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Enhance your Enterprise Network with the Software-Defined Mobile Edge

The communications and digital markets are under massive, synchronized transformations. Edge Internet is a distributed Internet architecture combined with a programmable paradigm where computing and connectivity are provided in close proximity to the point of consumption to meet the demands of current and future applications and services.

The synchronized transformations of the communications and digital markets are impacting every trillion-dollar industry in our economy. The next wave of mobile connectivity (5G and next gen wireless networks) and Edge computing is here bringing new applications and services the current infrastructure cannot handle.

"We are at the cusp of a seismic paradigm shift wherein computing and communications will move from a core network with a centralized cloud architecture to the Edge. The reasons are manifold but the basic premise is that in order to serve the data computing and communications demand of objects, sensors, people, resources, compute, and intelligence have to move to the Edge to not only operate in the most cost-effective way but to enable new use cases that can't be supported by traditional cloud architectures." – Chetan Sharma, Industry Analyst.

The Edge Internet is a distributed overlay Internet architecture – public and private – with programmable Edge API's, creating new computing and communications paradigms.

With the rise of 5G and computing environments, AlefEdge is key to unleashing the convergence of networking and computing. AlefEdge's Software-Defined Mobile Edge platform enables a new set of mobility, cloud and applications APIs that unleash Enterprises and application developers to leverage the full power of the Edge. By utilizing our unique APIs, Enterprises can deploy, orchestrate and manage Edge applications and services.

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Alef EdgeNet – Software-Defined Mobile Edge

Alef EdgeNet is a collection of interconnected Mobile Private Networks driven by Alef's invention – a programmable Software-Defined Mobile Edge (SD-ME) platform that orchestrates applications, devices and network services seamlessly. Alef's SD-ME delivers on the long-awaited promise of a distributed Internet and the power of a new high-speed Edge Economy to application developers and Enterprises alike through open Edge APIs, products and services. By delivering the power of a 5G-like Edge Internet through its platform's easily adaptable plug-and-play overlay architecture, Alef EdgeNet can enable Enterprises to upgrade and futureproof their network without the need for costly upgrades, and ready themselves for the massive Digital Transformation that lies ahead.

The Alef EdgeNet framework allows Alef Edge Sites to be connected into an Edge cloud that enables mobility management at the session level, roaming between Private Edge Sites, orchestration of user application services across Enterprise Edge Sites, and the elastic flow of microservices across Alef Edge Sites to adjust to varying demand for them.

Alef's Software-Defined Mobile Edge platform enables a new set of mobility, cloud and application APIs that enable Enterprises and application developers to unleash the full power of the Mobile Edge using a Software Defined architecture. By leveraging Alef's unique Edge Mobility and Application APIs, Enterprises can enable, deploy, orchestrate and manage the Edge and applications.

Industry Problems

Enterprises have engaged in earnest in Digital Transformation. Digital Transformation refers to investments in technology, software and cloud-native services and methodologies in order to enable Enterprises to make their locations, products and services smarter and ready for digitization. Enterprises have numerous choices facing them when it comes to making investments in technologies that rapidly bring about this digital transformation. These solutions range from connectivity options such as 5G to SD-WAN for application performance and Edge computing that ushers in a new parallel connected universe. Enterprises are turning to their consulting partners and/or relying on their CIO's or CDO's to make the right decision on the technologies and processes they will have to invest in to usher in this digital transformation. Enterprises have to weigh the deleterious effects of vendor lock-in and lack of interoperability along with future proofing requirements, not to mention price, in making these tough decisions. High bandwidth costs are another significant consideration for Enterprises, as many have multiple broadband connections ranging from inexpensive ones costing a few hundred dollars per month all the way to expensive MPLS lines running into the hundreds of thousands of dollars per month per location. The multitude of options has left Enterprises reeling and unsure about navigating the way forward towards their digital transformation. Whether the solution is video streaming for Enterprise training or an IoT device for manufacturing or security, Enterprises have high data costs due to their demand for applications and performance as well as investing in the right technology to enable these. Security is another major consideration for Enterprises as they work to combat internal and external threats to their existing Wi-Fi

and wireline networks. Typical solutions in the market cannot universally meet the needs of every Enterprise in every Industry.

| Multiple Solutions to choose from | High Data Bandwidth Costs | Security Risks |

Enterprises are constantly looking for ways to overcome these challenges. With networks becoming more complex, a variety of industry solutions to pick from, high data bandwidth costs and security requirements becoming more stringent, Enterprises need a solution that meets their challenges while driving forward on the path to digital transformation. Alef EdgeNet, based on SD-ME, can solve the industry's most vexing issues, while focusing on and providing unique next-generation services for Enterprises.

Enterprise Problems

With digital transformation driving Enterprises to adopt new technologies, some Enterprises are wondering if they need to wait for 5G to arrive to bring the promise. Others are looking for solutions that will accelerate their digital transformation while having access to an open, programmable solution where they can attract best-of-breed developers, solution providers and System Integrators to help them quickly develop and implement solutions. Another requirement is mobility for employees who are on mobile networks, whether Wi-Fi or a flavor of LTE. Employees who are often on the move – whether in their own office environments or away from their home offices, require the same high-quality experience for their applications as when they are on their internal networks. Some solutions while being able to provide employees the low latency, high performance capabilities for their demanding applications while they are on their internal network, fail when those employees are on the move. The reason is in order for continuity of user experience, the networks which serve these applications must be able to support mobility, which is often not possible for point solutions. The result is a discontinuity of application persistence, poor performance and a reduced user experience. When application performance can be met with mobility, the Enterprise's users can benefit from a network that takes into account not only their high performing applications but user mobility and session persistence. New types of low-latency applications such as AR/VR, gaming, Autonomous Systems, low latency advertising and Real Time Bidding, Enterprise video delivery etc. demand high application availability and unceasing and exacting performance.

Enterprises also need easy tools such as APIs, connectors and network services to enhance and create these new applications for digital transformation. Without such APIs and connectors, building low latency and high performing applications will not be easy and quick. Also, waiting for 5G is not an option for many Enterprises as 5G has yet to be

deployed in any kind of scale. So Enterprises are eager to get going but understand they need a new architecture that can deliver on the promise of digital transformation, an architecture that is open, programmable, highly automated, offers APIs and services to hasten low-latency application development, provides high service assurance and SIs who can provide them with implementation and ongoing maintenance services.

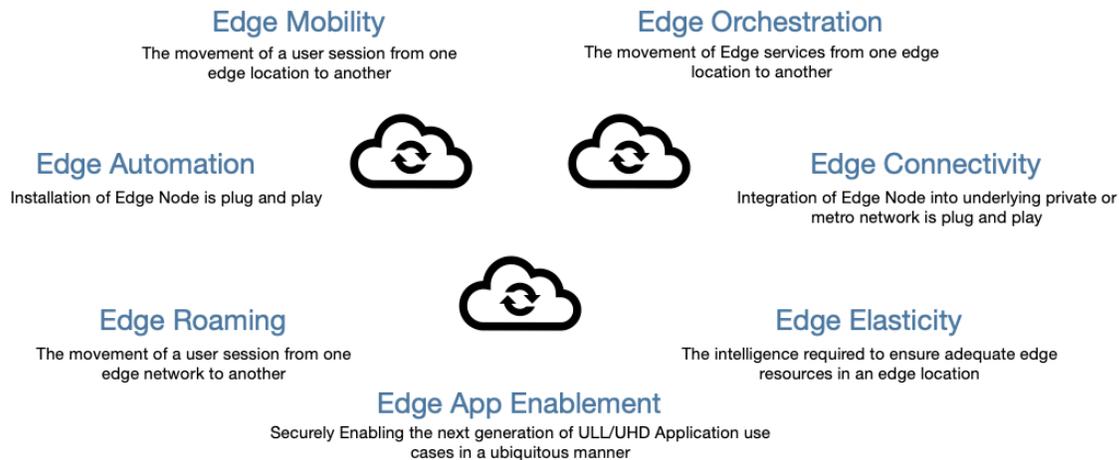|		
Lack of Application and User Mobility	Poor Application Performance from Today's Cloud Network	Lack of Willingness to wait for 5G to accelerate Digital Transformation

By implementing the Alef's parallel (to the existing Cloud) connected, open, programmable, highly automated Alef EdgeNet solution, Enterprises can focus on superior application performance today, without having to wait for any costly upgrade to 5G to arrive. This frees them up to focus on their core business to drive revenues through new services and superior customer service.

Solution Deep Dive

Alef EdgeNet for Enterprises addresses the digital transformation imperative for Enterprises by offering a Software-Defined Mobile Edge platform. Alef's SD-ME is highly automated, works on Wi-Fi or LTE networks, has a high degree of automation, and embraces an open, programmable API based architecture. By leveraging Alef's SD-ME Programmable Edge architecture with a subscription model, an Enterprise can build its own private network by leveraging a completely private and secure network provided by Alef. Alef's SD-ME based architecture takes advantage of the shift away from Networking Engineering to Network Programming, allowing every layer of Alef's software stack – connectivity, cloud, and application enablement - to be programmable. Digital transformation has unleashed numerous use cases from application performance improvements to new applications that require the power of the Edge such as Industrial 4.0, real time stream processing, and IoT. With Alef's SD-ME based Alef EdgeNet, Enterprises can begin their digital transformation today without waiting for a costly upgrade to 5G.

The Alef EdgeNet SD-ME framework allows different Alef Edge Sites to be connected into an Edge Cloud that enables mobility management at the session level, roaming between Enterprise Edge Sites, orchestration of user application services across Enterprise Edge Sites, and the elastic flow of microservices across Enterprise Edge Sites to adjust to varying demand for them.

The core Cloud capabilities of Alef's SD-ME based Alef EdgeNet are shown in the figure and described below:

Edge Mobility
The movement of a user session from one edge location to another

Edge Orchestration
The movement of Edge services from one edge location to another

Edge Automation
Installation of Edge Node is plug and play

Edge Connectivity
Integration of Edge Node into underlying private or metro network is plug and play

Edge Roaming
The movement of a user session from one edge network to another

Edge Elasticity
The intelligence required to ensure adequate edge resources in an edge location

Edge App Enablement
Securely Enabling the next generation of ULL/UHD Application use cases in a ubiquitous manner

Capabilities are offered through Programmability and APIs therefore addressing the Friction

- Edge Mobility – Seamless movement of a user session from one Private Edge location to another
- Edge Automation - Plug and play installation of Alef's SD-ME in a Micro edge location and the ability to bring Enterprise wireless traffic onto Alef's SD-ME stack in a completely automated way
- Edge Roaming - Movement of a user session from one Edge network to another, whether Private or Public
- Edge Orchestration - Transference of application state awareness from one Edge location to another so the user's experience is seamless
- Edge Routing - Plug and Play integration of Alef's software stack into the Micro or Metro Edge environment
- Edge Elasticity – Intelligently moving microservices around thereby ensuring adequate Edge resources in any given edge location
- Edge App Enablement - Securely enabling the next generation of Edge native and Edge enhanced applications through Open APIs and a programmable interface

The Alef EdgeNet software stack is end-to-end, encompassing mobility, cloud and application enablement layers. Our core capabilities delivered as Edge services and APIs to application developers and Systems Integrators, deliver on the promise of the Software-Defined Mobile Edge. Together, we offer a full end-to-end solution while being interoperable with the emerging Edge ecosystem as well as the current Micro and Metro Edge network environments.

Application and User Mobility	Open Programmable Edge and Edge Solutions	Futureproof Architecture, easily upgrade to 5G

How Alef EdgeNet can help Enterprises

Alef EdgeNet based on SD-ME creates a 5G experience using your existing Wi-Fi or LTE network today, without the expense or complexity of upgrading to 5G. Enterprises can automatically connect and integrate their wireless traffic with the nearest Alef Micro Edge site and begin their digital transformation in minutes. With Alef EdgeNet, Enterprises can deploy Edge native and Edge enhanced solutions easily including dozens of ultra-high-def video solutions, AR/VR, computer vision, AI, Video Conferencing and enhanced security. In order to deploy these solutions, Enterprises can leverage Alef's Open APIs and build their own internal solutions or leverage Alef's Marketplace for 3rd party applications and solutions.

With Alef EdgeNet Enterprises can experience:

- 100% secure zero trust networking creating a secure data environment
- 62% higher data throughput increasing productivity
- 48% increase in network efficiency resulting in lower bandwidth costs
- 2.1x better video resolution creating more high-definition and ultra-high-definition video possible
- 1.7x faster startup time leading to ultra-fast applications such as enhanced analytics, machine learning and artificial intelligence

The Alef EdgeNet platform and open APIs can be easily purchased and deployed through the Alef EdgeNet Portal. Alef EdgeNet customers can pick locations where they would like to deploy their Alef EdgeNet, pick a standard offer around Alef's core Private Network platform and additional products and services to begin their digital transformation.

Alef EdgeNet provides the following benefits:

- Accelerate Edge Businesses: Collaborate and develop new Edge applications faster with a library of reusable Edge APIs, connectors, and more
- Mobile Edge Connectivity: Integrate with any application data, or device — on-premises or in the cloud or at the Edge
- Friction-Free Development and Deployment: Time to market advantage by integrating APIs to build applications faster, and deploy easily using one unified Alef SD-ME platform

- Future-proof architecture: Alef's overlay architecture works seamlessly over any access network like 3G, 4G, Wi-Fi, CBRS and easily upgradeable to 5G
- Secure by Design: Protect data and control access with Alef's unified security framework based on thereat models, the use of a firewall at the Edge, and different layers of security
- Actionable Visibility: Manage all your Edge deployments from a single interface that provides for data visualization allowing quick identification and resolution of issues as they arise

How Enterprises can deploy

The Alef EdgeNet for Enterprises solution can be easily deployed for your network. Signing up, deploying and managing can be done through Alef's EdgeNet Portal. You can learn more about Alef EdgeNet for Enterprises and how to deploy the solution today by learning more in our Resources section.

For more information on any of the documentation, please contact us, use the search bar or contact your sales representative.