

DRIVE~~E~~NETS

# Edge Networking Solution for Service Providers

WHITE PAPER

# Rapid Adoption of Edge Networking

The networking industry has been undergoing a significant shift toward edge computing as networks increasingly move away from traditional centralized architectures. According to Gartner, over 70% of organizations will deploy hyperscale cloud edge solutions for at least one of their edge computing systems by 2025 compared to under 15% in 2022.

Edge computing offers faster and more efficient data processing, lower latency, and improved application performance. Driven by emerging applications such as 5G, OTT services, artificial intelligence, and deep learning (which is transforming various industries), customer demand for edge computing is growing. Service providers, in turn, are widely adopting edge networks to support this shift.

## Network Edge Use Cases

The network edge usually includes the access layer, aggregation layer, and edge/core routers. It plays a crucial role in providing secure and reliable connectivity between local networks and the internet or the backhaul. There are four main network edge use cases – business services, mobility, aggregation, and peering services. Each use case presents unique challenges for service providers, and requires flexible and scalable solutions to ensure optimal performance.

### Business services

By routing traffic to the nearest edge node, edge routing reduces latency and improves performance. This enables businesses to offer diverse services to their customers, partners and others. Examples of common services are cloud connectivity, VPN services, API gateways, or other SaaS, IaaS and PaaS solutions.

### Mobile network

Mobile applications such as network slicing, OTT services, IoT, and mobile edge computing require advanced virtual protocols, low latency, and high bandwidth to deliver a seamless user experience. Additionally, the primary technology driving mobile networks is 5G. Given the rollout of 5G networks, the number of cell sites has risen significantly compared to previous generations of mobile networks. As a result, service providers' edge networks need to support the increased capacity for emerging mobile backhaul to ensure high network performance.

### Aggregation

Aggregation is the consolidation of traffic from multiple sources into a single location. Edge locations require efficient aggregation of traffic from diverse sources, including mobile networks, branch offices, data centers, and cloud services. This enables service providers to optimize network performance and reduce costs.

### Peering services

Leveraging various interconnect solutions, peering is a vital part of the traffic exchange between different networks at the edge. Service providers are constantly seeking new solutions to optimize traffic engineering policies, enabling them to steer traffic toward the most efficient peering links based on specific criteria. This can significantly enhance the quality of peering connections and reduce their costs.

# Edge Routing Challenges

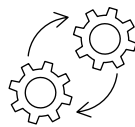
Edge routing plays a critical role in meeting the diverse needs of business customers across various use cases. However, transitioning to a distributed network also creates several networking challenges. Service providers must focus on overcoming these issues to establish a robust and resilient network edge that meets the demands of modern applications and services for the aforementioned use cases.

Service providers face four main challenges when transitioning to the network edge.



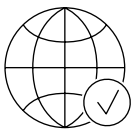
## Elastic bandwidth

Scalability is a critical requirement for edge networks. With the rise of modern applications, these networks must be able to handle an ever-increasing number of devices and applications that generate and consume massive amounts of bandwidth. And as network traffic continues to grow, edge routing solutions must be able to scale dynamically without experiencing service degradation, latency or downtime. An ideal edge routing solution offers unlimited and elastic bandwidth scalability, enabling service providers to meet market demands. In addition, scalable edge networks can help service providers achieve better cost efficiency by optimizing resource utilization and reducing the need for additional infrastructure investments.



## Network operations

Edge networks are distributed where multiple nodes are placed across a wide geographic area. Given that multiple routers carry out a specific task and maintain varied operational requirements (e.g. spare parts, supply chain), edge network management can be daunting. Moreover, each router is usually managed by a different team, making coordination and maintenance even more complicated. And as the number of devices and applications increases, the challenge of managing edge networks grows exponentially. Therefore, service providers require an edge routing solution that offers comprehensive operation and management tools to simplify network deployment and maintenance.



## Network reliability

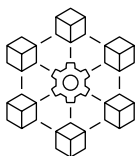
Network reliability is crucial across all network domains and particularly at the edge given its ability to deliver constant high-performance connectivity and fast response times. Such reliability is especially critical for emergency, automotive, augmented reality, and other real-time services. To maintain high performance, service providers must have a reliable infrastructure that handles lightning-fast data transfers with low latency. Even a slight delay in this real-time environment is unacceptable and can lead to lost revenue and customer churn.



## Cost

It's no secret that service providers are losing the monetization battle to over-the-top (OTT) providers and hyperscalers, leaving them with debt for infrastructure investments required to support their business customers. Edge networking plays a crucial role in this area by facilitating new market requirements such as cloud computing, 5G network rollout, and IoT adoption. However, the increased network complexity associated with edge networks comes at a high cost.

To remain competitive, service providers require a solution that simplifies their operations, while enabling new service innovation and lower time to market (TTM) of new revenue-generating services. These improvements will enhance operational efficiency and lower the total cost of ownership (TCO).



## Interoperability

Interoperability is crucial for edge networks since they typically involve multiple hardware elements, communication protocols, and services. It is essential that these devices and technologies work together seamlessly, without limitations or disruptions. A great edge-routing solution should be able to balance the needs of a protocol and service-diverse network, while utilizing hardware elements efficiently. Therefore, service providers require a solution that handles various communication protocols and services, while minimizing additional infrastructure investments.

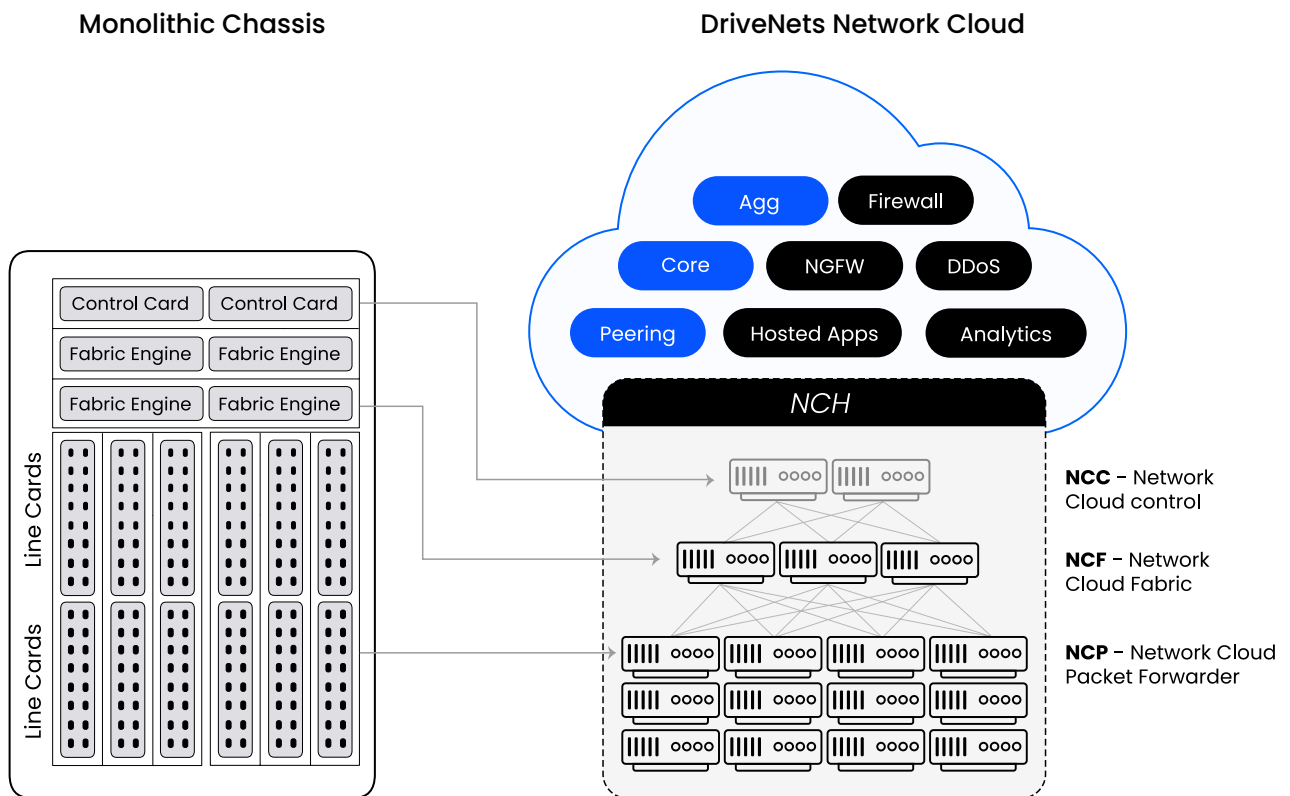
# Solving Edge Routing with DriveNets Network Cloud

The emergence of edge networking has created a new network domain that includes myriad network services. As such, service providers need to navigate through many distinct network entities and teams within their organizations.

DriveNets Network Cloud overcomes this challenge by offering a simple, two-building-block architecture, which sets it apart from traditional network vendors who typically maintain a wide and complex product portfolio. With DriveNets' proven commercial Distributed Disaggregated Chassis (DDC) deployments, DriveNets is positioned as the leading choice for supporting edge networking and its diversity challenge.

DriveNets Network Cloud enables network and cloud operators to build their networks like clouds, which involves adapting cloud architecture principles to network design. Principles such as separation (disaggregation) of software and hardware, use of standard white boxes, virtualization and the ability to run multiple and diverse applications over one shared pool of resources, all been utilized, to create a new way to build networks.

Unlike traditional monolithic chassis, DriveNets Network Cloud enables service providers to build and operate their edge networks as a single cluster with multiple network entities sharing the same resources. This approach delivers superior performance and simplicity, while offering unmatched agility and scalability.



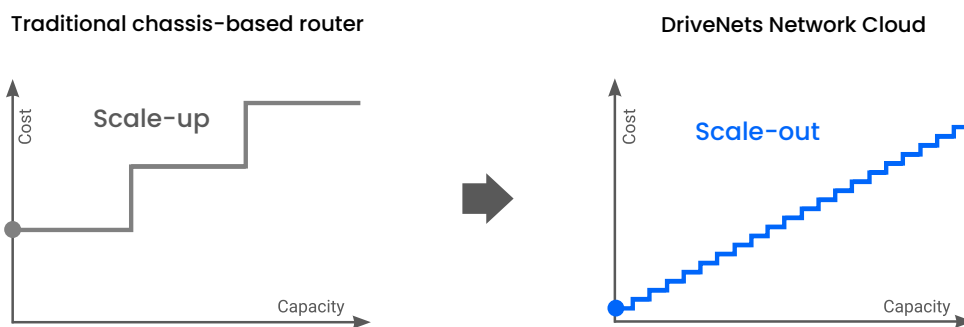
*DriveNets Network Cloud Distributed and Disaggregated Chassis*

# Key Capabilities of DriveNets Network Cloud

To better understand better how DriveNets Network Cloud addresses the edge routing challenge, here is a review of its key capabilities.

## Cloud scalability

Given the increasing number of connected devices and diverse business services, service providers require a cloud-like elastic network solution that can flexibly resize its resources in response to changing network demands. DriveNets Network Cloud is a dynamic solution that addresses this challenge. By building networks like a cloud, DriveNets can support any capacity requirement, while its distributed and disaggregated chassis concept empowers service providers to abstract any network entity into a cluster of standard white boxes. As a result, by simply adding or removing boxes, service providers can incrementally scale up or down their edge clusters to anywhere between 2.4T and 691Tbps. With DriveNets Network Cloud, service providers can dynamically allocate resources to their edge networks based on real traffic requirements, making network scalability both easy and cost-effective.



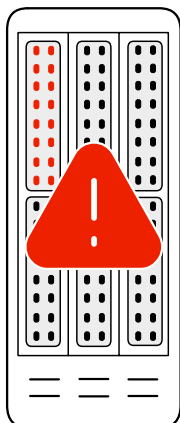
## Carrier-grade solution

Since edge networks are built to provide fast response times, availability and performance at the edge are critical. Any performance change at the edge significantly impacts automotive, VR, medical, and other time-sensitive services, which can lead to customer churn and lost revenue. Therefore, service providers constantly strive for a proven reliable solution with high availability and fast recovery.

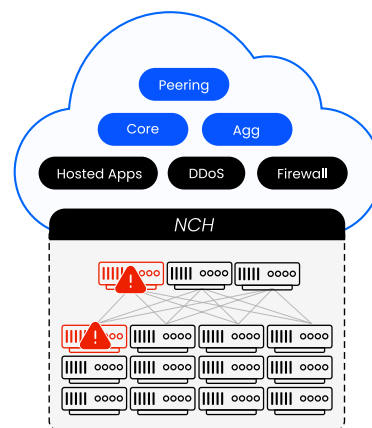
- **High availability and fast recovery**

DriveNets Network Cloud ensures network performance and high availability by leveraging inherent redundancy. This includes built-in redundancies at the hardware level through a disaggregated router model along with isolated microservices on dedicated containers at the software level to enable seamless operations even during failures. In addition, the disaggregated router model facilitates fast recovery by enabling immediate replacement of any white box while not having to schedule maintenance windows, thereby minimizing the costs and burdens related to traditional router chassis replacements.

Chassis-based Router



DriveNets Network Cloud



*DriveNets Network Cloud can operate seamlessly even if a component fails as opposed to traditional monolithic routers that may require replacing the entire chassis.*

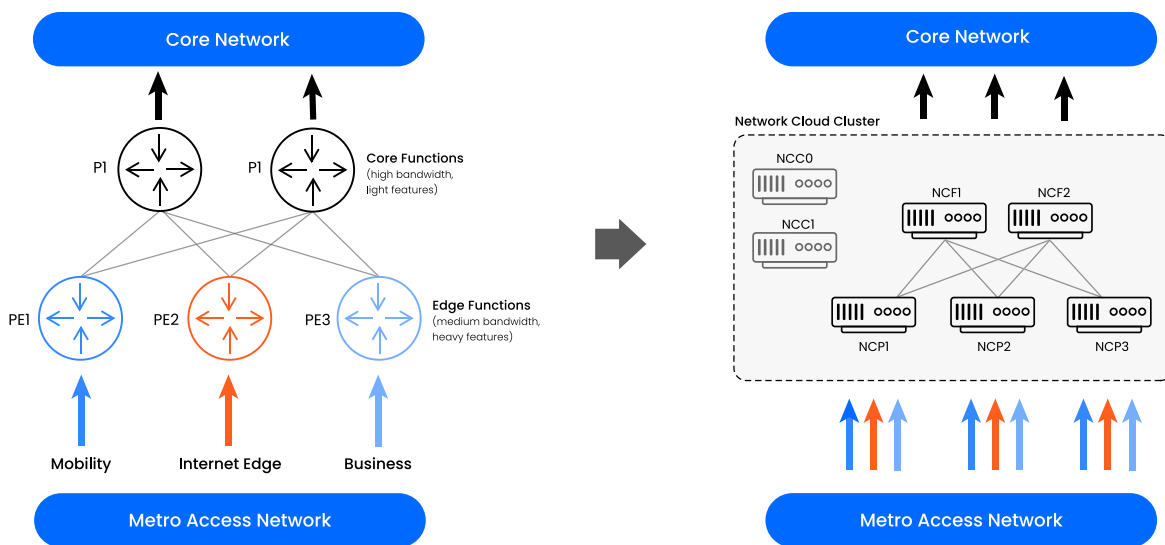
- **Experience matters**

DriveNets Network Cloud powers the world's largest DDC network, with more than 52% of AT&T's traffic running on it. DriveNets' proven DDC architecture experience means that service providers can enjoy the innovative cloud-like flexibility and agility critical to edge networking, while ensuring constant high performance and availability.

## Multi-service cluster

Traditional edge networks aggregate various services by using single service peering edge (PE) routers, with each one having its own set of operational environments and teams. This setup, however, can lead to resource isolation, low resource utilization, and slow innovation cycles for new services.

DriveNets' multiservice platform enables the hosting of multiple network use cases, including third-party applications and network functions on the same shared network resource. With multiservice clusters, service providers can build a single network entity that hosts multiple routers while utilizing the same underlying hardware and sharing existing resources. This enables them to build the perfect edge network through the following capabilities.



*Transforming single service routers into one large multiservice cluster that hosts multiple routers utilizing the same networking and compute resources.*

### Service resources and protocols

Traditional edge networks face challenges in sharing and utilizing resources among multiple single-service routers that form the edge network. DriveNets' multiservice architecture overcomes this by completely virtualizing cluster resources to enable any port to access any service and use any required hardware resource. Moreover, due to the architecture's unified design process, all network elements support all protocols and features, including EVPN, IPVPN, and IRB.

DriveNets also enables service providers to build ultra-flexible clusters that run multi-router software and utilize networking interfaces between 1G to 800G. This hybrid-cluster architecture helps service providers meet the demands of diverse use cases and traffic requirements at the edge.

### Optimal infrastructure utilization

Traditional edge networks often rely on monolithic routers and clos architecture, thereby requiring service providers to maintain and operate multiple components. This not only creates operational chaos, but also leads to unutilized hardware and the loss of 30% of port line

cards for intra-site connectivity (connecting the different physical routers within the same PoP).

DriveNets' multiservice architecture overcomes these challenges while providing optimal resource allocation. Rather than adding more physical routers to the network, the architecture enables the installation of additional containerized service instances (SIs) on existing hardware. The cluster hypervisor then allocates the necessary resources for each service to reduce the overall amount of required hardware resources to decrease operational overhead.

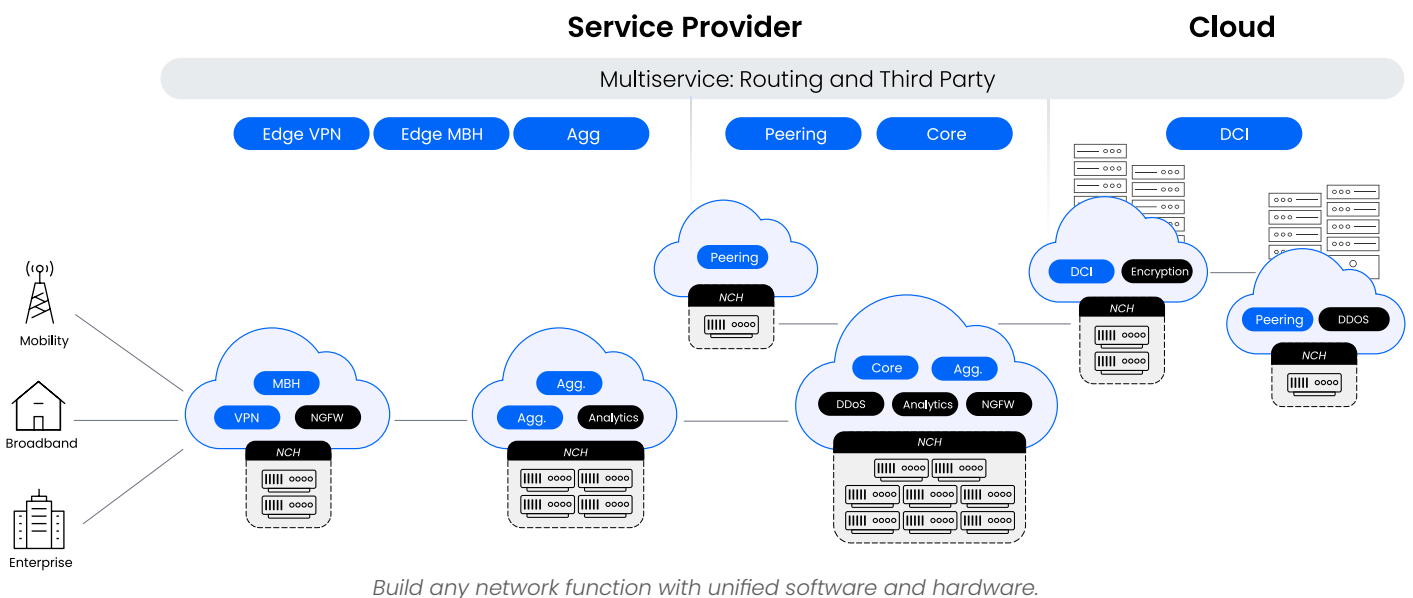
### Faster innovation of new services

The multiservice architecture goes beyond grouping existing network functions under one roof. With decoupled data and control planes, new network related services can be added to existing cluster resources by containerizing them and interfacing with Network Cloud's open API for optimal performance. This enables easy and fast introduction of new services with the simple click of a button, reducing time to market (TTM) of new revenue-generating services. Examples: from VPNs and IoT control functions to unique services aimed at increasing ARPU and preventing user churn.

## Streamlined operations

Traditional routing solutions involve the use of 5-to-20 types of boxes, multiple line cards, and other modules to make the operational process counterproductive for service providers. As such, they must maintain and operate multiple routers servicing different access services, invest in underpopulated boxes, and deal with complicated spare parts and procurement management across multiple remote locations.

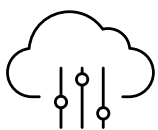
DriveNets Network Cloud takes a different approach to network architecture by relying on only two standard data plane building blocks (NCP and NCF) rather than multiple and diverse chassis-based routers with various line card models. This enables service providers to support the diversity of performance, protocols and services required by end consumers. It also eliminates the need for forklifting and for complicated maintenance operations at remote locations. Instead, service providers simply replace a white box to reduce operational complexity and enjoy greater flexibility.



## Build a More Flexible, Reliable and Cost-Effective Edge Network

Traditional monolithic networking solutions cannot meet the diverse needs of business customers efficiently. As such, service providers need to juggle multiple single-service routers at the edge and rely on complicated clos topology. DriveNets Network Cloud is a proven carrier-grade solution with high performance and reliability. It provides true elastic bandwidth for dynamic edge networking and simplifies operations by relying on only two types of white box building blocks.

DriveNets Network Cloud helps service providers overcome the key challenges of transitioning to the network edge, enabling them to build a more flexible, reliable and cost-effective edge network.



### Cloud Scalability

Dynamic allocation of resources based on real traffic requirements



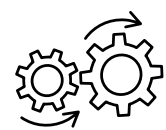
### Carrier Grade

Battle-proven solution with high availability and fast recovery



### Multi-Service Cluster

Multiple and diverse router support with the same hardware resources



### Streamlined Operations

Network function support using only two types of standard white boxes

# DRIVENETS

DriveNets is a leader in cloud-native networking software and network disaggregation solutions. Founded in 2015 and based in Israel, DriveNets offers service providers and cloud providers a radical new way to build networks, substantially growing their profitability by changing their technological and economic models. DriveNets' solution – Network Cloud – adapts the architectural model of cloud to telco-grade networking. Network Cloud is a cloud-native software that runs over a shared physical infrastructure of standard white-boxes, radically simplifying the network's operations, offering telco-scale performance and elasticity at a much lower cost.

For more information, visit us at [www.drivenets.com](http://www.drivenets.com)