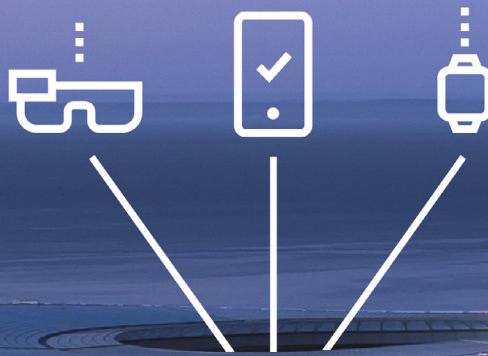# Embrace the 5G edge opportunity

Ericsson Local Packet Gateway

March 2022

5G takes edge applications to the next level

5G enables a myriad of new use cases for edge. It brings great potential to take edge and its consumer and enterprise applications to the next level by connecting and more tightly integrating and for edge computing capabilities.

Ericsson helps communications service providers (CSPs) to take a pragmatic approach towards virtual private 5G and hybrid private 5G networks. While the edge market is evolving with multiple standards and go-to-market models, a business-case-driven approach is required to monetize network capabilities and justify new investments.

Connectivity is the base for CSPs to address the edge opportunity. CSPs are looking towards the edge segment and positions building on connectivity to tap into the new growth opportunities in B2B and B2B2X segments. CSPs have relevant assets to leverage there, including strong relationships within the enterprise segment as well as the extended footprint of network assets.

Among these network assets, edge user planes play a crucial role in enabling virtual private 5G (including network slices) and hybrid private networks. With hybrid networks, CSPs can take full advantage of the user plane and application server being located on-premises.
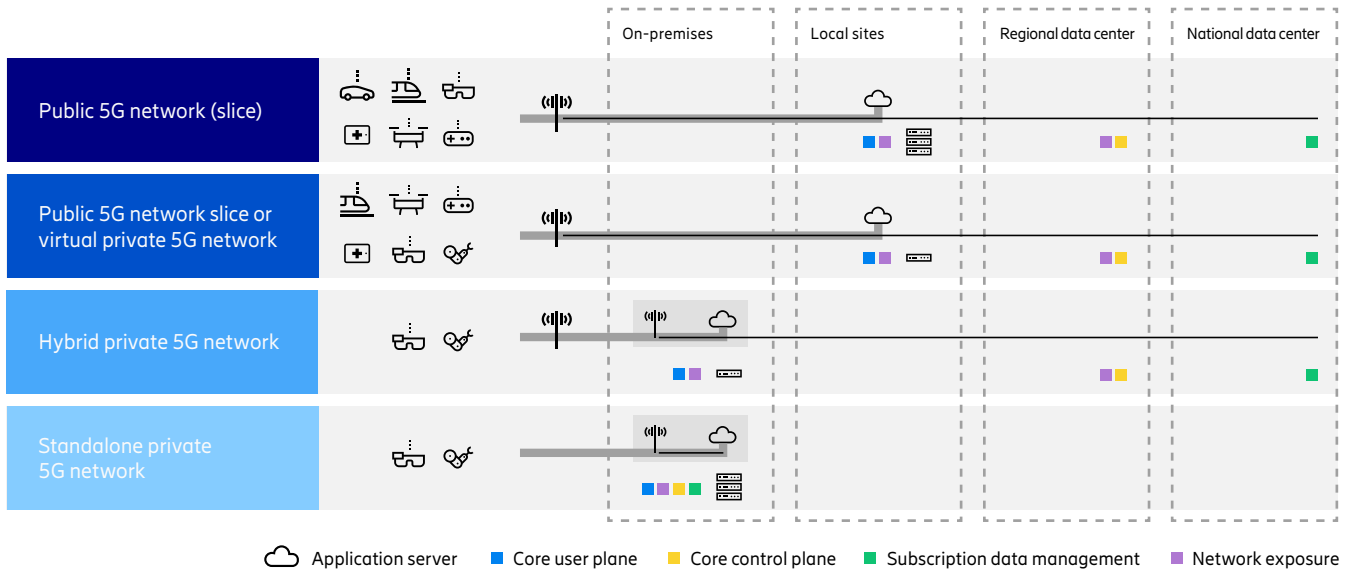
Figure 1: Edge use cases and edge market momentum

Use cases (non-exhaustive)	General overview	Private edge	Network edge
CDN-related cases	Latency: 100ms–1s+. Bandwidth: high	● Higher	● Higher
Video processing	Latency: 100–200ms. Bandwidth: high. Safety and regulations	● Higher	● Higher
Manufacturing, heavy industry plants applications	Latency: 1ms–1s. Bandwidth: variable. Reliability, regulations, data privacy	● Higher	● Very low
Business park and city offices, retail shops	Latency: 30ms–1s. Bandwidth: variable. Reliability, safety	● Higher	● Higher
Cloud gaming services	Latency: 30ms–1s. Bandwidth: variable. Reliability, safety	● Very low	● Higher
Data collection and processing (including AI/ML)	Latency: 100ms–1s. Bandwidth: high. Data processing distributed	● Higher	● Higher
Autonomous vehicles	Latency: 10–100ms. Bandwidth: mid/high. From private cars to AGVs	● Higher	● Higher
XR (AR/VR/MR)	Latency: 10–50ms. Bandwidth: high. Availability and complex processing	● Higher	● Higher

Application placement location, short- to mid-term: ● Higher probability/deployment ratio   ● Lower probability/deployment ratio   ● Very low probability/deployment ratio

Figure 2: Different types of 5G network distribution

	On-premises	Local sites	Regional data center	National data center
Public 5G network (slice)		Application server; Core user plane, Network exposure, Core control plane	Network exposure, Core control plane	Subscription data management
Public 5G network slice or virtual private 5G network		Application server; Core user plane, Network exposure, Core control plane	Network exposure, Core control plane	Subscription data management
Hybrid private 5G network	Application server; Core user plane, Network exposure, Core control plane		Network exposure, Core control plane	Subscription data management
Standalone private 5G network	Application server; Core user plane, Network exposure, Core control plane, Subscription data management			

Legend: ☁ Application server   ■ Core user plane   ■ Core control plane   ■ Subscription data management   ■ Network exposure

To realize the edge market potential, CSPs need to deploy a local user plane to reduce the latency and route the traffic to edge applications. CSPs can monetize and re-use their existing assets, such as packet core and radio investments.

In order to address enterprise edge needs, CSPs have to consider the following requirements:
- low-footprint user planes to enable edge use cases
- high deployment and integration costs
- scaling and automation of distributed UPF instances

Why Ericsson Local Packet Gateway?
Ericsson Local Packet Gateway is designed to meet CSP challenges, enabling a small-size user plane built for high levels of network distribution that can be deployed within a few hours with minimal intervention.

This solution is part of the market-leading Ericsson Cloud Core portfolio, and leverages both the cloud-native core deployment experience and knowledge of enterprises' private 5G solutions.

Ericsson Local Packet Gateway characteristics

Ericsson Local Packet Gateway provides a single-unit, single-server user plane designed for use on-premises and edge applications.

Designed end-to-end as an all-in-one solution comprised of hardware, infrastructure, application and lifecycle management (LCM), Ericsson Local Packet Gateway brings a dual-mode user plane function with an optimized footprint, competitive characteristics, and low total cost of ownership (TCO).

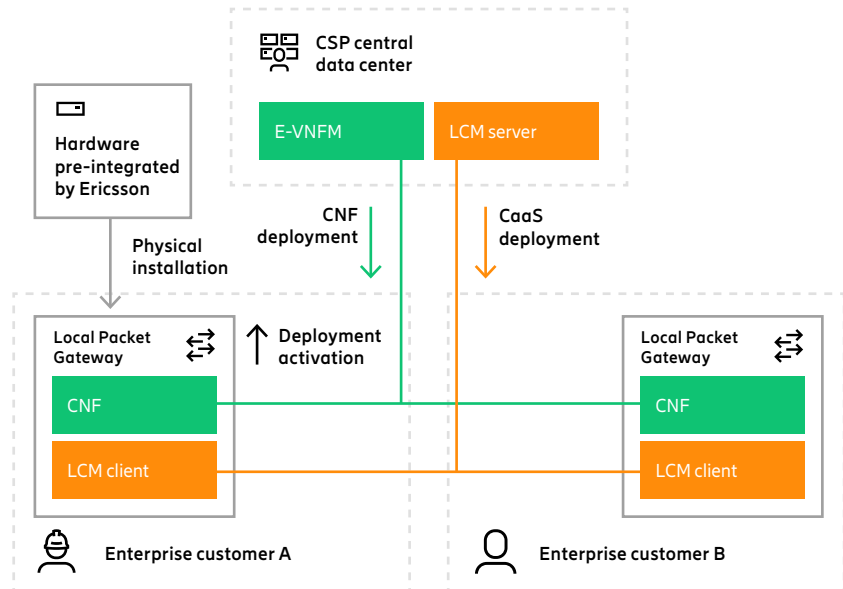**Figure 3: Ericsson Local Packet Gateway product overview**
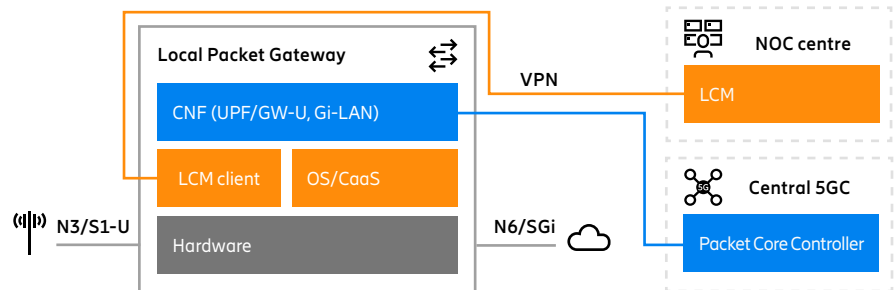
Simple and easy to deploy
The integrated LCM system allows a deployment concept with minimal on-premises intervention. After a triggered activation, a few defined steps in the CSP's network operation center result in Ericsson Local Packet Gateway being ready to carry traffic within hours without on-site specialist staff present.

Ericsson Local Packet Gateway reduces the complexity for both CSPs and their enterprise customers with an all-in-one product that is simple to onboard and manage, decreasing both the time to revenue and the time taken to scale up the network.

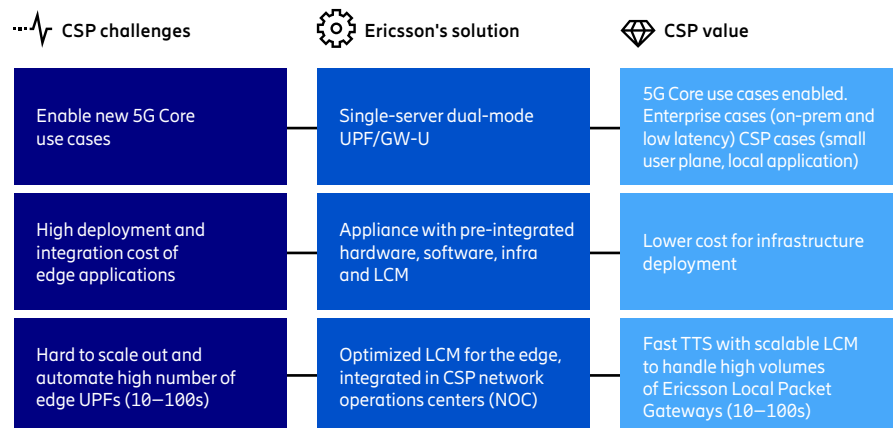**Figure 4: Ericsson Local Packet Gateway deployment concept**

The benefits of small-size user planes built for high levels of network distribution
Ericsson Local Packet Gateway meets CSP challenges with these three value pillars:
1. Low-footprint user plane to enable edge use cases: low-latency, local usage of data and on-premises use cases.
2. Low deployment and integration cost via an all-in-one pre-integrated appliance.
3. Lower cost for infrastructure deployment and shorter time-to-service (TTS) for edge use cases.

Figure 5: Ericsson Local Packet Gateway value proposition

CSP challenges	Ericsson's solution	CSP value
Enable new 5G Core use cases	Single-server dual-mode UPF/GW-U	5G Core use cases enabled. Enterprise cases (on-prem and low latency) CSP cases (small user plane, local application)
High deployment and integration cost of edge applications	Appliance with pre-integrated hardware, software, infra and LCM	Lower cost for infrastructure deployment
Hard to scale out and automate high number of edge UPFs (10–100s)	Optimized LCM for the edge, integrated in CSP network operations centers (NOC)	Fast TTS with scalable LCM to handle high volumes of Ericsson Local Packet Gateways (10–100s)

Ericsson Local Packet Gateway: Use cases

5G edge enhances the experience of existing mobile broadband use cases, such as gaming or media infotainment. It will enable new consumer offerings requiring immersive experiences (such as XR gaming or the Metaverse marketplace) and decentralized internet (for example, Web 3.0-enabled consumer banking).

Hybrid 5G private networks offer network-wide area coverage for enterprise use cases such as event venues, mission-critical communications, drones or autonomous vehicles.

They also represent a cost-efficient alternative to standalone 5G private networks, even for use cases demanding stringent performance such as Industry 4.0.

Such use cases require an existing central Packet Core that supports 5G network slicing, ultra-low latency and reliable features, and can also route device traffic from existing macro and/or dedicated RAN to a local user plane collocated with the edge application. The local user plane

connectivity should be highly robust and may include any Gi-LAN function such as network probing, CGNAT or Firewall. In addition, as the edge ecosystem evolves to 5G, it is important that solutions support 4G connectivity and easy migration to 5G.

Ericsson Local Packet Gateway provides all the application and platform capabilities for CSPs to offer 5G edge use cases with the lowest TTS and cost. The following use cases have been discussed or prototyped with Ericsson customers.

Example use case: Sport event

Ericsson Local Packet Gateway can be applied in event venues, for example at sports events where CSPs or event organizers can offer premium content to consumers in real time and on demand, such as football match statistics, live scores or video replays.

The video application server and Ericsson Local Packet Gateway can be deployed on-premises or at the CSP edge to provide data privacy and low latency. CSPs can configure an end-to-end network slice, partitioning the macro-RAN resources and routing only the premium application content from smartphones through the Ericsson Local Packet Gateway using Dynamic Network Slice Selection, offloading Ericsson Local Packet Gateway from the remaining device traffic.

Figure 6: Sport event use case enabled by Ericsson Local Packet Gateway
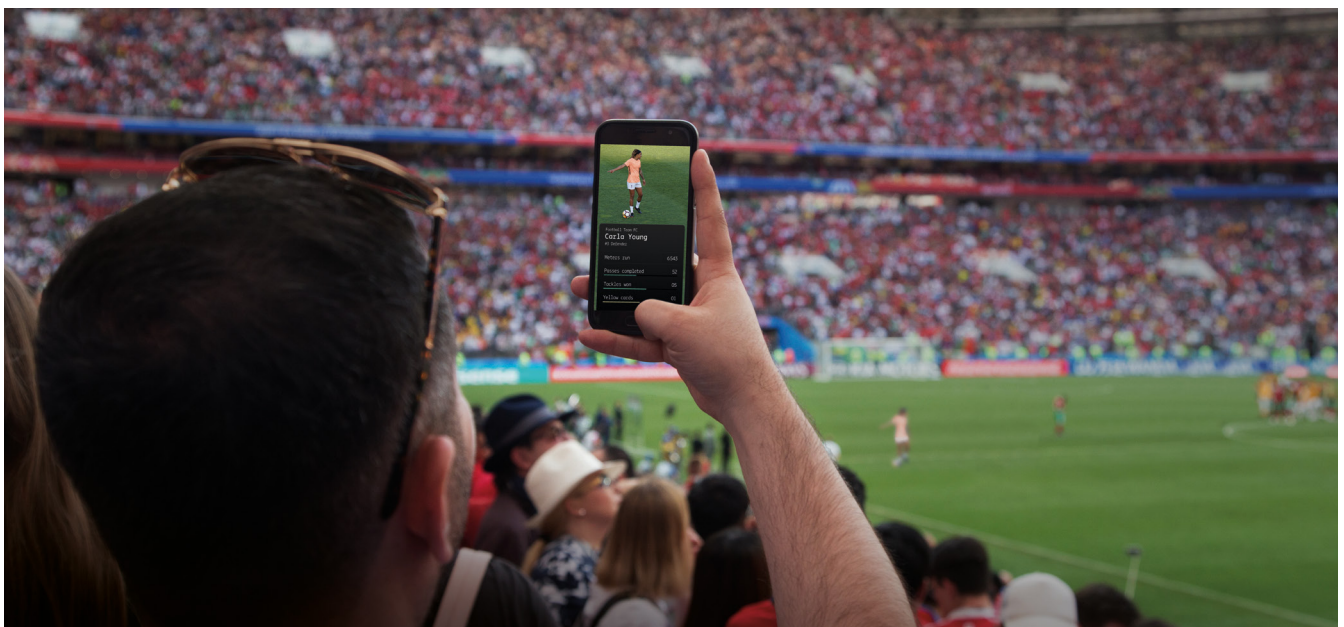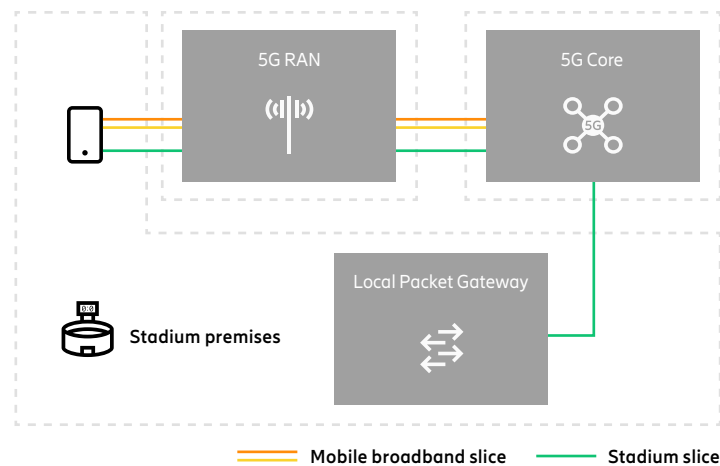
Example use case: Virtual reality gaming

Mobile gaming is a fast-growing and high-revenue consumer market, which is evolving to include XR and demands a high throughput and low to ultra-low latency in the range of milliseconds, which is key for time-critical communications.

CSPs can offer premium gaming services by deploying the gaming application and Ericsson Local Packet Gateway in their edge location or CDN edge whilst setting a 5G slice with ultra-low-latency quality of service (QoS).

Figure 7: Virtual reality gaming use case enabled by Ericsson Local Packet Gateway
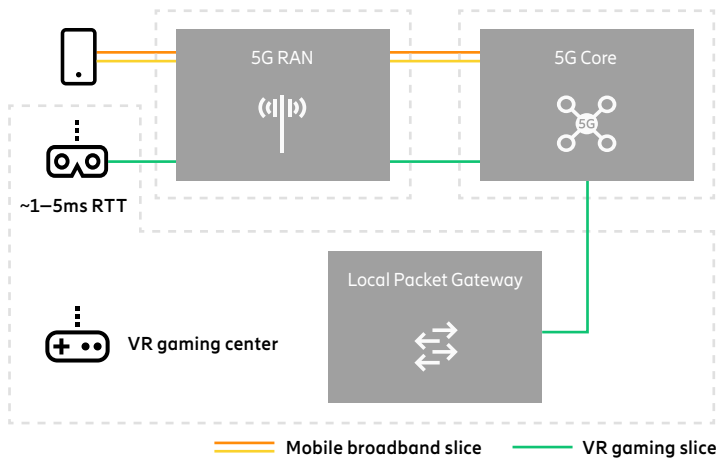
Example use case: Augmented reality for factory quality inspection

5G edge will enable remote maintenance in manufacturing, dramatically reducing the enterprise cost, such as the number of on-site quality inspections.

Different types of sensors and cameras installed in the manufacturing plant

will stream real-time data to an image- and AI-processing application deployed on-premises. Such critical communication is realized by a dedicated network slice and an Ericsson Local Packet Gateway deployed in a highly available

manner and collocated to the application. Ericsson Local Packet Gateway provides ultra-reliable and low-latency 5G QoS, firewalling and integrated probing for service monitoring.

Figure 8: Augmented reality for factories enabled by Ericsson Local Packet Gateway
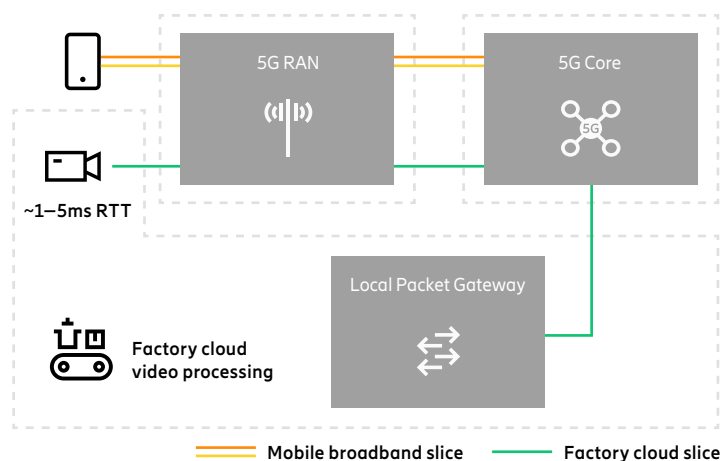
Summary

Ericsson Local Packet Gateway makes the edge user plane a real source of new revenues and use cases, pushing one step ahead into 5G's full potential. Designed to be easy to

deploy and manage, with an optimized footprint as well as a wide range of features tested in the field, CSPs can serve both their enterprise customers' use cases and the new, demanding

applications that technological evolution demands. Our solution offers all of this, while leveraging on CSPs' existing investments in radio and dual-mode 5G Core.

About Ericsson

Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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