



## 5G is Driving Mobile Edge Computing

Integrated Application Hosting with Extreme Fabric Automation for IP Fabrics enable best in class 5G cloud native infrastructure solution.

New bandwidth intensive applications, such as IoT, Artificial and Virtual Reality (AR/VR) have long been driving the need for bringing computing to the network edge. Now, in a COVID-19 pandemic world, the demand for high-speed connectivity is accelerating and networks have never been more critical than they are right now. Between streaming media and conference calls, service providers must deliver and ensure flawless service delivery. 5G architectures are set to dramatically expand both the number of sites and the volume of IP traffic that needs to be carried across mobile networks.

By nature, fixed and mobile service provider have distributed sites, large and small where various equipment is placed to provide connectivity across rural, suburban areas and cities. In cities we find more enterprises connected to their network, hence larger data centers are needed. The more remote the location – the smaller the capacity and physical size.

Operators have spent lots of money in building out central offices for their network gear and some have older equipment and are not as modern as recently built-up data centers. However, the more things that are connected –

people, cars, trucks, and industrial machines – the more valuable the sites may prove to be. A short distance to the data center where the actual service is executed is often a necessity for many IoT services that have very strict requirements on latency.

In other words, this distributed telco environment is a benefit for taking part in the IoT value chain as well as enterprise on-premises solutions. Many nodes are deployed close to offices or inside factories, warehouses and other locations where data is generated and consumed.

Micro-data centers are the solution and with small physical size and a low number of resources they deliver compute, storage much closer to the user. Think of the impact to CDN and video caching services or software updates for autonomous electric cars.

The best way to address small physical installations is to design integrated systems – integrated as in one system integrating storage, compute, switching and routing, as well as simplifying the applications moving from virtual machines (VMs) to containerized applications. To keep overhead costs down, integrated, automated IP-Fabric management with high availability (HA) is a key ingredient for a micro-data center. Day-0, Day-1 and Day-2 network automation becomes a key feature that allows to deploy and manage 1000s of small fabrics at the edge of the network as well as tenants provisioning and orchestration.

Leveraging Integrated Application Hosting (IAH) that is built-in the network infrastructure enables compute and storage power in micro-data centers and provides enough edge compute power to drive latency sensitive applications for enterprise customers or integration of 1000s of IoT devices.

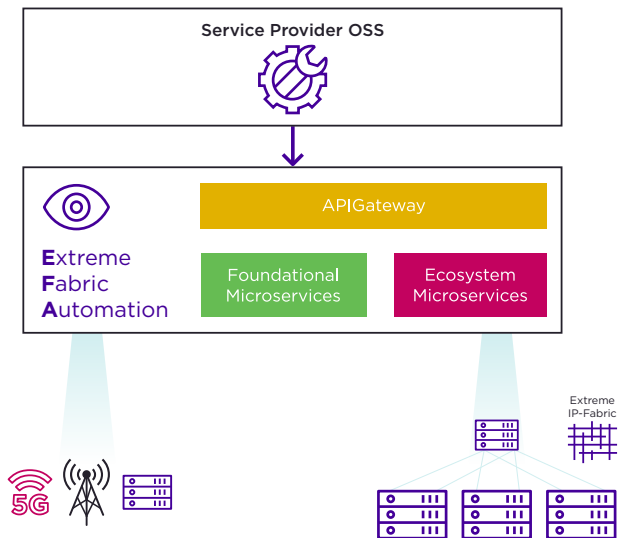


Figure 1: Integrated Application Hosting with Extreme Fabric Automation

Geo-redundancy of equipment is also vital, instead of being over-ambitious in implementing resilience in hardware and software. This means that various sites will work together to make sure the service is always running in case of failure in one specific location.

## Network Transformation Starts With 5G Mobile Edge Computing

Edge computing is as an evolution of cloud computing and brings application hosting from centralized data center down to the network edge, closer to the enterprise and consumer and the data generated by applications. Edge computing is acknowledged as one of the key pillars for meeting the demanding Key Performance Indicators (KPIs) of 5G, especially as far as low latency and bandwidth efficiency are concerned.

However, not only is edge computing in telecommunications networks a technical enabler for the demanding KPIs, it also plays an essential role in the transformation of the telecommunications business, where telecommunications networks are turning into versatile service platforms for industry and other specific customer segments like enterprises. This transformation is supported by edge computing, as it opens the network edge for applications and services, including those from third parties.

## Service Disruption Is Not an Option

With the introduction of 5G and edge computing service providers can provide new offerings to enterprise customers while processes and functions are automated. Edge computing provides distributed computing and storage resources closer to the location where it is needed. It targets new business opportunities that provide support for specific new application use cases like Artificial Intelligence (AI) and Machine Learning (ML).

Customers want reliable application delivery and service providers need to put pressure on their IT staff to address issues as quickly as possible. More compute power in the edge of the network means containers are constantly being deployed faster than IT-staff can manage them. Management tools can be used to automate deployment, troubleshooting and assuring service must be done in an automated fashion. With telemetry data spread across multiple server components, the IT staff needs to process data quickly and gain valuable insights based on visible trends.

The solution here is AI, specifically machine learning, which powers orchestration to deliver predictive and scalable operations across workloads. The combination of real-time network monitoring and ML provides an automated solution for provisioning, instantiating, and configuring physical and virtual network functions quicker and more accurately than if a human carried out the task.

This frees up time for IT staff to spend their time on mission critical, higher-value tasks that contribute to the business.

## Data Processing at the Edge for IoT

With IoT devices soon expected to produce trillions of gigabytes of data daily, the Internet of Things (IoT) is expected to be both the biggest producer and consumer of data. Billions of IoT devices will include components in a variety of uses, including smart city, smart retail, smart vehicles, smart homes, and more. 5G in high bands enabling critical IoT and industry automation as defined in release 16 of the 5G standard.

Edge devices are, in theory, IoT devices – and video analytics and AR/VR will play an important part of the IoT. For example, a face detection workload may be run for a device in a smart city setting, or for checkout in a smart retail shop, or as a part of AR for a private user. IoT workloads will also generally include all the AI workloads in terms of processing a data point.

One specific IoT-related workload is the IoT Gateway. With all the IoT data needing to be processed differently at different latencies for varying purposes, compute capability to process all this data at different locations to fulfill the varying latency requirements is necessary. Thus, the edge cloud is an ideal location for performing such functions.

Data organization and processing will be an important operation at the edge cloud. Fundamentally, data organization entities range widely in complexity, from simple key-value stores that are designed for very fast access to data to complex analytics operations. There will be end-to-end use case providing video surveillance to cities, enterprises or neighborhoods over the network. Edge cloud micro datacenters are used for analyzing video streams from nearby surveillance IP cameras to conduct targeted searches in order to detect, recognize, count and track pedestrians, faces, vehicles, license plates, abnormal events/behaviors and other types of content in the video. Analysis and

processing happen closer to the point of capture, thereby conserving video transmission bandwidth and reducing the amount of data routed through the core network.

## Summary

Service Provider and especially 5G Mobile Operators are forced to push more compute and storage power to the edge of their network. Leveraging their existing distributed geo infrastructure is a great asset. Building up 5G micro data centers - build with Integrated Application Hosting and IP Fabric Management - enable and simplify the management of IP-Fabric networks that deliver the foundation for emerging applications in the 5G eco-system.