

5G Enabling Fabric (5GEF)



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NTT Data 5G Enabling Fabric (5GEF) is a Network & Service Manager and Slicing Management Function, aimed to enable Telcos, MNOs and Enterprises 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.

Moving up the value chain, owning key customer relationships

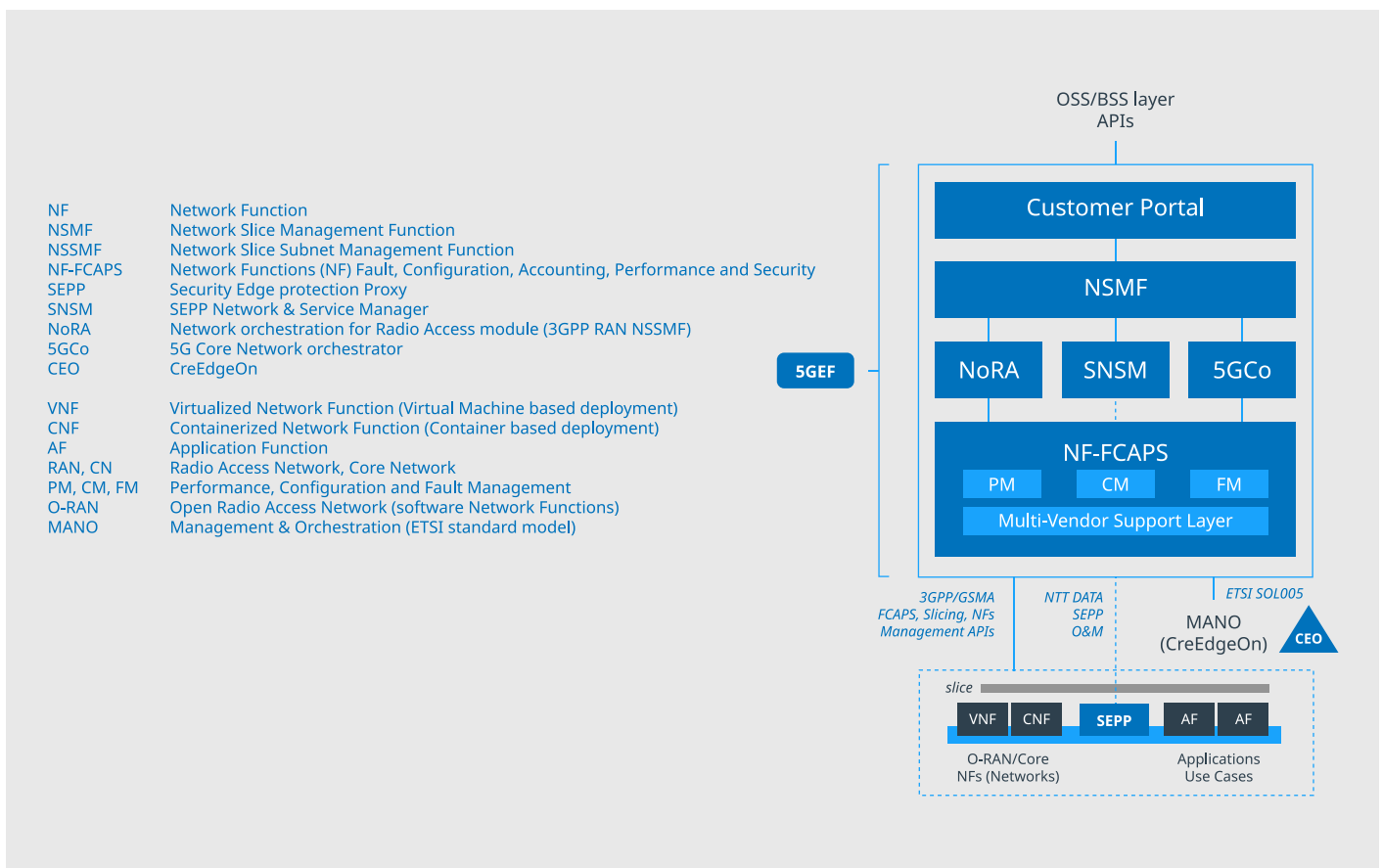
Previous technology breakthroughs in the telecommunication and mobile communications space have proved highly profitable for applications vendors and content owners, especially in the B2C space. MNOs and other Telcos, by contrast, have seen no rise in their profitability and are sometimes treated as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



What is 5G Enabling Fabric?

5GEF is composable delivery platform, whose modules are autonomous software components interoperating each other through open interfaces, compliant to the 3GPP standard on 5G Stand Alone and SBA (Service Based Architecture) networks for the modeling of network resources, connectivity service elements and for the definition of subnetworks and related network slices.

5GEF is provided with a Customer Portal, where final users can ask for a specific use case from a list of available services, with the possibility of customizing technical characteristics, service parameters and number of devices. The request is translated by the 5GEF platform with a chain of actions: creation of a connectivity service (network slice), automatic deployment of the software images required for the use case, coordination (orchestration) of the addressing rules between devices, network resources and applications. The connectivity services make leverage on network slicing. It works on network infrastructures: physical RAN, vRAN, Open RAN, as well as Core Network domains (4G, 5G Non Stand Alone, 5G Stand Alone). Connectivity is made extensible among different distribute locations through overlay SD-WAN paths, as embedded capability.





Network Management

5GEF includes a specialized FCAPS module for RAN and Core Network Functions. It is named as NF-FCAPS. It works as a domain-specific Operations & Maintenance manager, capable to perform Network Function creation, configuration, provisioning, and assurance by referring to the standardized 3GPP Network Resource Management model for both APIs and data model. NF-FCAPS works on Network Function templates ingestion, so that network modeling is fast and flexible.

Service Management

5G Enabling Fabric is focused on network layer capabilities, therefore concentrated on RAN, Core Network and Transport domains, aiming to establish on-demand connectivity services to let final users be capable to join software applications (use cases) wherever they are located. 5GEF embedded Customer Portal, or alternatively northbound cross-domain systems, can ask for such connectivity. 5GEF elaborates on that with involvement of specialized modules for Slicing Management capabilities.

Slicing Management

5GEF works with a layered standard architecture. The NSMF (Network Slice Management Function) module coordinates the RAN and Core Network NSSMF (Network Slice Subnet Management Function) modules, in order to create and requested end-to-end network slice, connecting user access to applications. 5GEF NSSMF modules are respectively named NoRA (Network orchestrator for Radio Access) and 5GCo (5G Core Network orchestrator). Their job is to create a subnetwork (collection of Network Functions) in the RAN (markedly, Open RAN) and Core Network domain they manage. Each subnetwork is assigned to the end-to-end network slice with the selected resources (slice subnet). Network Functions are instructed by NoRA and 5GCo modules to activate the slice subnets, based on the network topology depicted by NSMF modules, through the support of southbound NF-FCAPS module. All the exposed APIs and data model are 3GPP standard and interoperable with analogous management functions coming from Third-Party implementations.

Driving the Delivery

5G Enabling Fabric orchestrates the delivery processes by referring to the network topology (subnets) where the connectivity services shall be configured on top. The applications (use cases) are loaded and deployed on the processing nodes, Edge or centralized, on-premise or in the Cloud, based on the network topology. The information model adopted to integrate both network and applications is the Network Service Descriptor (NSD), introduced by the ETSI standard. Dimensioning, customization parameters and autoscaling policies are part of the NSD preparation. 5GEF works as consumer for NSD execution, by invoking ETSI APIs exposed by a selected Deployment Manager as producer on NSD lifecycle. For NTT DATA product suite, that one could be CreEdgeOn or a third-party management function. Resources are continuously monitored. Business Customer can pay the Service Providers only for what is needed, when is needed, for the time is needed.



5G Stand Alone Roaming

Another 5GEF components is the SEPP (Security Edge Protection Proxy) Network and Service Manager (SNSM) module, which is a specialized profile of NF-FCAPS module. 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. Moreover, a great opportunity comes from Enterprise Market. The provision of 5G virtual private networks for technology or manufacturing companies very often requires the adoption of numerous IoT devices. Such elements are identified with dedicated IMSI codes and appear as natively roaming terminals. That's why NTT DATA also developed a SEPP Network Function as a product belonging to network layer's Product Portfolio. Both SNSM module and SEPP adopt 3GPP standard APIs and resource model, including message manipulation capabilities for interoperate with third party platforms. GSMA standardized scenarios for roaming hub involvement, service profiles and security features are also supported.

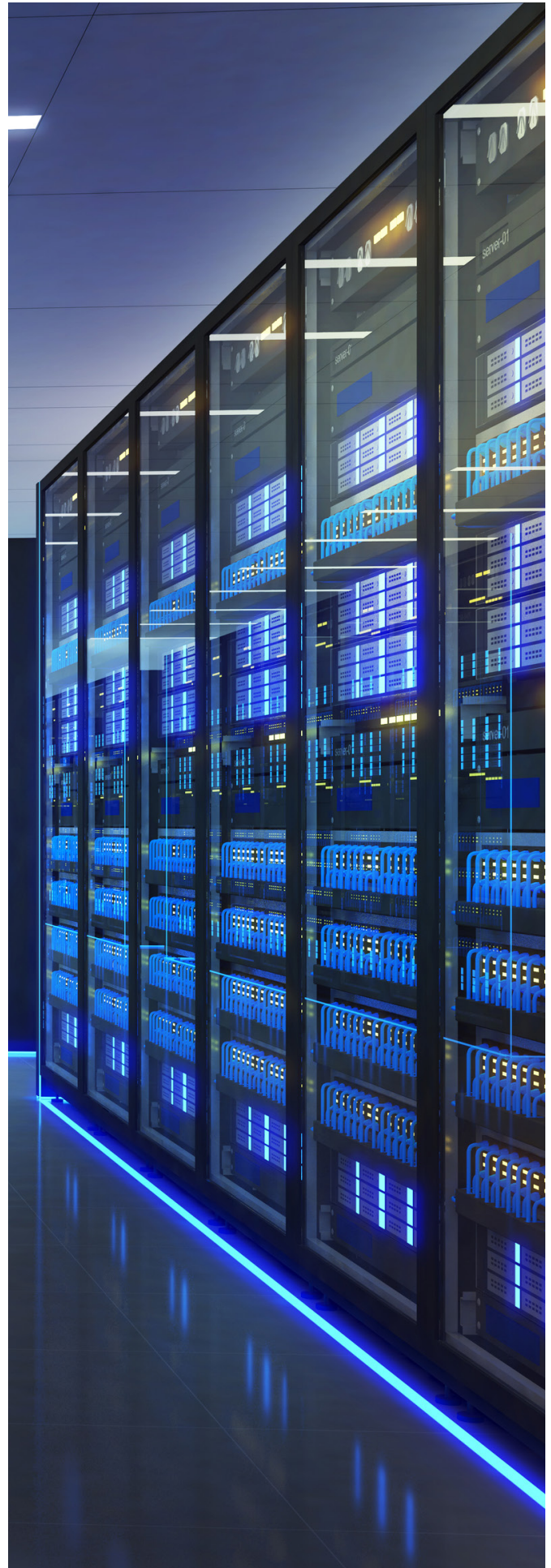


Neutral Host

5G Enabling Fabric is also focused on RAN Sharing (MOCN, MORAN) scenario, where the Hosted Operator can manage the shared CU, DU Network Functions and establish on-demand network slices for connectivity services. Neutral Host Service Provider owns the infrastructure and provide to Hosted Operators the visibility and the APIs set to manage configuration, assurance and connectivity services over the shared resources as they were part of their facility. 5GEF modules NSMF, NoRA and NF-FCAPS make it happen.

Open RAN

5G Enabling Fabric orchestrates the delivery processes by referring to the network topology (subnets) where the connectivity services shall be configured on top. The applications (use cases) are loaded and deployed on the processing nodes, Edge or centralized, on-premise or in the Cloud, based on the network topology. The information model adopted to integrate both network and applications is the Network Service Descriptor (NSD), introduced by the ETSI standard. Dimensioning, customization parameters and autoscaling policies are part of the NSD preparation. 5GEF works as consumer for NSD execution, by invoking ETSI APIs exposed by a selected Deployment Manager as producer on NSD lifecycle. For NTT DATA product suite, that one could be CreEdgeOn or a third-party management function. Resources are continuously monitored. Business Customer can pay the Service Providers only for what is needed, when is needed, for the time is needed.



Benefits for the Market

For business users, 5GEF is the key to a highly intuitive, simple, and cloud-like experience as they define and implement the services that meet their own, often highly specific needs.

Customer Portal allows a simplified model to present the solution delivery (network topology, connectivity service by network slicing, and applications) as an integrated process. The easy-to-manage environment reduces design costs and improves time-to-market for the required delivery.

Resources are managed with automatic (horizontal) scaling properties. Resources optimization is then achieved, and Service Providers can apply pay-per-use model.

Delivery automation brings the Service Provider to a reduced TCO on infrastructure and facilitates the capacity planning forecast.

Resources within the scope of the services are identified and orchestrated, combining different applications (mash-up) and functionalities, for presentation as a complete use case to the user.



Interoperability is a must. 5GEF supports multi-vendor infrastructures building on open standards and products. Despite that, mediation device functionalities for interfaces or protocol are implemented to make consistently interoperable different technologies in an integrated scenario.

Hybrid environments may apply to overcome possible limitations. Most operators are not yet fully 5G Stand Alone ready, so NTT DATA products adopts open APIs to enable creation of extended, hybrid platforms. This approach uses IP/MPLS connectivity as well as SD-WAN overlay or pre-provisioned tunneling to build integrated mesh-based networks that integrate 5G, where available, and other connectivity to deliver services.

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.

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.

It also brings to an improved collaboration model. 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. That's a way to add value to collaboration.



In summary, 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. The interoperability with other NTT DATA products, as CreEdgeOn for Deployment Management and the SEPP Network Function for 5G SA roaming, creates a suite of products with full coverage on Network and service delivery. The interoperability with third-parties for reducing the vendors’ lock-in factor is now reality.

NTT DATA

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The NTT DATA Innovation Centre comprises a Strategy Headquarters, the headquarters that defines the technology strategy, and local centres in six countries (Japan, the United States, Italy, Germany, China and India), each one dedicated to specific technology areas with around 100 experts, mainly researchers, consultants and engineers. Thanks to joint R&D initiatives with leading companies, technology partners and collaboration with universities and start-ups, these centres will be among the first to gather information on advanced technologies to set future strategies. success and combine global reach with local client attention to serve them in over 50 countries.

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