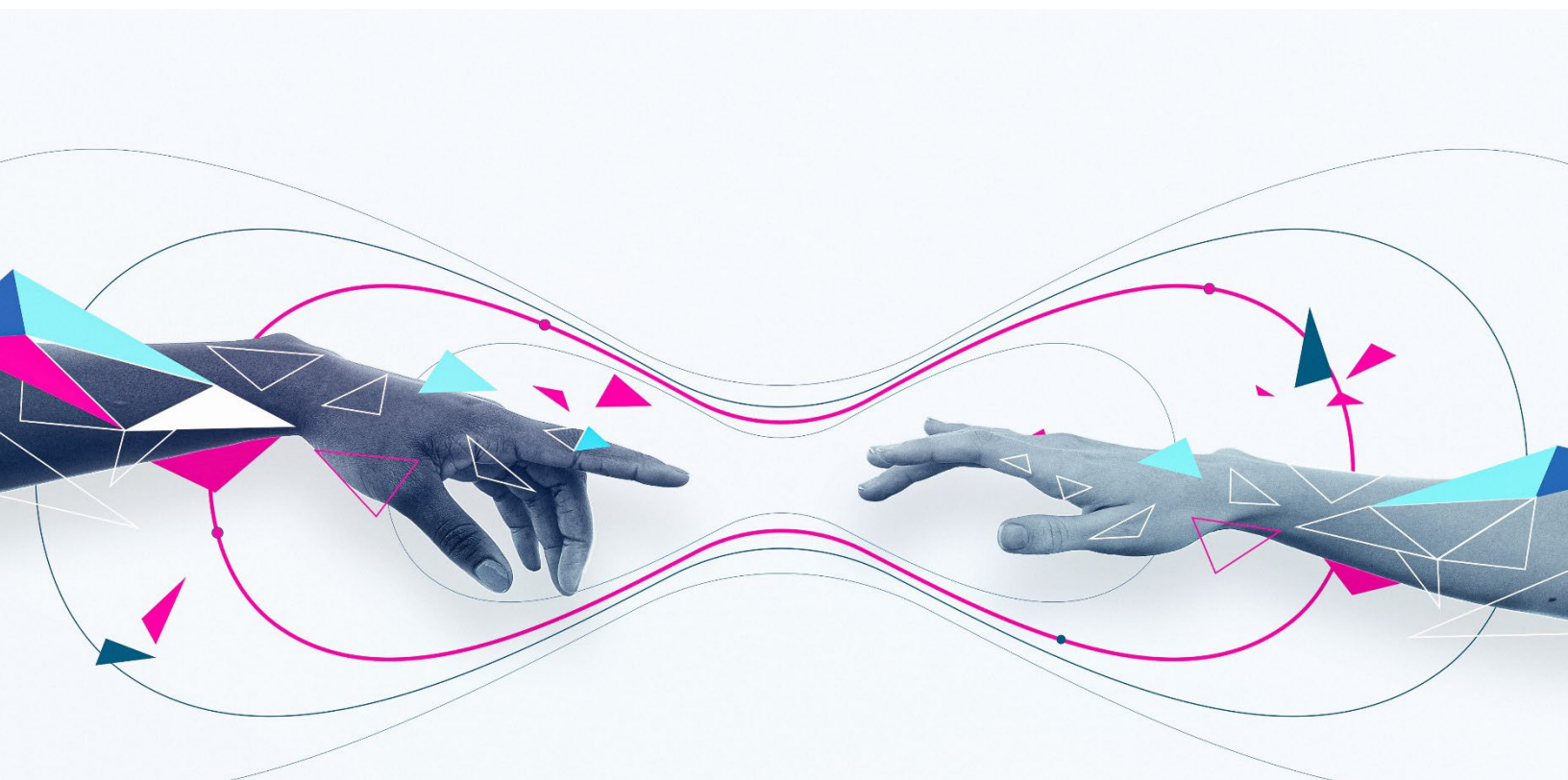




Building the 5G Future:

Exploring Developer and
Telecom Partnerships



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About the 5G Future Forum

Founded in 2020, the 5G Future Forum (5GFF) aims to accelerate the delivery of 5G and Multi-Access Edge Compute (MEC) enabled solutions for developers and multinational customers around the world. Our partnership-focused approach enables operators to create interoperable specifications, driving reach and scale, while empowering members to collaborate on innovative, cutting edge 5G applications and use cases.

The 5GFF Experience and Exposure Management workstream is developing and testing APIs that will allow developer applications to seamlessly transition between MEC platforms across operators and regions. Our technical teams work with leading technology companies and platform providers across the world, ensuring that the 5GFF APIs are applicable across a host of use cases and can be rapidly scaled, whenever and wherever needed.

The 5GFF Commercial Ecosystems workstream engages with the global 5G community, validating and testing emerging 5G use cases where the 5GFF APIs can provide the most value. The workstream focuses on 5G use cases feasible today and in the near-term, but also evaluates the application of 5G beyond the current technological horizon, while determining network and other technology advancements required to make future use cases a reality. The Ecosystems workstream also engages with other leading technology organizations, ensuring the relevance and adoption of the 5GFF APIs.

Both workstreams consist of leading technical and commercial teams from our members, including Verizon, Rogers, Telstra, Vodafone, America Movil, KT, and Bell Canada. This enables the 5GFF to adopt a global and holistic view of where 5G and MEC are today and where they're headed tomorrow.

Join us today to revolutionize the deployment and adoption of 5G and MEC: [5GFF Membership](#)

The 5G Revolution

5G offers faster speeds, lower latency and increased capacity compared to previous generations. It has the potential to revolutionize the way we live, work, and communicate, with applications ranging from enhanced mobile broadband to autonomous vehicles and smart cities. 5G is expected to play a crucial role in shaping the future of the digital economy, providing the backbone for a wide range of new services and use cases. With growing technological complexities, companies are looking for connectivity that can bring together segregated operating systems and be deployed at scale - opening a multitude of problem-solving opportunities. These opportunities have the power to redefine business models, creating more engaged and interconnected ecosystems while driving improvement for both industries and consumers.

5G has also led to a proliferation of emerging technologies making waves across geographies. Markets are now opting for increasingly digital and novel solutions that differ greatly from the traditional way of functioning - and for the better. 5G brings to the forefront the potential of efficiency and flexibility in real-world situations.

This considerable impact of 5G across industries, geographies and customers has led to the creation of a global 5G ecosystem that is composed of Telecom Service Providers (TSPs), Cloud Service Providers (CSPs), System Integrators (SIs), and Independent Software Vendors (ISVs). While TSPs are the primary connectivity providers, other emerging players operate in the realm of cloud computing and digital applications.

This expanding 5G ecosystem caters directly to the customer's digital expectations and has a growing impact on TSPs. This has highlighted the criticality of TSP collaboration with the broader ecosystem.

Criticality of Telco and ISV Partnerships

When viewed through the lens of 5G, it is imperative for TSPs to partner with leaders in the digital ecosystem to provide the experiences that customers are looking for, across all their connected devices. When vying to revamp mobile experiences over 5G, telcos also need to look at application and software developers, otherwise known as ISVs.

ISVs provide software applications that deliver enhanced experiences to the end-user or consumer. ISVs take advantage of the higher bandwidth and lower latency that 5G provides to deliver solutions such as Augmented/Virtual Reality (AR/VR), Cellular Vehicle to Everything Communications (C-V2X), audio and video streaming as well as enhanced Internet of Things (IoT) products.

Engagement with ISVs can help TSPs become ecosystem enablers, co-creating, and co-launching new services and offerings. This transition from connectivity provider to ecosystem enabler can help drive innovation and competitiveness across TSPs.

TSP and ISV partnerships allow TSPs to benefit from the agile responsiveness of ISVs to dynamic market conditions, while TSPs provide ISVs with access to their expansive networks for real-world application testing and validation. These cooperative relationships between TSPs and ISVs will allow for faster development and scaling of new products and services, providing customers with a more comprehensive and integrated experience.

By engaging with members of the ISV ecosystem at varying stages of their evolution, TSPs can unlock new 5G commercialization and monetization opportunities, securing their role in this emerging and evolutionary digital ecosystem.

Multi-Access Edge Compute (MEC)

Multi-Access Edge Computing, or MEC, is a key technology for enabling the full potential of 5G networks. It enables the processing of data and applications at the edge of the network, closer to the end-users, rather than in a central data center. This provides faster response times, reduced latency, and improved user experiences, particularly for applications that require real-time processing and low latency. MEC also enables the deployment of new applications and services that would otherwise not be possible due to the limitations of previous network generations.

The combination of 5G and MEC has the potential to create new opportunities and transform not just customer experiences, but industries as well. The integration of 5G and MEC is a crucial step in the evolution of mobile networks, helping to drive innovation and create new business opportunities for both service providers and end-users.

5G and MEC Use Cases

5G and MEC are expected to drive significant advancements in a wide range of industries, with numerous use cases already being developed and tested. One of the most promising areas for 5G and MEC is in the field of healthcare, where the combination of fast, low-latency networks and edge computing has the potential to support remote patient monitoring and telemedicine services. These services would allow medical professionals to provide care to patients in real-time, remotely.

Another industry that is set to benefit from 5G and MEC is retail. For example, by providing fast, low-latency networks, retailers can offer new and innovative services, such as augmented reality shopping experiences, which would enable customers to virtually try on clothes and accessories or see how furniture fits into their homes. Additionally, 5G and MEC can support real-time inventory tracking, enabling retailers to manage their stock levels quickly and accurately, and ensure that customers can access the products they want, when they want them.

The transportation industry is also expected to benefit from the integration of 5G and MEC. This integration can support the development of autonomous vehicles by providing real-time communication between vehicles and traffic infrastructure, allowing for faster and more efficient decision-making.

Additionally, 5G and MEC can support the deployment of new applications such as intelligent traffic management systems, which will help to improve road safety and reduce traffic congestion.

Internet of Things (IoT) devices will also benefit from 5G networks, with their ability to support a higher density of devices at higher speeds using less energy. Supporting a larger network of IoT devices can accelerate the large-scale deployment of use cases such as remote monitoring and visual inspection, as well as building and facility management at remote locations.

5G and IoT are also driving significant improvements in precision agriculture, where robotic devices conduct labor-intensive farming tasks real-time. These can include tractors ploughing fields to harvesters managing the picking and harvesting of crops.

The world of Artificial Intelligence (AI) will also benefit from the deployment of 5G. Combining 5G's lower latency with AI's efficient algorithm calculations, devices will be able to function more efficiently and quickly, becoming more productive and profitable.

In conclusion, the use cases of 5G and MEC are wide-ranging and diverse, and the potential benefits are significant. By providing fast, low-latency networks and edge computing capabilities, 5G and MEC have the potential to drive innovation and create new business opportunities across a range of industries and to help shape the future of the digital economy.

5GFF Approach to Partnerships

The 5GFF mission of accelerating the deployment and adoption of global MEC platforms has influenced the strategies and approaches adopted to building ecosystem partnerships. For the 5GFF, this ecosystem consists mainly of ISVs, CSPs, and other TSPs. Among all the ecosystem players, ISVs play a large role in validating both 5GFF APIs as well as emerging MEC use cases. CSPs and TSPs play a critical role in the adoption of these APIs, primarily to boost the role of MEC in emerging applications and technologies.

The goal of engaging with the global ISV and developer community is to make their applications better by using 5G and MEC. Since these are relatively new technologies, the 5GFF is providing support to ISVs and developers through interoperable APIs and opportunities to leverage 5G and MEC for their applications. Further commercialization of these application will be up to the TSPs.

ISV Selection, Testing, and Go-To-Market

The first step in commercializing these applications is to establish a common methodology to ensure partner applications and solutions meet a demonstrated market need. It is also critical that selected partners have both the ability and commitment to take such solutions to market, across channels. In this section, we outline the 5GFF's approach to ISV selection, testing, and go-to-market. As indicated previously, each telco and ISV must independently determine what approach is best for it.

Some ISVs are developing an enterprise level solution and others are working with TSPs or CSPs to validate their solution, augmenting their application during that process. It is critical that ISVs looking to partner with TSPs can bring their application to market at scale.

There are a few preliminary criteria needed before proceeding to the below steps. First, the ISV must either already be on the CSP's platform or be willing to switch. Second, the ISV must be willing to devote developer time to architecting their application for the edge. And lastly, there must be agreement on go-to-market models.

Use Case and Inherent Market Need

The first step in selecting an ISV partner is to outline the key industries that will benefit from their application or for which industries/verticals the application is targeted. Each industry or vertical likely has different needs and requirements (e.g., complying with Health Insurance Portability and Accountability Act (HIPAA) for healthcare and privacy and data security laws for facial recognition). Additionally, the customer value proposition is shaped by vertical-specific customer needs.

It is important to also identify telco network capabilities and APIs to support the ISV use case, as these key elements will help develop the use case customer value proposition.

Ability to scale is an additional component that should be considered. Application architecture, ISV size, and the application support model should all be looked at when deciding if the application is scalable.

Competitive Landscape and Market Trends

Once the use case and technical feasibility have been identified, there is a need to determine the prioritization of the use case by customers. This will need to be followed by an in-depth study of any competitive solutions and how the selected solution compares, particularly around customer value proposition and steps required for a large-scale implementation.

The key question that needs to be answered during this phase is how MEC enhances the value proposition of this application / solution. MEC as an enabling technology is not the selling point - it's how 5G and MEC together make the application the best possible solution in the marketplace.

Application Testing

Prior to any consumer and market facing launches, there is a requirement for all applications to be tested. This can include technical, network, and experience elements. There are three components to this process: evaluation of the solution / application, onboarding to the MEC platform for preliminary testing, and validation with a specific use case and customer.

Evaluation of the solution is usually done in conjunction with the developer, identifying and specifying performance metrics / outcomes that influence pre-determined success criteria.

In this step, involvement of the CSP is also critical, as technical assistance may be necessary. Additionally, feedback can be shared between the TSP and CSP at this stage, which is especially useful when using a new technology, such as MEC.

Go-To-Market Alignment

The go-to-market model of any TSP-ISV partnerships depends on the solution, vertical, and customer preference. There are three potential options (and there may be more):

- Sell With
- Sell Through
- Resell

Each TSP and ISV will need to decide on the best model for their relationship and aligning with the ISV on the right approach is critical for success. There are several steps that can be taken to determine which model best fits the partnership structure.

Some of them can include:

- Evaluate the ISV-defined plan / approach to take to market
- Availability of ISV sales and marketing resources
- Existence of telco edge partner programs that can comprise of:
 - CSP Marketplaces (e.g. AWS Marketplace, Microsoft Azure Marketplace, Google Cloud Marketplace)
 - Channel Partners such as System Integrators (SIs), Value Added Resellers (VARs), Value Added Distributors (VADs)
 - Enterprise relationships that consist of either B2B2C or B2B channels

At the end of this whitepaper, several 5GFF member ISV engagement programs are listed - some have been explicit about which of these models will be leveraged and how they plan to partner with the ISV.

5GFF MEC Acceleration Program

The 5G Future Forum was founded with the objective of accelerating the usage and deployment of MEC across operators and geographies. Our membership consists of some of the world's leading international telecommunication companies, based in North America, Europe, South America, and APAC regions.

The 5GFF MEC Acceleration Program (5G MAP) is designed to expand and interconnect the global MEC ecosystem by partnering and engaging with developers whose applications leverage 5G.

The 5GFF is inviting global ISVs who either currently use 5G and MEC or have 5G and MEC utilization in their roadmap to apply for this program and join the 5GFF in creating an interconnected edge computing ecosystem.

Selection Criteria

All applicants will be vetted against selection criteria by members of the 5GFF workstreams, that will include, but not be limited to, the following:

- Utilization of 5G and MEC technologies
- Use case and commercialization / monetization opportunity

- Demonstrated ability to execute and scale
- Cross-carrier interoperability requirements
- Diversity in management team

Program Benefits

Applicants will be invited to present their value proposition to both 5GFF workstreams, Commercial Ecosystems and Technical Experience Management. If applicants are selected to be a part of the 5G MAP, they will benefit from:

- Close interaction with commercial and technical teams across 5GFF members
- Opportunity to conduct API demos with the 5GFF at events such as MWC
- Support in enhancing and tailoring their offering to the needs of telco customers
- Ability to provide feedback during the 5GFF API development process
- Be early testers of the 5GFF APIs and provide feedback to 5GFF workstreams
- Direct line of communication to our partners across industries

The 5GFF is always looking for innovative 5G use cases and applications. Applicants that are not accepted into the program will be able to update their applications at any point in time to revise their submission to the program.

What Our Partners Say

The 5GFF has had the opportunity to work with global partners in the developer community and below are what some of them have to say about engaging with our Commercial and Technical workstreams.

Julian McCrea, Co-Founder of Open Sesame

Describing the benefits of working with 5GFF:

"In one word - interoperability. When we are deploying our SyncStage solution with a hyperscaler, you deploy once, and your application can live in any country, territory and time zone where that hyper-scaler [CSP] is present. When you work at the telco you only work in that one territory, which - no matter how fantastic the performance is of your solution - you have to do that for every territory. To allow you to deploy your applications across territories, as we have shown with SyncStage with 5GFF, opens up a wide range of use cases allowing collaboration to be borderless

across education, music and the metaverse, bringing humans together. This would not be possible without 5GFF."

Doug Makishima, Chief Sales and Marketing Officer at Summit Tech

"Edge computing represents the next phase of the digital transformation and is enabling key new applications that require maximum geographic reach. Our Odience 360 VR live streaming platform is one such application where brands, artists, teams and enterprises want to reach their customers and audiences across different markets. 5GFF is helping to solve the cross-carrier MEC interoperability challenge via edge discovery service (EDS) APIs. Working with 5GFF member operators Verizon and Rogers, we conducted a multi-edge trial using the 5GFF EDS APIs to successfully demonstrate cross-carrier MEC interoperability to extend the telco edge to a cross-market footprint."

5GFF & Technical Ecosystem Engagement

The 5GFF technical workstream has been actively engaging with the global developer community, including with Project CAMARA, to ensure the adoption of our interoperable APIs.

Ecosystem engagement is a significant method of ensuring that the 5GFF is considering the requirements of everyone involved in not only the development, but also the consumption of these APIs. This ecosystem consists of other global telcos, system integrators, ISVs, and CSPs.

5GFF and Project CAMARA

[The Linux Foundation](#) and the [GSMA](#) have come together to start a new open-source project called "CAMARA – The Telco Global API Alliance". This global partnership addresses challenges in porting and reproducing API services across heterogeneous operator and cloud architectures.

CAMARA intends to assist customer and developer ecosystems by developing an open, global, and accessible API solution with access to operator capabilities, allowing applications to run consistently across networks and geographies. CAMARA is also working closely with the GSMA's Operator Platform Group (Open Gateway) that is defining a federated platform solution for exposing operator network capabilities to external applications. This collaboration will ensure that

developers relying on the CAMARA project's API solutions and abstraction will be applicable across operator networks.

5GFF is a CAMARA Steering Committee member and has played an active role in building, publishing, and driving adoption of various API specifications, particularly where there are areas of overlapping prioritization. 5GFF And CAMARA are working together to enhance telco interoperability by collaborating on API development and leveraging CAMARA's broad membership base for distribution.

5GFF API Roadmap

With developers increasingly relying on uniform APIs in the telco world, the 5GFF is engaging with the broader ecosystem to augment its API development, while also determining their applicability in specific applications that are of interest to technical and commercial teams. The 5GFF roadmap, detailed below, provides an insight into the depth and breadth of the APIs, each performing a specific and unique function for those consuming the APIs.

Edge Discovery Service

The 5GFF Edge Discovery Service ("EDS") addresses the most fundamental challenge of the rapidly evolving edge-computing landscape: optimizing dynamic routing from mobile devices to an ever-changing set of MEC nodes by enabling seamless discovery and connectivity to MEC locations with the lowest latency. The EDS can direct and connect application clients to optimal MEC endpoints for every application session. To determine the ideal 5G MEC platform for a device to be connected to, the EDS considers the device location, IP anchor location, current network traffic, and other factors. EDS is designed with developers in mind – to simultaneously launch and scale applications across operators and networks, globally. As adoption of these APIs broadens, developers will be able to use a common EDS API across all 5GFF members – minimizing the cost and time required to provide end-users with a seamless application experience.

These readily available APIs are fundamental for the use cases, enabling key base tasks such as finding the optimal 5G edge platform(s), registration of end points for carriers' services, and finding optimal service endpoints for clients. If you are a consumer, this means that as you move from one coverage zone to the next, your service would not be impacted even if the carriers are different.

Workload Orchestration

Building on top of MEC EDS, the focus of the Workload Orchestration API service is to define various sets of APIs for developers to orchestrate application workloads through an intent-based API (i.e., an API that takes care of all the back-end operations pertaining to the work it does, like updating a database) that is TSP-agnostic. Workload placement, compute reservation, application lifecycle management, workload migration, and health monitoring are some of the categories of intents the API service plans to support.

Bi-Directional APIs

MEC offers opportunities to empower new use cases that demand low latency, reduced jitter, and localized secure information processing. Bi-directional APIs are intended to exchange information that will enable TSPs and CSPs to offer best outcomes to developers and end customers.

5GFF is closely collaborating with CSPs on the development of bi-directional APIs for MEC that will outline specific information to be exchanged through APIs and event flows between TSPs and CSPs. The information shared through bi-directional APIs will play a foundational role in discovering, assigning, and managing optimal MEC resources and services effectively no matter how the workload has been provisioned. This allows either the TSP or CSP to have the insight needed to serve applications at the right location and compute power to take advantage of the capabilities that MEC has to offer.

Quality of Service (QoS) Management

5GFF recognizes that for certain use cases, simply running the application on MEC is not enough. The network Key Performance Indicators (“KPIs”) – such as latency, bandwidth, etc. - required to support these use cases warrant a need to support UE differentiation and application flow differentiation.

The QoS management API spec offers the capability for applications to request an enhanced quality of service based on the application and user requirements to be provisioned dynamically in real time. This translates to less lag for mobile gaming or faster reaction times for autonomous vehicles to avoid a crash.

Network Intelligence Exposure

TSPs have had access to a wealth of data related to their network which has predominantly been used for internal purposes. With MEC bringing compute resources to the edge of the network, network KPIs have gained increased relevance and provide valuable data points to MEC-hosted applications. 5GFF envisions TSPs exposing important network KPIs like network utilization, throughput, latency, jitter, and packet loss in the form of APIs to enable applications to make real time decisions leading to improved end use experience.

Network Slicing

To meet the diverse needs of MEC-hosted applications, network slicing and slice mapping API specifications could empower applications to have more control over network configurations associated with the application end user. API specs could abstract the intricate details of the underlying network elements so that developers have the freedom to continue to focus on new products and services.

Telco ISV Engagement Programs

Each 5GFF member currently has or is on the cusp of deploying 5G-enabled MEC platforms. With developers increasingly launching 5G-enabled applications, telcos have devised unique ways to engage with the global developer community and validate emerging solutions.

These engagement programs enable developers to gain a deeper understanding of the commercial and technical requirements of their solutions to be deployed across operator networks. These programs also bring developers one step closer to their end user - the retail customer. While telcos may play the role of the interface, there is valuable insight that is passed from the consumer to developer, allowing them to tweak their applications to maximize adoption and uptake.

Several 5GFF members have engagement programs that are designed based on the maturity of the 5G ecosystem, TSP objectives, and their MEC roadmap. While every TSP is in different stages of the technology and infrastructure rollout, the overarching objectives of driving MEC adoption and usage spills across geographical and corporate lines.

Verizon Edge Partner Program

The [5G Edge Partner Program](#) is an ecosystem of partners that choose to deploy their solutions on Verizon's 5G Edge platform. Companies participating in the program will showcase partner solutions and demonstrate the benefits of using 5G and edge computing. Partners are also provided access to Verizon's sales and distribution channels along with go-to-market, marketing and development support.

Partners help demonstrate the value of the 5G Edge Platform while simultaneously providing additional value. Partners also help drive consumption of the 5G Edge Platform, as well as other products and services.

Partners have access to information that will be included in the 5G Edge Program Partner website to gain exposure to prospective customers. Each partner will be assigned a Verizon Partner Manager who will work closely with the Verizon sales channel and coordinate any networking requirements for customer deployments. Partners gain access to Verizon Business Group marketing, sales training, and lead sharing activities, leading to the increased exposure of the partners brand and product. The partner will be part of the Bill on Behalf of (BOBO), where Verizon will bill on partner's behalf, providing customers with one bill for their Verizon services and partner solution.

Onboarding Requirements

1. [MEC Instance](#): Partners determine the best MEC instance on which they can deploy their application
2. [Business Models](#): Verizon will review ISV business models for a typical deployment in order to determine strategic fit partnering and to set up billing labels.
3. [Network Requirements](#): Partners provide an estimate for the average amount of network/connectivity uplink and downlink required for their use-case; Verizon engineering can assist partners in determining this information.
4. [Marketing Materials](#): Partners work with Verizon on marketing their solutions (as per the specific terms of their signed agreements).
5. [Onboarding](#): Partners work with Verizon on appropriate onboarding tasks to allow Verizon to bill the partner solution.

To become a part of the Verizon 5G Edge Program, the partner displays an out of the box, end to end product with a target use case, product(s) that are able to leverage 5G Business Internet (BI), Private Wireless, Public MEC or Private MEC, validate the product's functioning on Verizon 5G technologies, have customer references illustrating the successful deployment of their product, be interested in a mutually beneficial relationship that showcases both their solution and Verizon 5G Edge, have a direct to go-to-market and a support channel, and have a differentiated experience on Verizon's 5G devices (e.g. phones & tablets).

Vodafone Edge Innovation Program

The Vodafone Edge Innovation Program was launched in 2021 and enables developers to develop emerging services on its 5G network and MEC platform. The program is open to companies of all sizes, from any industry and for any use case.

Vodafone has launched the Edge Innovation Lab in Salford, UK, and has outlined plans for additional Innovation Labs in Germany. The first year of the Edge Innovation Program in 2021 resulted in increased MEC market awareness, while also demonstrating the capabilities of Distributed MEC, which resulted in the launch of the 2.0 interaction in May 2022. The Vodafone Edge Innovation Program 2.0 provides participants with:

- 1.** Opportunity to trial ideas on Distributed MEC, Dedicated MEC, Mixed Reality, and Visual Inspection services at a discounted rate
- 2.** Further discounts for future services following the conclusion of a Proof of Concept
- 3.** Exclusive access to learning videos on Distributed and Dedicated MEC, Mixed Reality, and Visual Inspection
- 4.** Access to in-house experts and technical support, as well as industry specialists, to build the best MEC Solution

Vodafone received an overwhelming response to the program, with hundreds of applicants expressing interest in trialing their MEC services across the UK and Germany. Vodafone has partnered with over 30 companies, including:

- 1.** Aurrigo: A Cambridge-based SME, Aurrigo used MEC and Vodafone's 4G/5G network to improve the safety and performance of its driverless vehicles, as well as enhancing security as data does not travel over the public internet.

2. Sportable: With wearable IoT technology embedded into baseballs and uniforms of the players, Sportable captures every movement on the pitch, delivering real-time insights to fans, coaches, officials, and broadcasters
3. InterDigital: Creating solutions for advanced wireless and video technology to make richer video and multimedia experiences for businesses and consumers - with use cases supporting zero defect manufacturing for Industry 4.0.
4. Keyless: A privacy-first biometric authentication solution, Keyless makes the authentication processes for digital payments faster, utilizing the MEC to make real-time multi-factor biometric authentication a reality for all end-users.

Rogers 5G Innovation

The Rogers Innovation and Partnerships team was created to position Rogers as a global leader in the adoption and monetization of 5G technologies. The team operates with three pillars: Co-Creation and Market Development, Research, and Partnerships & Ecosystems.

Co-Creation & Market Development

The Rogers 5G Create Lab focuses on co-creating solutions with strategic customers to find innovative solutions to address customer pain points, leveraging 5G and associated technologies. They use a design thinking approach to explore the art of the possible taking a solution from idea all the way to proof of concept.

Research

Through various university and academic partnerships, the Rogers Innovation team explores new perspectives on 5G use cases, experimenting with emerging technologies in real-world scenarios with enterprise customers. These demonstrations and experiments are made possible through industry collaborations and at Rogers-sponsored 5G university campus testbeds.

Partnerships & Ecosystems

Through partnerships with industry groups, mobile network operators, strategic vendors and partners, Rogers fosters new innovation by continuously engaging and integrating with key leaders of the 5G ecosystem.

Incubation Engagements

The Rogers Create Lab, along with the Innovation & Partnerships team, has built a pipeline of incubation engagements with customers in key verticals to advance 5G adoption and commercialization.

In 2019, Rogers partnered with the University of British Columbia, making it the first 5G Smart Campus in Canada. The UBC campus serves as a testbed for various projects related to intelligent transportation, mixed reality, healthcare, air quality, and climate change. Through these projects, Rogers is leveraging UBC's campus as a living lab, enabling the defining and development of 5G-powered technology solutions. Rogers has also joined forces with University of Waterloo to explore various 5G-related solutions including smart city infrastructure and asset tracking.

The Rogers 5G network is also enabling remote island communities in Canada to get access to medical support by working with InDro Robotics, a UAV and drone company. By tapping into the potential of UAV and drone technologies, these communities were able to access healthcare supplies and testing facilities during the peak of COVID 19.

Rogers Create Lab Process

Rogers Create Lab engages customers through a design thinking process: taking them through ideation and incubation phases, all the way to prototyping and proof of concept.

The Ideation process may include discovery workshops, hackathons, and developer engagement programs to identify emerging solutions. The teams work to co-create solutions for problem areas and create low-fi prototypes that can identify the points of friction in the existing solution experience.

The Incubation stage includes the refinement of use cases and concept prototypes, allowing for the visualization of a detailed architecture. In addition, the team also works with other groups at Rogers to develop initial market sizing, competitive analysis and identify potential customers.

Prototyping includes the integration of customer feedback and market research to validate solutions, including research through testbeds and demos.

The last stage of the RCL process is Prototyping. This stage involves the building of a proof of concept that demonstrates the solution in real-world situations and working technologies. The development, building and testing of the solution architecture is done with co-creation partners, paving the path for the execution of a partnership plan and roadmap.

Bell Canada

Bell announced the launch of the first public multi-access edge computing (MEC) with AWS Wavelength in Canada during April 2022. Building on Bell's agreement with AWS, announced last year, together the two companies are deploying AWS Wavelength Zones throughout the country at the edge of Bell's 5G network starting in Toronto.

Use Cases & Delivery

Bell continuously collaborates with developers and ISVs to deliver new services and immersive customer experiences through the power of Bell Public MEC. Below are a few real-world examples of how Bell has engaged with developers and augmented digital services using their 5G network and MEC.

Virtual Shopping Experiences

Bell partnered with Canadian apparel company, Rudsak, and VR streaming platform Summit Tech to provide customers with an immersive shopping experience. Using 360-degree cameras, Rudsak customers could move around stores using either their smartphones or VR headsets, including engaging with sales representatives and completing purchases. The Summit Tech *Odience* platform leveraged the MEC to enable multiple viewers of the stream to interact with different parts of the video at the same time, changing how customers interact and engage with brands.

Automating Deliveries

Bell joined forces with Tiny Mile, a Toronto based food delivery robot (rover) platform. Providing restaurants and other food delivery companies with automated delivery services, Tiny Mile leveraged Bell's MEC to provide their bots with real-time video analytics to detect and avoid obstacles. In addition, operators could manually control the delivery bots when needed. Given the fact that Tiny Mile bots operated on the busy streets of Toronto, utilizing the MEC enabled them to do so safely and efficiently.

Drone Logistics

Autonomous drones require intelligent decision making in real-time, along with the ability to operate without constant human input safely. Bell partnered with Drone Delivery Canada (DDC) to leverage its MEC platform and conduct real-time video recognition, replacing the manual scanning of the take-off and/or landing areas to provide the drone with a go/no-go decision. With video analysis being completed at the edge, DDC gains vital seconds in being able to avoid safety related incidents.

Research

Bell Canada and Western University partnered in 2019 to establish a centre of excellence for 5G research & development. Currently, Western researchers are conducting several 5G related projects using Bell's on campus 5G+ network. Bell's 5G+ network provides Western University researchers with a living lab, where real world challenges can be addressed using a variety of technologies. Some examples include using 5G to enable smart roadways on campus for collision avoidance and safety for vulnerable road users, creating more engaging 360-degree virtual classrooms, and improving student mental health. All the projects rely on Bell's 5G+ network, which delivers lower latency, higher throughput, and increased capacity, relative to previous generations of 4G networks.

Ecosystem Partnerships

The recent launch of Bell Ventures, a corporate venture capital initiative, has been designed to encourage the development of companies that harness the power of Bell's networks to drive growth and adoption of advanced technological solutions. Recent investments by Bell Ventures include Boreal Ventures, a venture capital fund supporting Québec's most promising deep tech start-ups, created in partnership with Centech.

Bell has a strategic relationship with a Canadian innovation center in Montréal, [Centech](#). As Centech's exclusive telecommunications provider, Bell will leverage its advanced network capabilities, 5G and AI management expertise to help emerging Canadian businesses drive innovation, growth and adoption of advanced technological solutions.

Centech's accelerator environment enables Bell to partner with entrepreneurs and start-ups, including Haply Robotics, a start-up that develops 3D haptic controllers. The technology that Haply Robotics has developed reproduces tactile sensory inputs, allowing users to feel precisely what it

is like to interact in a specific environment, for example, during remote surgeries or on screen, with a VR headset. The high speed and low latency of Bell's 5G network enables real-time control and feedback for physical robots through remote-touch controls in disciplines where this was not previously possible.

Key Takeaways

5G has the potential to drive significant changes in the connectivity ecosystem, driving cross-industrial transformation for enterprise customers and end-users. This connectivity ecosystem can collectively benefit from this change by continuous collaboration and partnerships.

Each TSP has their own strategy in engaging with the global developer community, but it is evident that there are certain criteria that are considered when evaluating a TSP-ISV partnership:

- Use Case and Market Needs
- Competitive Landscape
- Technical Integration Requirements
- Alignment on GTM Strategy

One of 5GFF's goals is an interconnected network of TSPs and their MEC platforms, with CSPs and ISVs playing a critical role in the success of this network. This interconnectivity is being empowered by the 5GFF APIs, which have been designed based on TSP priorities as well as feedback from the broader ecosystem.

The 5GFF is working to develop an interconnected and interoperable 5G MEC ecosystem - whether you are a TSP, CSP or ISV, there is significant potential and value in your contributions.

Visit us at www.5gff.org

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