

The Drivers and Benefits of Edge Computing

White paper

Dr. Sufian Mousa Mitani
Futurist



“

Introduction

The rapid growth of mobile traffic and costs drive a need to implement changes to maintain the quality of experience, generate revenue, and optimise network operations as well as resource utilisation. The advent of automation with the Internet of Things (IoT) is further congesting the network, and network operators need to do local analysis to ease security and backhaul impacts. After all, enterprises want to enable and engage with their customers with more efficient, secure, and low-latency connections. ^[1]

”

Edge computing helps to transform how billions of devices generate data and are stored, processed, analysed, and transported. Edge computing aims to reduce the bandwidth costs associated with data from where it was created to either an enterprise data centre for private network realisation or the central cloud. Recently, the rise of real-time applications requiring minimal latency, such as autonomous vehicles and multi-camera video analytics, are driving the concept forward; the more the data gets processed locally, the better the quality of experience.

The ongoing global deployment of the [5G wireless](#) standard ties into edge computing because 5G enables faster processing for these cutting-edge, low-latency use cases and applications.

What is edge computing?



At its most basic level, edge computing brings computation and data storage closer to the devices where it is gathered, rather than relying on a central location that can be thousands of miles away. Edge computing is adopted so that data, especially real-time data, does not suffer latency issues that can affect an application's performance. In addition, companies can save money by having the processing done locally, reducing the amount of data that needs to be sent to a centralised or cloud-based location.

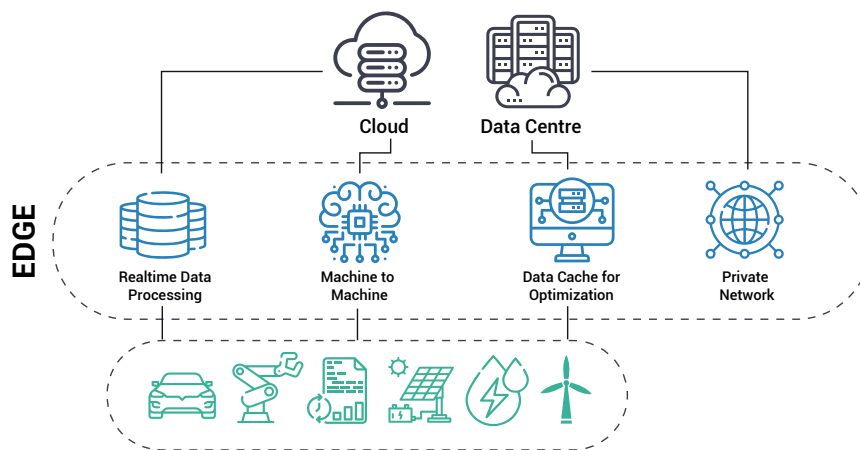


Figure 1: Edge Computing ^[3]

Figure 1 shows the overall use cases addressed by edge computing; think about devices that monitor manufacturing equipment [on a factory floor](#) or an internet-connected video camera that sends live footage from a remote office. While a single device producing data can transmit it easily across a network, problems arise when the number of devices transmitting data simultaneously grows.

Instead of one video camera sending live footage, multiply that by hundreds or thousands of devices. Not only will quality suffer due to latency, but also the bandwidth costs can be very high. By localising this processing at the edge, the quality of experience will improve and lower the cost of the overall solution, thus enabling realising of an optimised network.

Why edge computing and what advantage does it has in 5G?



While edge computing can be deployed on networks other than 5G (such as 4G LTE), the converse is not necessarily true. In other words, companies can only benefit from 5G if they have an edge-computing infrastructure.

Yes, 5G reduces the network latency between the endpoint and the mobile tower. Still, it must address the distance to a data center, which can be problematic for latency-sensitive applications.

As more 5G networks get deployed, [the relationship between edge computing and 5G wireless will continue to be linked.](#)

However, if needed, companies can still deploy edge computing infrastructure through different network models, including wired and even Wi-Fi.

Nonetheless, with the higher speeds offered by 5G, it's always feasible to couple it with edge infrastructure ^{[2] [5]}



How does it work?



The idea is to connect client devices to a nearby edge server for more responsive processing and smoother operations. Edge devices include IoT sensors, an employee's notebook computer, the latest smartphone, security cameras, etc. The figure below shows the data path.

While service providers looking to support an edge network will deploy many edge servers, enterprises looking to adopt a private edge network will also need this hardware. They would need to deploy the edge cloud.

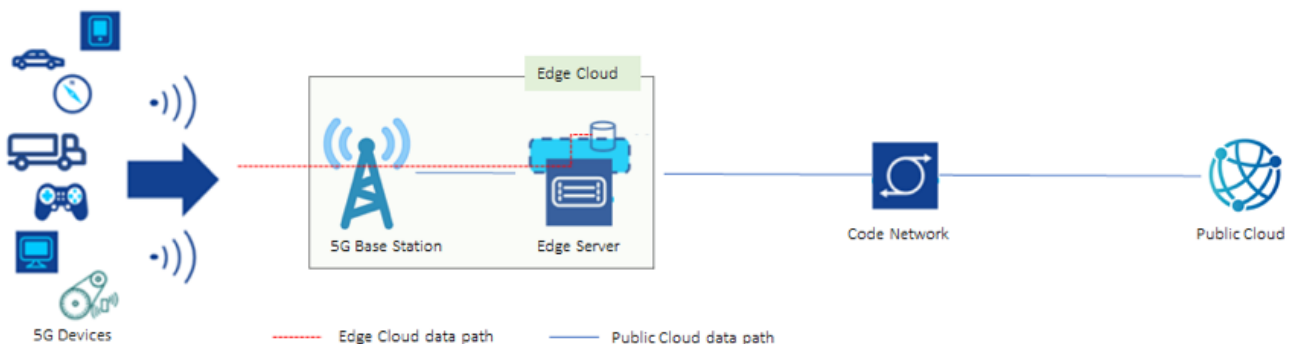


Figure 2: Edge Compute data flow from devices



What are the benefits of edge computing?

For many companies, cost savings alone can drive edge computing deployment. Companies that initially embraced the cloud for many of their applications may have discovered that the costs in bandwidth were higher than expected and are looking to find a less expensive alternative. Edge computing might be a fit.

Increasingly, though, the most significant benefit of edge computing is the ability to process and store data faster, enabling more efficient real-time applications that are critical to companies.

Before edge computing, a smartphone scanning a person's face for facial recognition would need to run the facial recognition algorithm through a cloud-based service, which would take a lot of time to process.

With an edge-computing model, the algorithm could run locally on an edge server, gateway, or even on the smartphone itself.

Applications such as virtual and augmented reality, self-driving cars, smart cities, and even building-automation systems require this level of fast processing and response.



The main benefit of edge computing is reducing the risk of network outages or cloud delays when highly interactive and timely experiences are critical. Below are the three primary attributes of edge:

1. Unparalleled data control

Edge is the first point where the computer taps into the data source and determines how much of the original fidelity is preserved when digitalising the analog signal. Here, we implement what data is stored, obfuscated, summarized, and routed. It's also the point where we can add controls to address data reliability, privacy, and regulations^[4]

2. Favorable laws of physics

Edge is always on and has low latency thanks to reduced network uptime, round-trip times, and bandwidth constraints^[1]

3. Lower costs

Processing at the edge makes cloud upload and storage cheaper. Why pay for full-fidelity data when a summarised view or key insights might be all you need? ^[4]

Conclusion



Edge cloud integrates centralised and distributed architectures: the central core and the edge cloud work hand in hand to enable new experiences. Data is generated or collected in many locations and then moved to the core, where computing is centralised, making it easier and cheaper to process data together in one place and at scale.

Edge computing uses locally generated data to enable real-time responsiveness to create new experiences while simultaneously controlling sensitive data and reducing data transmission costs to the cloud. Edge reduces latency, meaning it lowers response time by doing the work close to the source instead of sending it to the more distant cloud and waiting for a response.

The benefits are exponential when coupled with 5G.

References



1. https://portal.etsi.org/portals/0/tbpages/mec/docs/mobile-edge_computing_-_introductory_technical_white_paper_v1%2018-09-14.pdf
2. http://www.etsi.org/images/files/ETSIWhitePapers/etsi_wp23_MEC_and_CRAN_ed1_FINAL.pdf
3. <https://innovationnetwork.ieee.org/real-life-edge-computing-use-cases/>
4. <https://www.accenture.com/us-en/blogs/cloud-computing/what-you-need-to-know-about-edge-computing>
5. <https://www.networkworld.com/article/3224893/what-is-edge-computing-and-how-it-s-changing-the-network.html>



Creator of Smarter Ecosystems for a better Malaysia

Established in 2000, TM R&D is the innovation arm for TM Group focusing on creating smarter ecosystems to make business and life easier for a better Malaysia. TM R&D's solutions are clustered around four (4) pillars namely Intelligent Platforms, Data Brokerage, Connectivity/Tools and IR4.0/Digital Solutions.

Growing from strength to strength since 2016, TM R&D has won multiple global awards and generated more than 2,800 Intellectual Property Rights (IPRs) and 1,400 digital assets to-date.

TM R&D's innovations are all developed in-house and cut across multiple verticals such as Utilities, Retail, Agriculture, Healthcare and Education with safety and productivity as the top priority.

As TM R&D continues to expand beyond connectivity and into smarter digital ecosystems, its role in TM has become more prominent and exciting.

We are looking for remarkable people to join us. People who are courageous enough to push boundaries, curious enough to experiment with new technologies, and who have the determination to drive new ideas forward. A new opportunity awaits you here in TM R&D.

Be a part of our family at <https://www.tmrnd.com.my/jobs/> or email recruit@tmrnd.com.my

For more information about TM R&D and its products and services, visit www.tmrnd.com.my

