Whitepaper

EdgeNet and “The 5G Edge API”

How to Simplify, Accelerate, and Rapidly Operationalize 5G Edge Services

Introduction: Welcome to the Era of "The 5G Edge Internet"

We are in the midst of a digital tectonic shift – the next generation of the internet is centered around decentralization with communications and computing moving to the Edge. This shift, combined with the emergence of 5G, is fundamentally changing the way people and things engage with the internet. Centralized software workloads associated with network cores and cloud computing are being distributed in an intelligent manner, leading to a new breed of shared infrastructure, architectures, and applications. According to Gartner[1], the major drivers of Edge computing include security, real-time responsive business, new and better user experiences, and smarter, safer systems. As access to the internet has expanded incrementally and systematically, application capabilities have grown exponentially which includes autonomous systems, Artificial Intelligence (AI) and the Internet of Things (IoT). Importantly, mobility is essential and is driving the need for 5G services. This is the era of "The 5G Edge Internet".

Experts estimate this emerging distributed 5G Edge economy will be worth $8 trillion by 2030[2]. The impact of this economy is here today. For instance, approximately 80 percent of organizations expanded their work-from-home policies, with 67 percent seeking to maintain them for the long-term[3]. The shift to a distributed workforce is leading to structural changes in enterprise IT. While these changes introduce greater flexibility for employees and expand the scope of enterprise business opportunities, it yields significant challenges for enterprise IT teams. For example, instead of focusing on a few branch office locations, IT staff must now figure out how to securely deliver services to thousands of individuals in unique locations, while having an available and flexible architecture to deploy new services.

This whitepaper will outline how organizations can rapidly establish 5G Edge services in minutes and to achieve their desired business outcomes. The architectural approach is centered around EdgeNet – a secure and comprehensive platform that is deployed across a network of interconnected networks at the Edge. The 5G Edge API, which is accessible on EdgeNet, is crucial for realizing the shift towards decentralization of the internet.

> "With the ability to place infrastructure and applications close to where data is generated and consumed, organizations of all types are looking to edge technology as a method of improving business agility and creating new customer experiences.
>
> **Dave McCarthy,** Research Director of Edge Strategies, IDC[4]

[1]https://www.gartner.com/en/documents/3981952/top-10-strategic-technology-trends-for-2020-empowered-ed
[2]https://www.mobileworldlive.com/featured-content/home-banner/nokia-tips-5g-enterprise-boom-to-make-8t impact
[3]http://press.spglobal.com/2020-06-18-COVID-19-Shakes-Up-the-Future-of-Work
[4]https://www.idc.com/getdoc.jsp?containerId=prUS46878020#:~:text=According%20to%20the%20new%20 Worldwide,the%202019%E2%80%932024%20forecast%20period.

Addressing the 5G Edge Conundrum

Businesses can connect to EdgeNet in minutes and start launching 5G Edge services of their choice globally

Conventional Wisdom

To deliver on the promise of 5G Edge, a massive architectural upgrade is in the cards with mobility as a key ingredient to realizing that promise. The promise and purpose of 5G Edge includes trillions of dollars in enterprise economic outcomes. However, conventional wisdom suggests it will take years to build, with hundreds of billions in investments throughout the ecosystem, including operators. This is the 5G Edge conundrum.

EdgeNet challenges conventional wisdom by abstracting out the complexities of 5G, to deliver on the promise of 5G Edge. In its simplest form EdgeNet is a parallel internet universe of connected private Edge area networks. Moreover, through an adaptive overlay integration architecture on existing connectivity and cloud networks, EdgeNet delivers on the promise of 5G Edge without requiring massive investments. In addition, with The 5G Edge API, enterprises and developers no longer need to wait for massive architectural changes to launch 5G Edge services in minutes. In summary, businesses can just connect to EdgeNet globally in minutes and start launching 5G Edge services of their choice.

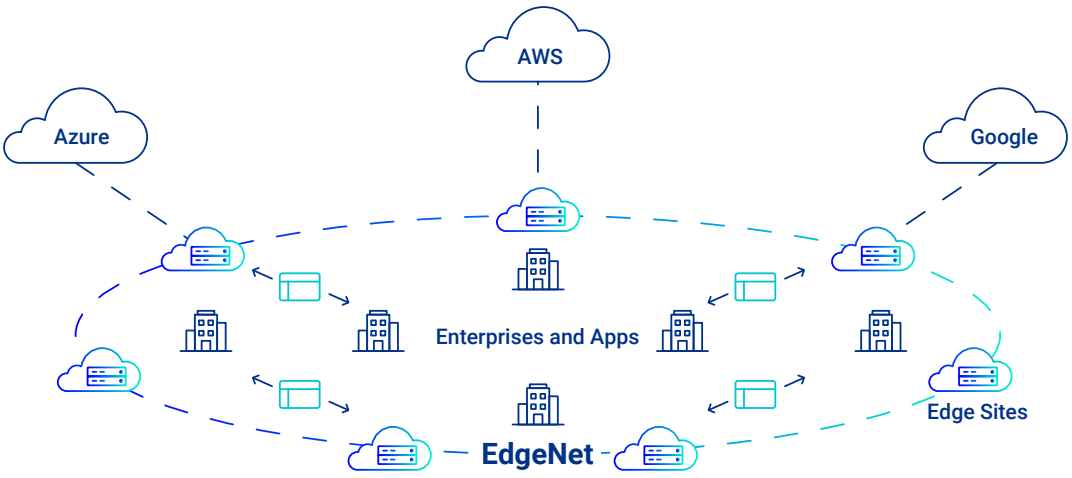

Figure 1: EdgeNet - a parallel internet universe of connected private Edge area networks

An Edge First Software-Defined Mobile Edge Platform

EdgeNet is based on the new computing and mobility paradigm commonly referred to as Software-Defined Mobile Edge (SD-ME), which is purpose-built for the 5G Edge. With this simple to use platform, companies can launch 5G Edge services in minutes, including two types of applications in the Edge internet: Edge-enhanced applications and Edge-native applications.

- **Edge-enhanced applications:** Those that become more efficient with the Edge
- **Edge-native applications:** Those that are not possible without the Edge

Layers of SD-ME

Designed with an open, cloud-neutral architecture, SD-ME consists of allowing users to securely program the functionality they need into each layer. SD-ME is comprised of three software-defined layers, each with centralized control and distributed user plane execution of various functions abstracted that streamline the launch of 5G edge services.

The three layers are:

1. **Software-Defined Mobility Networking (SD-MN):** Comprised of multi-tenant CUPS and access-agnostic, EdgeNet's Edge Gateway enables application developers to uniformly build across all radio access including 4G, 5G, and Wi-Fi. It also includes enhanced security abstractions to establish and ensure security at every layer and at scale.
2. **Software-Defined Mobile Edge Cloud (SD-MEC):** Typical software defined compute abstractions deal with tens of thousands of servers in a given location, orchestrating the compute across those servers. Centralized, software-defined principles empower users to manage Edge applications and services across thousands of locations from a single point-of-contact. This greatly simplifies the provisioning and orchestration of 5G Edge resources, including Edge-to-Edge and Edge-to-cloud connectivity. This also makes it easier to establish DevSecOps for the Edge, accelerating the build and deployment of services at the speed of 5G.
3. **Software-Defined Application Delivery Framework (SD-ADF):** Developer APIs and frameworks make it easy for teams to add Edge services to their applications for both Edge-enhanced and Edge-native applications.

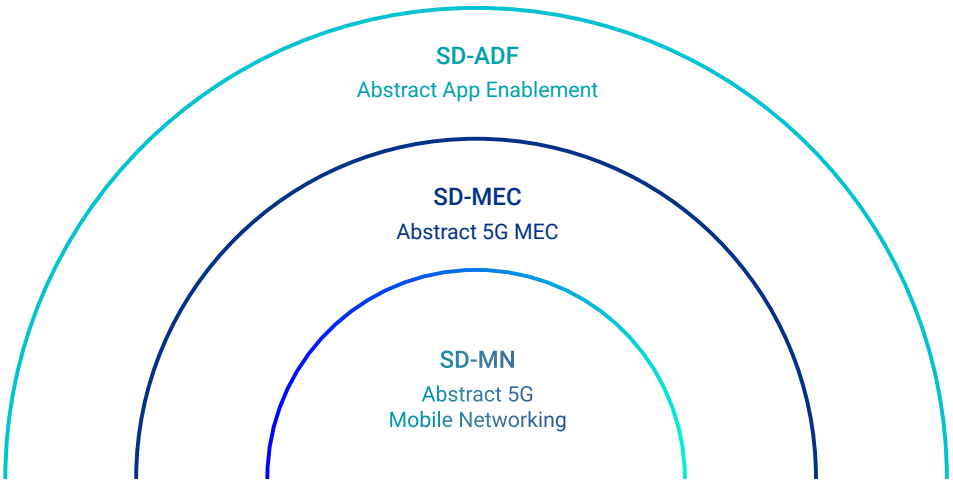

Figure 2: Breakdown of SD-ME API enablement at every layer of EdgeNet

The 5G Edge API

Developers gain access to EdgeNet through the 5G Edge API. This robust family of open APIs and application frameworks that come with implementation of EdgeNet allows developers to abstract away the complexity of 5G in building 5G Edge applications. The combination of the software stack and open APIs is what makes quick deployment of 5G Edge services possible.

5G Edge Connectivity and Mobility API

The operational complexity of delivering services to the Edge, due to the massive volume of endpoints and speed at which users expect services, leaves no room for manual administration. To ensure maximum performance and uptime, enterprises must automate Edge operations.

Being fully software-defined and providing APIs at every layer of the platform, EdgeNet enables enterprises to easily automate the 5G application lifecycle – from installation to application enablement. All of this can be managed from a centralized console, further alleviating the administration of 5G Edge services.

For developers, API implementation at the networking layer of the platform enables intelligent traffic optimization reducing traffic response times. EdgeNet's mobile networking gateway uses various defined network services to process and route incoming mobile traffic to determine what can be served from the Edge. This is achieved by automatically rerouting traffic via centralized cores at micro-Edge data centers.

5G Edge App API

EdgeNet is a foundational platform, on which another set of platforms is built to enable developers to push boundaries when building out Edge applications. Driving innovation in several different Edge areas, developers have access to starting points for application use cases including video notifications, computer vision, video enablement, and Edge AI. Using SDKs and open APIs, developers can produce enterprise applications suited for delivery of video notifications or for boosting overall application and video performance.

5G Edge Compute API

Building private 5G infrastructure takes years. If enterprises want to stay ahead of their competitors, they need to immediately expand their offerings to the 5G Edge by upgrading their existing applications to Edge-enhanced applications. Alternatively, they need to develop Edge-native capabilities to deliver on user expectations through the next wave of technological innovation.

EdgeNet's access-agnostic fabric acts as a single overlay across all network, cloud, and Edge types creating capabilities for roaming. Edge mobility APIs applied at the MEC layer orchestrate session handoffs between networks (e.g., private Edge networks to mobile networks), creating a seamless experience for enterprises and end-users alike.

5G Edge Value Added API

The rapid adoption of remote teams and new IoT devices has created thousands of new unsecure connections and endpoints for malicious actors to exploit. Additionally, there are different protocols for various network types – making it increasingly difficult to scale security and compliance at the speed of 5G.

EdgeNet is designed to comply with all relevant Edge security and compliance standards. It delivers Edge gateways, encryption, and other programmable security policies via APIs, all of which can be centrally managed from the EdgeNet portal. This also allows application developers to direct more focus to actually building of new 5G Edge capabilities, accelerating time-to-market, and providing organizations with greater agility.

The 5G Edge API Family

- Connectivity and Mobility API
- App API
- Compute API
- Value Added API

Enterprise Use Cases for EdgeNet

The capabilities for building with EdgeNet to create undiscovered user experiences are endless as Edge cloud architectures move data processing and analytics as close to user endpoints as possible. By bringing applications and infrastructure closer to service endpoints, businesses can optimize bandwidth speed and minimize service latency for the ultimate user experience.

EdgeNet is at the intersection of mobile connectivity and Edge computing, coming together to free the enterprise. There is a market for two types of applications in the Edge internet: Edge-enhanced applications (those that become more efficient with the Edge) and Edge-native applications (those that are not possible without the Edge).

Both of these application classifications have uses in a number of different industries from healthcare to manufacturing to retail.

Edge-Enhanced Reference Designs

Alef has a portfolio of reference applications that demonstrate the potential of EdgeNet's full capabilities.

Advision: Connect to new DOOH Advertising Marketplaces and deliver highly targeted advertisements in real-time.

Boost: Deliver application and video traffic from the edge with intelligent routing to Internet Exchange Points.

These applications are intended to inspire enterprise programmers and application developers to use the platform to create applications for use cases that have yet to be discovered.

With such an innovative platform, the possibilities for new applications are endless and it is certain that the developer ecosystem will become a thriving self-sustaining environment. We at Alef hope that our reference products encourage developers to explore development for untapped causes. We can't wait to see what our community can build.

Programmable Edge - Developer Heaven!

Sectors with the potential to be boosted by 5G Edge

Smart Cities

- Traffic Management
- Public Transportation
- Smart Grids
- Asset Management
- Field Service

Manufacturing

- 3D printing
- Alt vision
- Robotics
- Edge Security

Healthcare

- Personalized homecare
- Tele-medicine
- Health records
- Privacy and Data Residency
- Community counseling services

Utilities

- Revenue models
- Digital field support
- Smart grids
- Asset management
- Sustainability

Retail & Advertising

- AI Targeting
- E-commerce
- Brand management
- Point of Sale
- HD Videos

Transport

- Autonomous vehicles
- Electric vehicles
- Smart ambulance
- Connected traveler
- Freight Tracking and Routing

Enterprise use cases for EdgeNet:

- Private edge network
- Smart cities
- Autonomous systems
- Smart venues
- Smart Retail
- Industry 4.0

Free the Enterprise: Embracing 5G Innovation at the Edge

EdgeNet provides enterprises with a single platform to develop and deploy 5G Edge services in minutes, without the headache or cost of managing 5G infrastructure. EdgeNet has simplified the journey into the new 5G Edge paradigm. With EdgeNet, developers are free to build innovative applications with focus on functionality, knowing that EdgeNet enables delivery in the most secure, highly available manner.

With the 5G Edge API and frameworks provided by EdgeNet, IT staff are free to create powerful Edge native applications that result in excellent user experiences. Rapidly establish your enterprise freedom with 5G Edge services and applications using EdgeNet.

Getting Started

EdgeNet can easily be deployed in minutes. To find out more about EdgeNet and related offerings from Alef, please visit our website.

For more pointed questions about the platform, please contact us through our website or through your sales representative.

About AlefEdge

AlefEdge, the innovator behind the 5G Edge Internet, delivers the superpowers of a programmable 5G Edge to developers and enterprises through The 5G Edge API. Responding to trends of Internet decentralization, Alef has integrated mobile networking with Edge computing in its flagship platform EdgeNet. By abstracting the complexity of 5G, EdgeNet unleashes a massive Edge Internet economy by securely enabling developers to build 5G Edge services that include artificial intelligence, the Internet of Things, Industry 4.0 manufacturing, smart cities, virtual and augmented reality, and more.

AlefEdge is headquartered in New York City, with offices in India and Brazil.