:

- **Raw data:** This could involve selling only the raw data or aggregating it with data from third parties such as market research organizations or data analytics specialists. Alternatively, the operator can sell its data through application programming interfaces (APIs), which allow for specific information in a desired format according to a customer's need.
- **Applications:** Operators can provide a platform for third parties to host their data and gain access to the data. Customers can also build applications on the platform to profit from this data. For example, this data can enable public transport authorities to plan and manage their services based on real-time traffic information.
- **Analytics services:** Operators sell the services of their own data scientists and data to customers. For example, anonymized data of customers' profiles, behavior, and location can be offered to advertising companies to improve billboard placement or be used for in-store promotions that determine the optimum location for new branches. These services can be provided through subscription-based models or pay-per-use models. In the future, operators can also leverage their data to create new business models. For example, develop new services powered by their data, such as data-driven insurance or health-related services, helping generate additional revenue from their data.

Internal and external data monetization

There are two main categories of data monetization. Internal monetization strategies aim to refine network operations for cost reduction and efficiency. External monetization strategies leverage data to deliver value-added services to third-party entities.

Internal use cases

Data is kept and utilized within the operator. Multiple departments often use the data to improve the core businesses and operations. An example is using the data to employ a retention strategy to reduce subscriber churn.

Sales and Marketing	Customer Service	Product	Enabling	Network	Steering and Support
Cross-selling and upselling	Customer activation and provisioning	Automated tariff optimization	Automated IT security threat detection	Churn prevention	Smart procurement
Real-time sales monitoring	Real-time field force scheduling	Real-time product creation and management	Real-time IT fault detection and prediction	RAN energy and cost savings	Inventory optimization
Real-time media performance tracking	Boosted failure analysis for complaints	Product renewal enhancement	IT development quality assurance	Network planning	Revenue assurance and fraud management
Customer onboarding and ARPU growth	Customer journey and satisfaction	Credit scoring as a service	Application performance monitoring	Real-time fault detection and prediction	HR process optimization
Heavy roaming abuse detection	Automated natural conversation	Product convergence	Service activation optimization	Cost optimization	Field force analytics
Outdoor advertising optimization	Contact center productivity	Recommendation engine for customers	IPTC service assurance	Network performance optimization	Receivables optimization

Figure 2 - Examples of internal use cases for monetization

Here are some examples of how operators can drive and reduce revenues using AI/ML-powered analytics.

Sales and marketing

One of the first internal use cases that operators should adopt is the ability to cross-sell and upsell to their customers. By continually analyzing the subscriber data and usage trends, as well as quality and experience patterns at the individual level, operators can take the clear next step on the journey by making data-driven decisions that will increase their ARPU by personalizing the experience or tailoring plans, to serve the unique needs and preferences of individuals. For example, a subscriber may be a heavy viewer of streaming video on Netflix or a heavy gamer using fixed wireless access services. These are great candidates for subscribers willing to pay more for lower latency services. Increasing subscribers' quality of experience while increasing their ARPU by looking at the data that can include usage trends, device types, and location data to gain better customer insights. With internal data monetization, operators can identify loyal and high-value customers that will react to upsell campaigns more positively and likely convert to more premium subscribers.

Churn prevention

A high average churn rate plagues the telecom industry. The telecommunications industry has an average churn rate of 35% for Western European markets². Customer churn has serious consequences, such as acquisition costs and lost referrals. In our current macroeconomy, taming the beast of churn is more important than ever.

AI-infused assurance can reliably predict at least 50% of the customers that will churn by correlating customer quality of experience over time, continually monitoring connection speeds, subscriber behavior patterns, and quality of experience, and automatically identifying factors that predict churn. By delivering this churn reduction, operators can proactively reach out to these customers, resolve issues, and turn them into satisfied customers. This lets operators be proactive in preventing churn and provide a list of subscribers likely to churn to customer support and promo systems, identify and resolve customer 'pain' points, and improve the quality of experience before customers complain.



² <https://www.akkio.com/post/telecom-customer-churn>

RAN energy and cost savings

Radio access utilizes over 70% of the total network energy³, so it's a critical area that can be dynamically operated to save both costs to the operator and reduce energy consumption to help the environment and sustainability. Cell usage trends vary significantly according to the geographical region, connected devices, day or night, weekdays and weekends, etc. AI-infused assurance applies intelligent machine learning models to the network data to accurately set a power-saving policy for every individual site. It then constantly monitors the RAN and service quality to ensure that the customer experience and services suffer no degradation, thus driving down costs and saving energy by up to 30% while reducing CO2 emissions and ensuring that customer services are maintained to the highest standards.

Here are examples of analysis performed by RADCOM that shows the actual energy demand vs. the energy supply at every site. The energy waste and saving potential are significant (the exact percentage varies between vendors and networks).

Here are four typical cell site locations and peak energy scenarios (with the green line showing the current site energy profile):

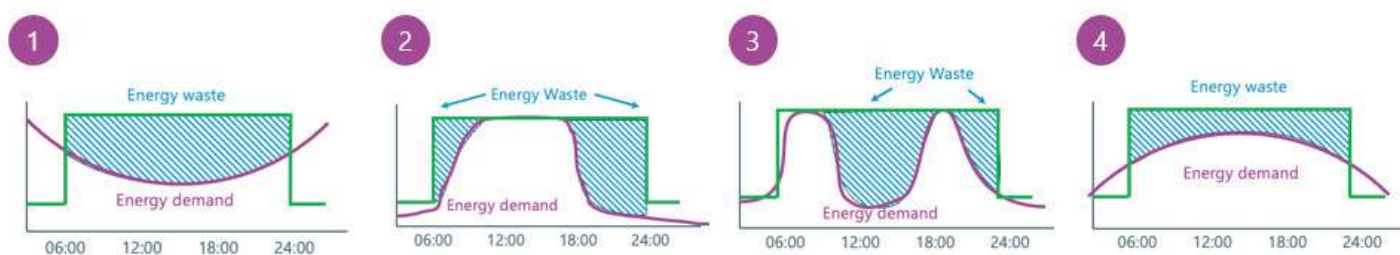


Figure 2 - Examples of internal use cases for monetization

1. In a residential area, peak usage is when residents are at home in the evening after work and early morning before leaving for work. This means that a lot of energy is wasted during the day.
2. A cell site close to a factory has the opposite usage and energy requirements as the residential area cell site. The factory site is at its peak usage during work hours and at its lowest at night. This means much energy is wasted from the early evening to early morning.
3. Proximity to a highway can vary depending on its location but generally would be in peak usage during the morning and afternoon rush hours when people drive to and from work. This means much energy is wasted between rush hour times from ~11:00 to ~16:00. Critical times to monitor the customer experience (CX) impact are during the rush hour periods when there can be fluctuations in mobile traffic.
4. A cell site near the airport starts ramping up usage in the early morning and slowing down late at night. This means that energy can be wasted late at night to early morning. However, it's critical to monitor the CX impact late at night because there can be fluctuations in mobile traffic, especially during holiday periods.

³ <https://arxiv.org/pdf/2209.11600.pdf>

AI-infused assurance can be pivotal in optimizing and monitoring power usage at cell sites, reducing operational expenses. Combining AI and assurance enables operators to dynamically assess traffic patterns, network load, and other factors to optimize power consumption. For example, AI can anticipate periods of low network traffic and send notifications to minimize power supply to cell sites, generating significant savings in power costs and improved sustainability. If capacity needs fluctuate, AI-infused assurance alerts the operator or triggers a closed-loop optimization to prevent customer experience degradation.

Network planning

As operators strategize for the future, they need to recognize the critical role of network capacity planning. It is about predicting network demand and ensuring adequate capacity meets evolving user needs. Inaccurate forecasts can lead to overspending on unused capacity or service degradation due to under-capacity. It is a challenge to fully understand complex network usage patterns, which means that traditional forecasting methods often result in inefficiencies. This is where AI-infused assurance comes into play, offering a more efficient and accurate approach to capacity planning.

After generating baselines in different KPIs/KQIs for network performance and service quality areas, AI-infused assurance uses this information for more use cases. The most common is predictive analytics. As the solution already knows how to generate the correct forecast in the short-term (for, say, release cause distribution), it can also create a long-term forecast for various performance and quality indicators and use it to plan future network capacity smartly.

These predictive capabilities allow more data-driven decision-making critical for network management and operations. Furthermore, by incorporating more sophisticated AI algorithms, which consider seasonality, it will also be possible to create forecasts for an extended period—for example, one month or a whole quarter. This frees engineers to spend more time optimizing the network performance and solving network degradations to ensure superior customer experience and operational excellence. It also lays the foundations for an open/closed-loop approach to managing network operations.

Intelligent data analytics tells the story of usage patterns and headroom capacity so operators can make data-driven decisions when planning network capacity and new service launches. These insights can also be used when rolling out new networks and help set the right priorities for the rollout phases at cell sites, leading to the operator deferring capital investment, and cost savings.

87% of participants from global telecom service providers underscored improving service quality as extremely important in a recent survey conducted by Light Reading⁴.

⁴ <https://radcom.com/further-reading/5g-orchestration-and-service-assurance-operator-survey-priorities-and-platforms/>

External use cases

External monetization services allow telcos to monetize their data by providing it as a service to other businesses, meaning that the data leaves the operator. This type of use case ranges from customized data as a service to developing custom products and solutions for third parties. Often, location-based data is used for marketing purposes. Operators have sometimes acquired such platforms or developed in-house, location-based analytics capabilities.

This type of data monetization covers a wide range of industry verticals, from using location-based data in retail to understanding when and where customers shop for better site planning and more targeted marketing offers. Making data-driven decisions will improve operational efficiency across the automotive, transportation, and logistics industries. To smart cities for site planning in the public sector and leveraging geo-location data to improve planning of services and facilities.

 Advertising	• Billboard placement • Real-time location-based targeting • Personalized content
 Finance	• Branch location planning • Product cross-sell/upsell • Fraudulent transaction detection
 Government	• Site planning • Smart city planning • Services provisioning • Traffic planning • Security surveillance
 Real Estate	• Site planning • Assessing property value • Pricing, marketing, and sales decisions (estate agents and brokers)
 Retail	• Retail site planning • Customer movement insight products • Real-time location-based marketing
 Tourism	• Public transport planning • Real-time location-based targeting • Personalized marketing
 Transport	• Route planning and analysis • Real-time traffic routing • Profile-based dynamic pricing
 Utilities	• Infrastructure planning • Site and network planning • Smart metering control and management

Figure 4 - Examples of external use cases for monetization

Some operators are already utilizing their data for external monetization. For example, in the US, Verizon has a data marketplace called Verizon Media (acquired by Apollo Funds), allowing companies to purchase access to Verizon's data for analytics and marketing purposes. AT&T has a similar platform called AT&T AdWorks, which enables companies to access AT&T's customer data for targeted advertising. Typically, this data strips off usage and customer experience measurements, which are irrelevant for many use cases. The data is also anonymized and aggregated, embracing privacy while offering real value.

A critical part of the data's value is the origin-destination matrix or OD matrix that describes the relation between traffic origin and traffic destination as a table. It can be used to numerically characterize the flow of people within a certain amount of time. The matrix rows typically denote the origin, and the columns the destination. Here are some examples of external data monetization and customer case studies provided by RADCOM that show the value in the OD matrix.

Utilities

Like other verticals, the utility industry is amid a transformation to become more decentralized, digitalized, and decarbonized, disrupting how end-users generate, transmit, and consume utilities, including electricity. As the energy and utilities industry continues to transform rapidly, massive amounts of data are continuously generated, and digital monetization is increasingly becoming a critical topic for the industry.

A particular area experiencing rapid development today is electric vehicle (EV) charging site infrastructure. RADCOM was asked to help an operator in Germany apply its data to find the most

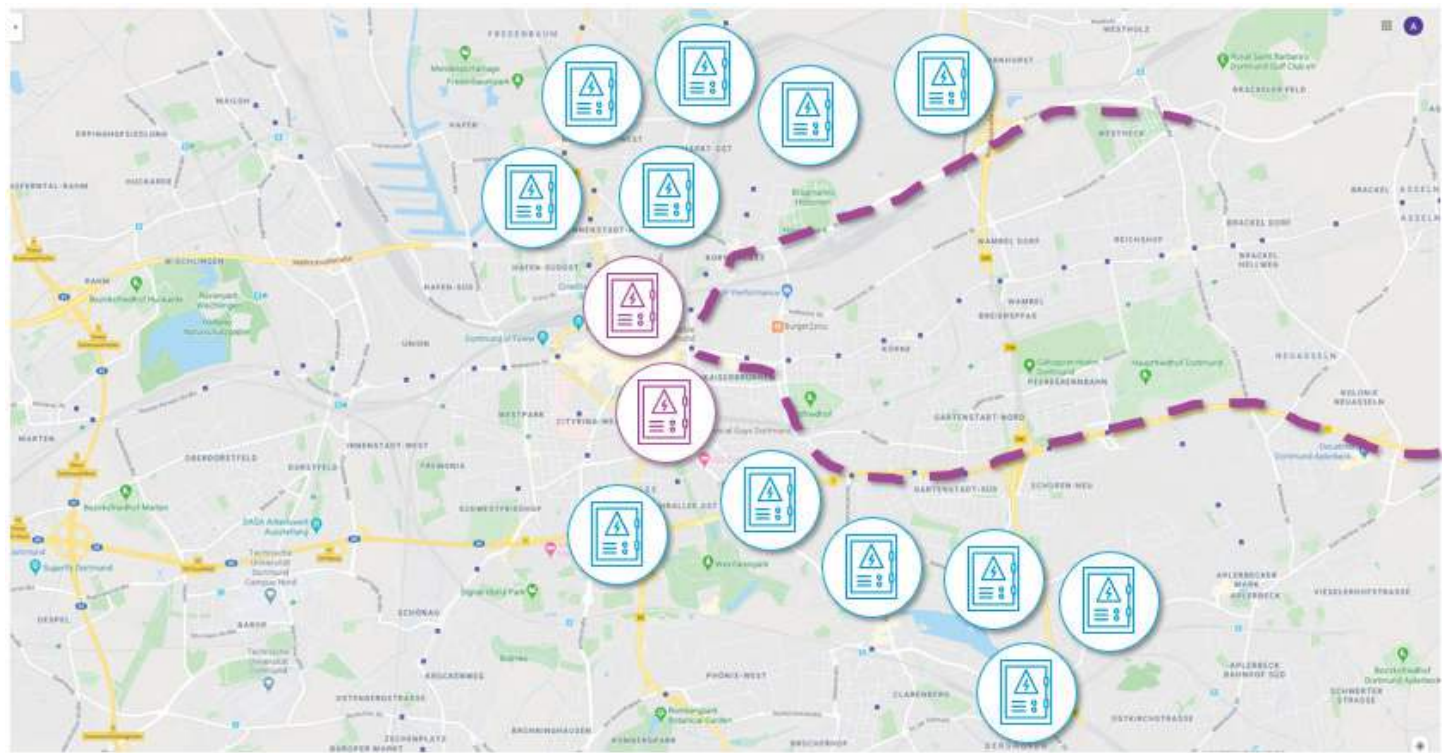


Figure 5 - Helping plan electric car infrastructure.

When the data analytics were applied, they clearly showed the locations where turning legacy cable cabinets into EV charging points was likely to be frequently used. The data from the operator showed:

- Frequent destinations of all inbound commuters by handsets, busy vs. non-busy hours.
- Frequent destinations of all inbound electric vehicles by the SIM currently registered by the operator.
- Frequent destinations of cars and driver's handset pairs. This means associating both SIMs on the same journey and locating the destination of the vehicle vs. the destination of the driver.
- Where is the driver headed, and how far is it from the parked car? Once the vehicle is parked, the driver can continue his commute on public transport or even take a scooter. (This showed a set of popular and adjacent commuter routes that were pre-filtered to be no more than 30 km)
- Popular outsets, which are represented above in purple, were analyzed, and their endpoints were assumed to be parking spots (confirmed using mapping data)
- The cabinets that were located close to the popular parking spots were prime candidates for the EV charging upgrades (marked in purple)

Retail

The same rich, AI-driven analytics can be used in the retail industry for site selection. Maximizing the profitability and performance of these brick-and-mortar sites is essential for a new retail location, and the network and subscriber data available to operators can play a crucial role in helping businesses and other entities understand whether a potential site will serve the highest number of high-value customers and, if not, where a better site could be located.

Once a new retail store is established and running, data provided by operators can also help in digital advertising campaigns or evolving merchandising decisions. The insights provide an understanding of where existing and potential new customers can be, offering a crucial differentiator for today's modern retailer. This data can be enriched by correlating this information with data streams such as credit card transaction insights or subscriber mobility insights to enable hyper-targeted campaigns at a deep granularity.

Government and municipalities

Smart cities can benefit significantly from data insights that help reduce costs in areas such as waste management, street lighting, and public transport operators and drive better planning and urban development. Visualizing and analyzing subscriber data and mobility for urban planning helps teams be more proactive and less reactive. For mobility planning, organizations can optimize public transport infrastructure, such as bikes, buses, trains, and metro services, which is paramount to reducing traffic and improving road safety. Analyzing commuter patterns through origin-destination data allows cities to provide the right services to those needing them.

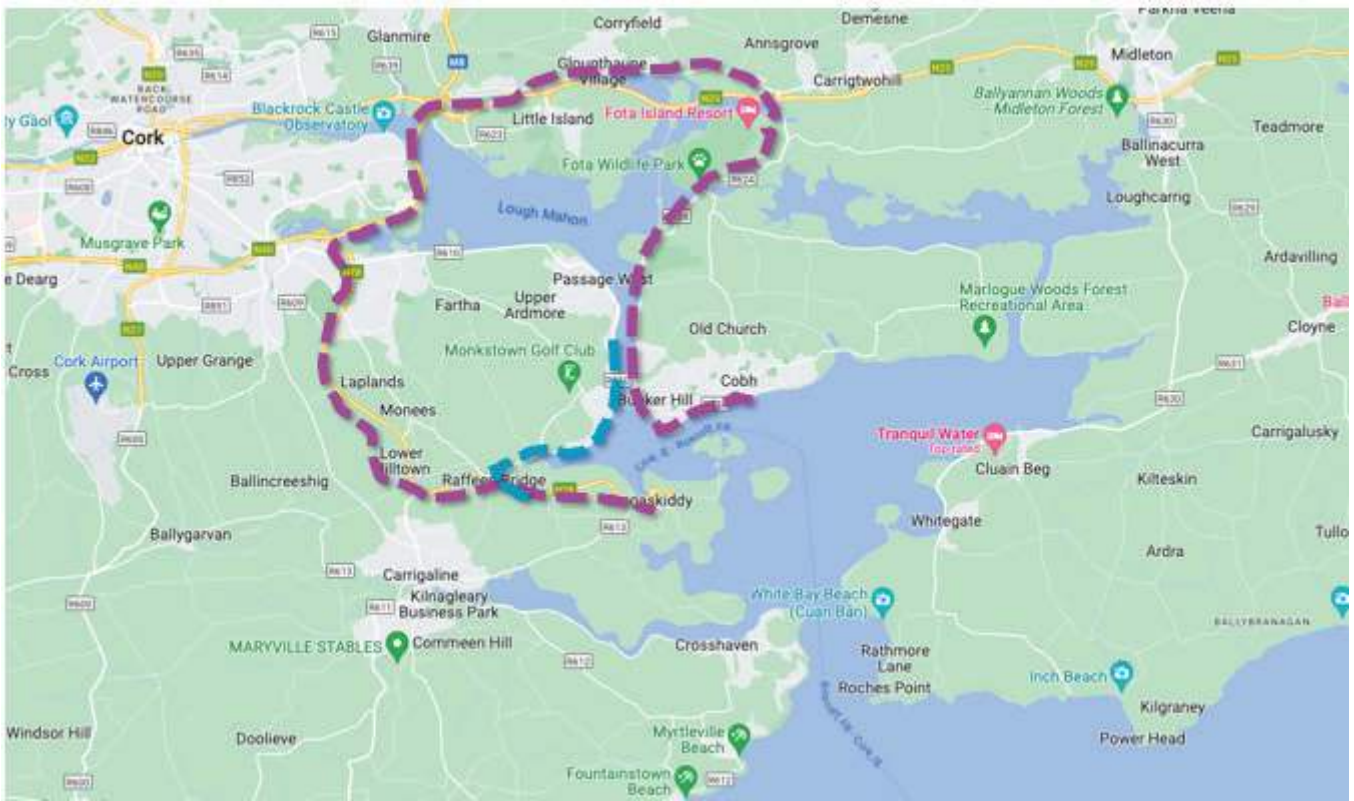


Figure 6 - Using data analytics to make informed infrastructure decisions

As an example, RADCOM was asked to help a European operator who was working with a local municipality to justify infrastructure expenditure scientifically with data analytics. The local municipality needed to decide whether bridge construction made economic sense for commuters of that municipality who were headed to a specific business park. The data utilized for this analysis was based on that OD matrix, and it covered typical commute patterns every day, across an entire month, in the morning and the afternoon, and enabled the municipality to decide what construction project would best serve the community.

Real estate

The data operators provide serves real estate developers, property sellers, and buyers. In the site selection process, understanding the data is crucial. Justifying pricing for both sales and rentals is more critical than ever, whether for retail sites, corporate offices, or industrial units. When negotiating sale or rental prices with customers, having data streams to justify pricing strategy can be a crucial differentiator for commercial teams. Using reliable data on subscriber traffic across time can show the potential of a specific location to close real estate deals faster.

Transportation

Local government departments can use mobility data to identify patterns and plan infrastructure adjustments, such as traffic lights, crossings, and new pedestrianized areas. Yet only a few local governments do. The value of this data stream can optimize city traffic management operations and reduce CO2 emissions.

Tourism

Tourist ministries and other entities can understand places of interest and what the visiting patterns are at each location. Operators can also sell this data to specific places of interest, such as a city museum, which will focus its marketing efforts more on the data and the actual traffic.

Distributing the wealth with open APIs

5G moves away from traditional telecom-style protocol interfaces to allow functions to communicate with one another and share data using a distributed web services model and not specific network protocols. Each function exposes its functionality and communicates through an SBI using RESTful-based APIs via HTTP/2. An API enables the exposure of an organization's digital services and assets in a controlled way and is a universal concept used by modern software design, especially for web-services and encompasses a wide range of use cases, which is why 3GPP decided that 5G service exposure should be based on RESTful APIs.

Using a modern, open, web-based design like Amazon, Google, and Facebook to expose their cloud platform in a controlled way, using already widely adopted RESTful paradigms will enable operators to break down traditional network silos and empower vertical markets to build upon the operators' infrastructure with modular services that will seamlessly slot into place, turning the telco cloud into a service platform for other vendors.

APIs open the network to offer a channel for innovation into telco environments by third parties or operators. These initiatives provide direct opportunities to monetize the capabilities provided within operators' networks.

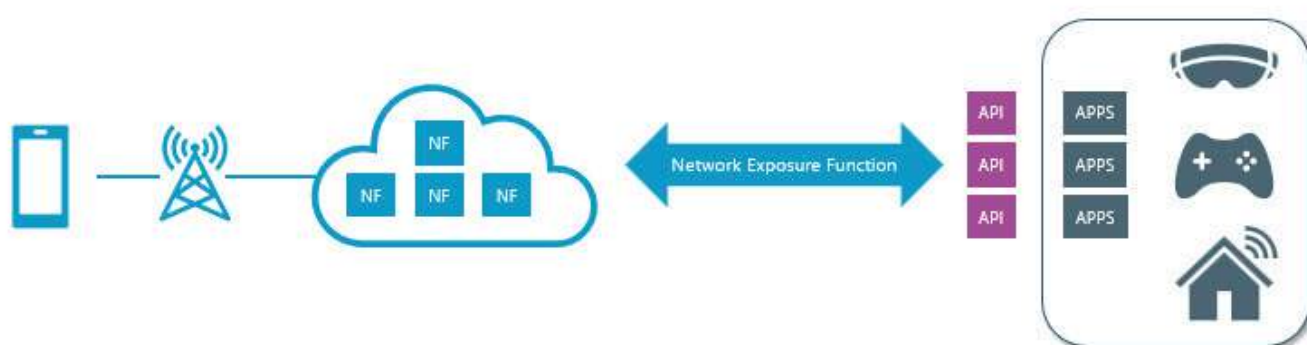


Figure 7 - APIs open the network to offer a channel for innovation in 5G

The industry is now focusing on developing API capabilities with initiatives such as the Operator Platform Group (OPG) and open-source project CAMARA—the telco global API alliance. The CAMARA project is explicitly working to define network capability APIs that are open and user-friendly. Sub-working groups within the project are developing “families” (or groups) of APIs. For example, API groups include edge cloud, device identifier, anonymized subscriber identifier, device location, etc.

Data analytics and other network capabilities exposed via APIs can share network data, drive new and service creation, and generate business value for the operator and the broader ecosystem. Additionally, ecosystem partners can add value by utilizing the API framework, which opens new channels for consuming advanced network and service assurance capabilities. There are many potential sectors to create new service types and use cases, improve on existing abilities, and drive monetization across the entire ecosystem.

Conclusion

In the transformative landscape of 5G, automated assurance and AI/ML-powered analytics are critical enablers for operators to unlock the gold hidden in these network and subscriber-based data analytics treasure troves and position themselves to compete in an increasingly cluttered and competitive market. Releasing the full potential of 5G and paving the way for a truly connected and digitized world.

RADCOM offers a fully cloud-native AI-infused assurance solution that provides operators with the best approach to data analytics. Helping operators understand what is happening within their networks and providing efficient ways to monetize your data for internal and external uses. This, combined with robust APIs, operators will be able to leverage and create new business models, services, and revenue and drive network automation, further improving operational efficiencies and cost savings.



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