

**NTT Data**  
Trusted Global Innovator

# 5G

ENABLING FABRIC



## The essential first step for Telcos aiming to be primary business partners for enterprises

A cloud native technology platform for a growing range of innovative, high performing and secure business services

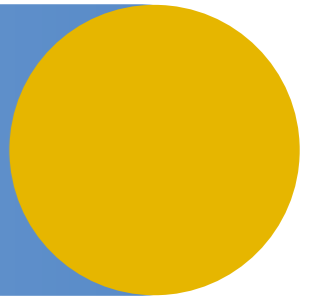
NTT DATA 5G Enabling Fabric (5GEF) enables Telcos and MNOs to maximize the potential of emerging 5G technology. 5GEF makes it possible to configure, provision and deploy highly customized business services, defined by end users and targeted to precise business needs, with the speed and simplicity we now associate with hyperscale cloud.

## What is 5G Enabling Fabric?

5GEF is a cloud-based platform specifically designed for configuring and delivering business services to enterprise customers.

NTT DATA's solution provides Telcos and MNOs with a modular platform for deploying business applications provided by any relevant vendor, to virtually any location worldwide, as easily as opening an account with a mainstream SaaS provider.

A slice-oriented architecture supports delivery of secure, dedicated services on a global shared platform, while an abstraction layer enables customer self-selection for automated launch of configurable use cases.



## Moving up the value chain, owning key customer relationships

Previous technology breakthroughs in the telecommunication and mobile communications space have proved highly profitable for applications vendors and content owners, especially in the B2C space. MNOs and other Telcos, by contrast, have seen no rise in their profitability and are sometimes treated as little more than commodity bandwidth providers.

**5G technology, with its exponential growth in capacity and much lower latency, has the potential to change all that.**

It can deliver business services to virtually any location, creating collaborative working environments, facilitating creative partnering and accelerating business initiatives.

By establishing an enabling fabric, Telcos can facilitate the strategic business partnering that enterprises need today and into the future.

5GEF is agile and scalable by design, giving business users a true cloud experience, but with mobility and global reach built in as standard.

## NTT DATA is a true game changer for Telcos and MNOs

### What's new about 5GEF?

Conventional business services have traditionally been delivered through dedicated instances of specific applications. These are normally based on proprietary IP, managed via annual licenses, delivered from either an on-premise server farm or now, more usually, from a private environment hosted on a virtualized datacenter, owned and managed by a hyperscale cloud provider.

Different locations are linked through connectivity that combines everything from Internet to existing MPLS to mobile circuits, with secure tunnels connecting hardened end points and edge devices. For fast-moving enterprises, this presents a lot of operational headaches.

Setting up new services on a cloud platform can be managed at high speed, depending on the levels of customization needed. Yet the all-important connectivity needed to manage a complex enterprise ecosystem as a single entity remains costly, sometimes unreliable and difficult to manage. That is what NTT DATA 5GEF changes, and that is why it is a true game changer for Telcos and MNOs.



### Competitive advantage and customer focus

For business users, 5GEF is the key to an highly intuitive, simple and cloud-like experience, as they define and implement the services that meet their own, often highly-specific needs. The key components in service delivery are:

#### Customer portal

Users can use this on a self-serve basis, identifying use cases, configuring through an intuitive GUI, applying their own business rules and then going live as agreed with their own management practices.

#### Orchestration and mash-up

Resources within the scope of the services are identified and orchestrated, combining different applications and other capabilities within the orchestration layer, for presentation as a complete use case to the user.

#### Operator domain

Deployment is then managed by the Telco or MNO, which acts as cloud service provider, delivering access to the resources specified in the chosen use case to any location. Network slicing is used to deliver secure environments for each business customer across the shared resource base. Connectivity, based on fixed and mobile end points, is brokered via SDN / NFV coordination (Software Defined Networks / Network Functions Virtualization). This enables secure hybrid connectivity that will mesh-connect almost any end point to any other.



# Delivering customer benefits- fast and at low risk

5GEF turns an extended communication network into a truly programmable environment, in which resources can be mixed and matched, customized and deployed with unprecedented speed and simplicity.

## Reduced TCO

5GEF removes an entire layer of capital investment from end user customers, cutting software licensing costs, as Open Source and 3rd Party licensed applications are combined, with the number of instances greatly reduced. As services delivered via 5GEF are normally provided on a SaaS basis, customers can expect their service to stay at best practice level with no need for capital investment from them.

## Cloud like experience

Most large to medium sized enterprises already know how to provision targeted services in the cloud, so they will find the intuitive user interface within the NTT DATA provided customer portal easy to use and highly secure. Operators will be able to deliver a complete end to end experience for customers with just a few clicks, building on their own and partner owned infrastructure.

## Improved collaboration

Most enterprises now depend on an ecosystem of partners and collaborators, and breaking the barriers between working across corporate boundaries is always an issue for agile working. Virtual collaborative workspaces, scalable, flexible and rapidly evolving, are a design feature of 5GEF, enabling more secure, agile joint working, everywhere.

## Extending cloud

Though 5GEF uses hyperscale cloud resources, it extends and adds value to normal cloud services. That's because the whole network is now programmable and intelligent, so fast provisioning goes beyond service definition and embraces all available locations, including mobile services.



# Building on open standards and products



## Network slicing

Network resources (data network, radio and core signaling) can be organized as slices, through the virtualization technologies within software components (NFV) and their software-defined description (SDN).

Each slice comprises a set of network function instances, dynamically created as virtualized, then assigned to Customers according to their requirements. 5GEF is able to orchestrate the processes related to creation, deployment and activation of network slices, and does this automatically, with fast delivery (zero touch) procedures. All actions are based on 3GPP endorsement and standard compliance.

## Hybrid environments

Most operators are not yet fully 5G ready, so the NTT DATA solution uses open APIs to enable creation of extended, hybrid platforms. This approach uses IP connectivity and existing MPLS circuits to build integrated mesh-based networks that integrate 5G, where available, and other connectivity to deliver services.

## Edge datacenters

5G networks enable interaction with Customer devices and on-premise equipment, delivering high performance in speed of response, bandwidth and number of simultaneously registered endpoints per square kilometer. 5G networks can also manage control and data plane functionalities located in proximity to Customer locations or mobile devices. Edge datacenter infrastructure can therefore be part of a 5G ecosystem and work as computing resources close to radio access infrastructures. 5GEF capabilities support deployment of Edge datacenter and proximity (Multi-Access Edge Computing, MEC) applications with network slicing policies. As 5G roll out continues, this approach will progressively increase due to evolved IoT-based devices (sensors, automotive technology), based on site locations and able to manage service access without the need for a cloud partner.

## Network as cloud

5GEF turns the Telco or MNO network into a cloud platform, which combines all the ease of use benefits that hyperscale cloud provides, including fast set-up, almost limitless scalability, pay as you go commercial approach, cloud-store type provisioning.

5GEF now adds global presence, mobility services and a huge rise in accessibility, driven by 5G's ability to connect up to 100,000 devices in a square kilometer. This will potentially enable Telcos and MNOs to supersede cloud specialists as the primary service contact for enterprises.

# Key Features

5GEF paradigm is built from:

- Customer portal** to enable rapid configuration of required services.
- Applications mash-up**, providing access to service components in a range of configurations and use cases.
- API Exposure** for interface to a wide range of network resources.
- Virtualized deployment** (NFV model, OpenStack suite as de-facto standard technology), with multi-tenant access control, for resource and security management, together with enablement of SD-WAN and VNF, delivering mesh capability and ensuring automated scaling and QoS.
- Slice Management** to meet multiple customers' needs on the same technological platform.
- SDN** dynamic inventory for flexible orchestration algorithms and resource allocation.
- Multi-Access Edge Computing** support, to ensure access to all required applications close to the locations and devices used by customer personnel.

In this model we see that 5G core components, application layer and management tools are held in an operator datacenter. The Operator's core network elements may be located in a centralized datacenter, or in an Edge datacenter for local connectivity features (low latency and high bandwidth).

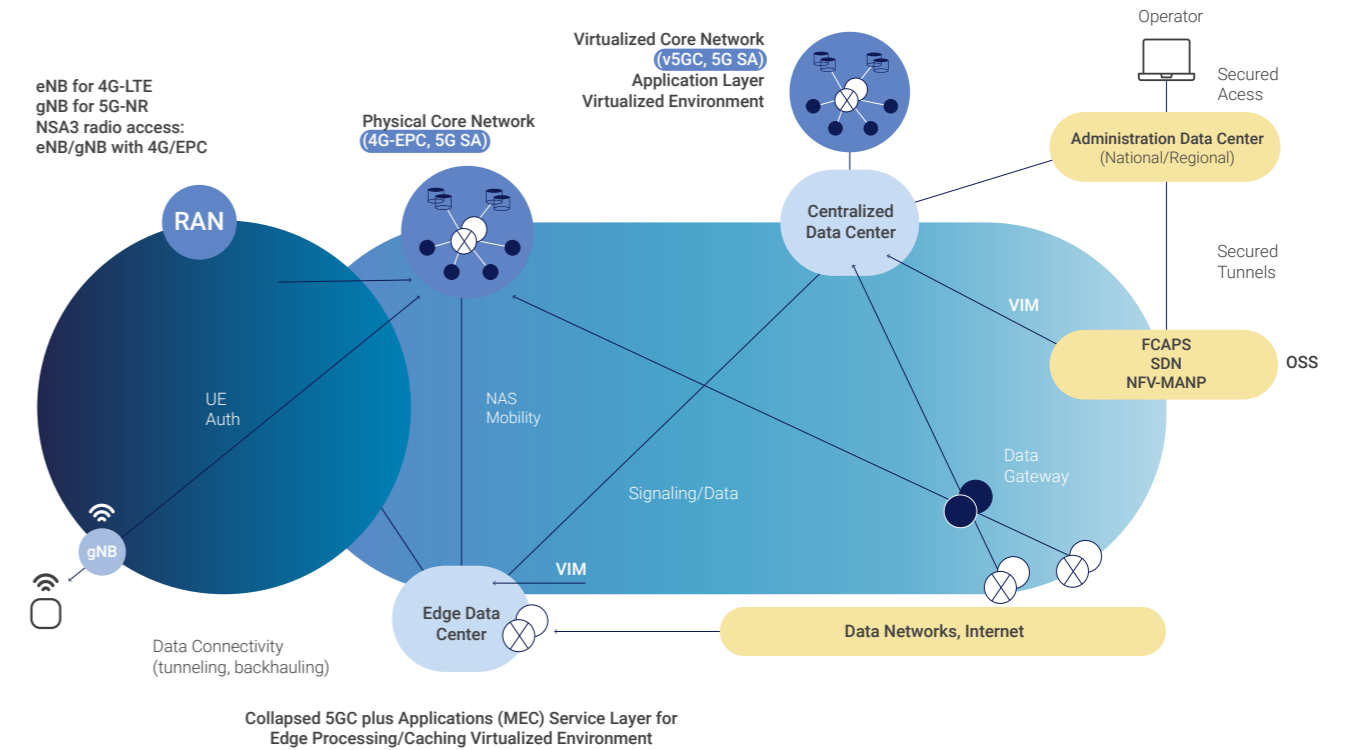
Applications for use cases can share the same datacenter platform, with separated tenancies and routing rules, aggregated

and optimized to make most efficient use of resources. 5GEF can offer access to customer-side administrators through a front-end presentation layer: the Customer Portal, enabling customers to choose their use case for automated deployment.

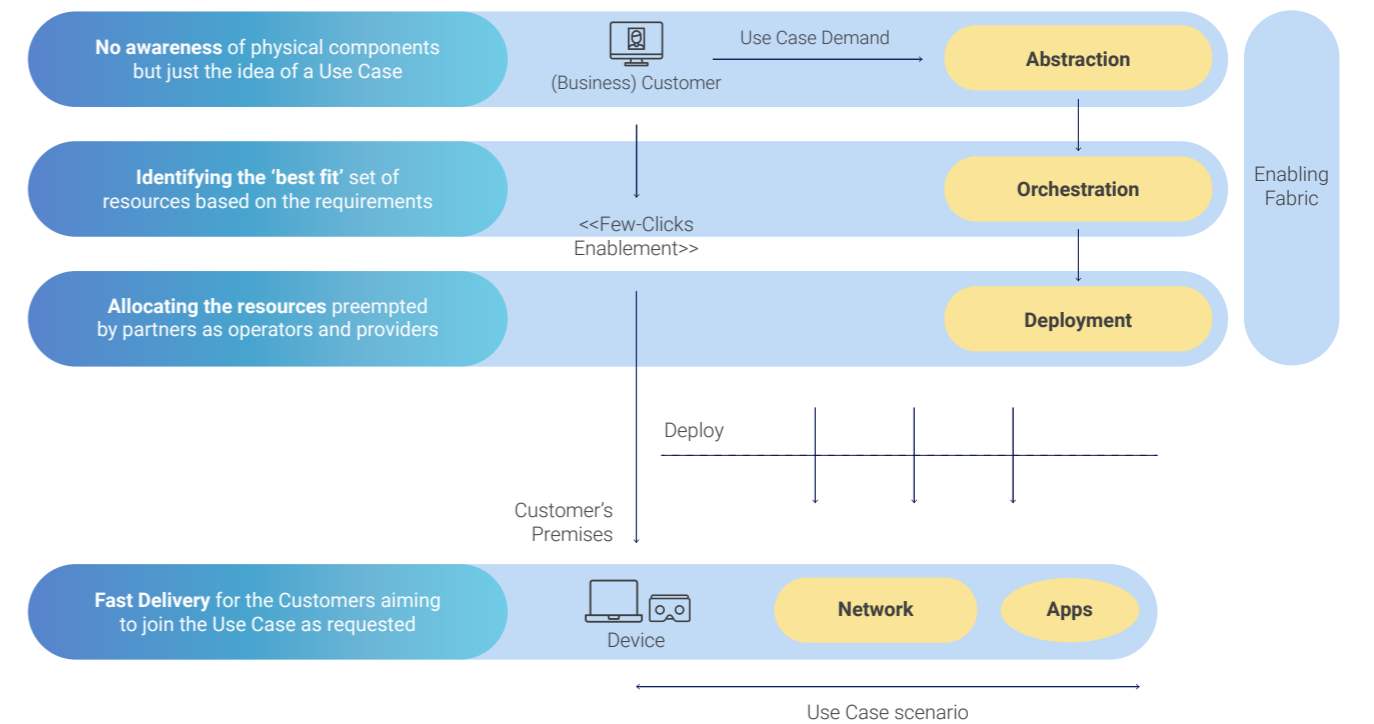
OpenStack technology is used as default platform for orchestration. It is used to deploy applications to users via NFV methodology, where application modules are loaded as Virtualized Network Functions (VNF) as well as Core Network functions in the 5G paradigm. Data and Core Network resources are in particular modeled and managed using SDN dynamic inventory and protocols. Edge datacenters, or on-premise Edge devices, replace local application instances and deliver consistent service quality to users, wherever they are and they move.

5GEF components are installed and run with the following delivery guideline:

- Customer Portal** (abstraction layer) is exposed to internet access and typically loaded into a Centralized datacenter, together with the back-end components for the orchestration layer (dynamic inventory, selection algorithm, resources monitoring, service order management) and deployment layer (NFV orchestration, deploy and control, creation and activation of virtualized functions).
- Mash-up Service Orchestration (MSO)** light software modules are loaded in all datacenter sites to manage interoperability of the software modules (applications) needed for use case utilization as SaaS services.
- Application** (software modules are loaded into centralized or Edge datacenters based on the typology of network interaction requested by the specific use case (determined by the orchestration layer).



A typical operator architecture model is shown above. Both 5G NSA (4G Core Network, 4G e-NB plus 5G-NR gNB) and 5G SA (full 5G-NR and 5GC components) are represented.



The diagram above identifies the functional layers and the way they work with network and datacenter resources, based on a Customer's requested use case.

# Use Cases examples

Examples of new and advanced services using the 5GEF approach are being developed now, with use cases already being deployed.



## Use Case: Virtual Visit (VisiVa)

Customers wish to demonstrate specific locations or infrastructures to remotely-based clients, with an immersive and highly defined quality. VisiVa service (Virtual Visit) is based on two combined concepts. A high-definition camera is placed at a place of interest, possibly on mobile support, under 5G radio coverage, while one or more observers are located in remote locations.

The camera can generate a 4K (or higher) definition A/V stream. The multimedia video content is collected by an application running in cloud, able to reproduce the image in one or more observation points. An observer can guide the camera wearing a viewer, or using a smartphone or tablet, by moving it synchronously based on low-latency features coming from 5G URLLC technology. 5GEF automatically deploys and delivers the components by selecting the right network and datacenter resources to ensure the requested latency control and bandwidth capacity.

## Use Case: SD-WAN connectivity

Another 5GEF solution component is SD-WAN. SDN Agent (SDNA) components are deployed as software VNFs, provided by best-in-breed Vendors. The need to automate integrated deployment of Services and SDNA VNFs also requires interoperability between the SD-WAN Controller (SDNC) and 5GEF (SDN) Orchestration layer.

API Exposure for Orchestration interworking, while currently monitoring data across SD-WAN tunnels, is part of 5GEF orchestration capabilities. This enables automated set-up of private 5G Networks to activate Edge datacenter multi-point connectivity and MEC application on top of 5G Radio and Core Network infrastructure.

## Use Case: Enhanced Roaming Functions

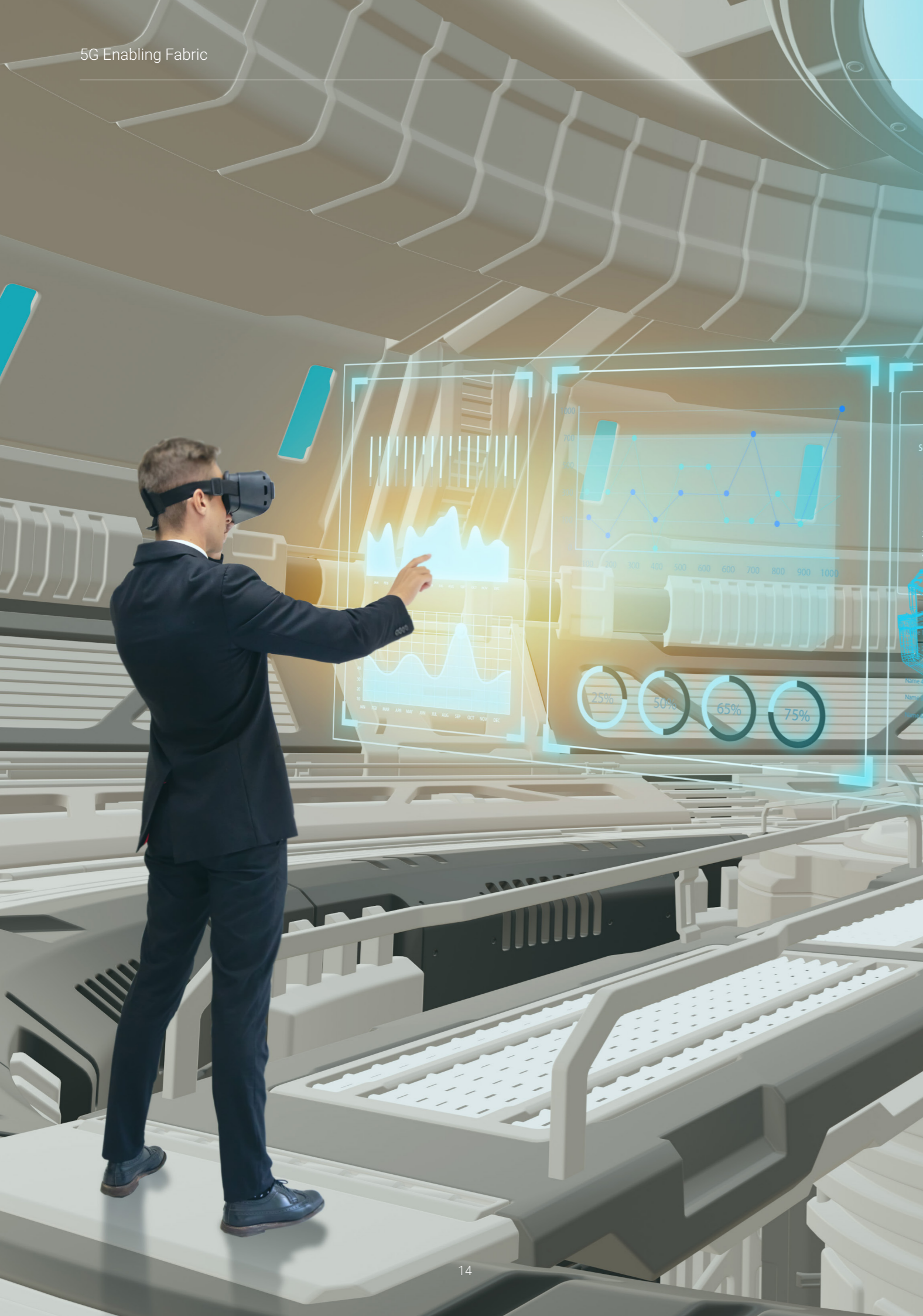
Leading mobile network operators are exploring use of 5GEF to deliver a more sophisticated, higher quality roaming experience to end users. The aim is to improve access to applications, deliver use cases more quickly and use SDN capability to improve quality of service.

The project focuses on Signaling Edge Protection Proxy (SEPP) as a key delivery technology. 5GEF can deliver network functions as virtualized software modules, and let them work as cloud components, aiming to support their REST API exposure. Edge network functions as SEPP nodes for 5G roaming are then delivered by 5GEF in fast and secure way.

## Use Case: Easy Broadcast

The Easy Broadcast service allows geographically distributed users to access very high-definition multimedia content, based on video produced by a 360 camera, with transmission quality of up to 8K definition. The application can adapt the video stream to the capacity of the observer's terminal.

The service allows several users to participate at the same time, with each able to manage their own multimedia sessions. In such cases, 5GEF automatically deploys and delivers the components by selecting the appropriate network and datacenter resources, and can deliver content via public video platforms (such as Youtube) or private on-premise equipment.



## Why Choose NTT DATA?

NTT DATA combines the capabilities and experience of a global telecommunication and mobile network provider, with an exceptional pedigree as IT service provider, specialist applications developer and industry subject matter expert. We bring together all the skills needed, therefore, to build and evolve the advanced networking solutions that enterprises of every size and in every market require.

We are proven innovators, with an annual R&D budget of around 3.5 billion USD, NTT DATA is a leading proponent and support of Open Standards, placing us in a leadership position for concepts built on collaborative working, co-creation and joint innovation. We are developing 5G based solutions to support our own operations as a global enterprise, so even the most advanced concepts we take to market are mature and proven to add value.

As a strong commercial player, with a decades long commitment to the telephony and mobility markets, we are a natural go to market partner for any telco determined to move up the value chain and become an essential service provider to ambitious enterprises, today and into the future.

We are **EXPERTS**

We are **INNOVATORS**

We are **LEADERS**

Visit us at [nttdata.com](https://www.nttdata.com)





**NTT Data**  
Trusted Global Innovator

# 5G

ENABLING FABRIC

