5G in a Box: The Game-Changer for Telco Industry Leaders
**Solution Brief**

Advanced next-generation Edge computing

The 5G-in-a-box solution from Lenovo, Nearby Computing and Casa Systems covers all the aspects related to disaggregated, virtual radio access network (vRAN) and multi-access edge computing (MEC) deployable in a variety of scenarios, from Non-Public Mobile Networks (NPM) to Telco Edge and hybrid clouds.

Partnering with the most innovative companies to deliver an open, modular Edge solution tailored to your needs

The proposed solution is based on an open and modular design, aligned with Intel´s CERA [1] specification, that aims to accommodate for different site sizing and use cases with a common framework to host edge applications (MEC and non-MEC) seamlessly.

5G-in-a box is compatible with best-practice VNF/CNF solutions to address the expected performance requirements of individual use cases and applications. It provides unified Northbound Interfaces (NBI) based on open APIs and protocols for easy integration and suits different connectivity models, allowing tailored solutions for each use case.
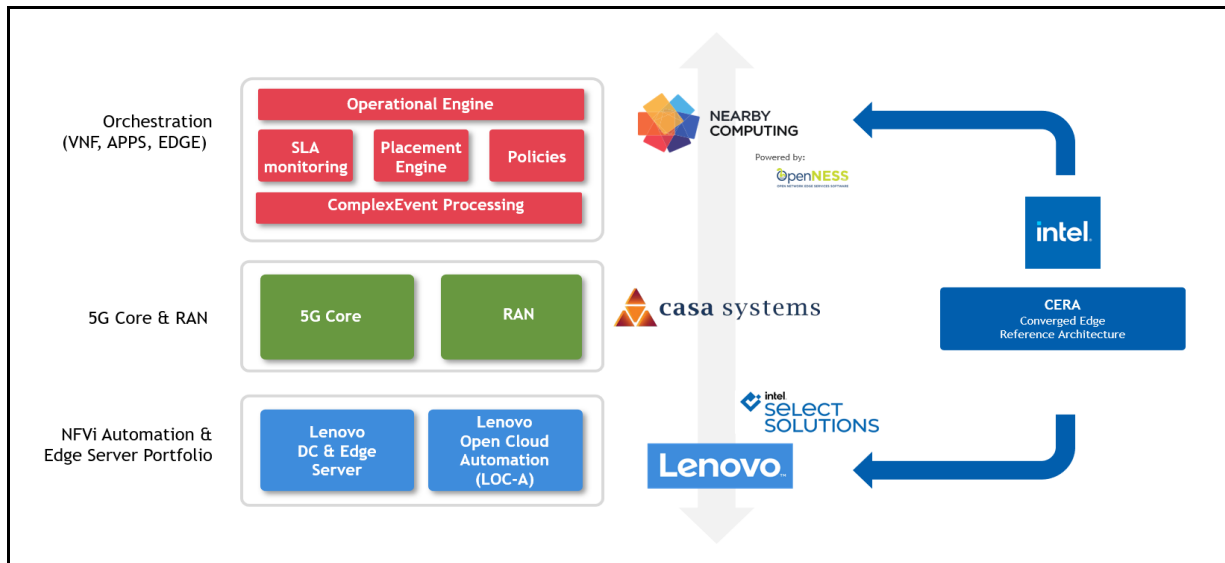
The solution covers all the aspects related to an advanced edge orchestration platform (NFV, Applications, MEC, Edge), and physical infrastructure management, which has been overlooked in the past but clearly represents a pain point in day-to-day network operations. Thus, the solution includes the necessary HW infrastructure, SW components as well as their automated deployment and management.

- **Lenovo** provides a comprehensive and unique portfolio of Data Center and Edge Servers as well as Lenovo Open Cloud Automation (LOC-A), a cloud infrastructure deployment and management solution that will rapidly deploy, optimize and manage NFV cloud infrastructure for bare metal servers, containers and VMs. LOC-A can provision OpenShift, VMWare and Kubernetes clusters

- **Nearby Computing** provides the Nearby One solution, an orchestration platform that goes beyond market standards to manage all tiers of the network, from Cloud and Data Center to Edge, from a single pane of glass

- **Casa Systems** delivers converged ultra-broadband LTE/5GSA and wireline broadband infrastructure as well as a range of small cell solutions specifically designed to address indoor and outdoor capacity and coverage applications. Casa Systems 5G Core was designed using their web-scale Axyom™ decomposed, microservice based software architecture. The Axyom common software framework includes Casa Systems' Kubernetes-native service components, and the software that manages those micro-services. Casa has worked with partners, to test and deliver a complete best-of-suite 5G Core solution.

5G in a box can manage all packet core functions in a box, including disaggregated radio functions such as Centralized and Distributed Units (CU/DU).

The unified interfaces and single pane-of-glass dashboard provides a uniform view of the system whatever connectivity model is chosen.

The solution can be deployed in two different flavors, depending on the connectivity model of choice:

- **Fully private network approach**: As part of the catalog of ISVs that are unleashed thanks to the core technologies of this solution, a number of network vendors can be found (and most of them part of Intel's Network Builders ecosystem) that offer 5G-NSA/5G-SA solutions that can be hosted in a box or at least on small footprint sites. They enable private packet core solutions, with reduced cost, an efficient lightweight resource footprint and enough capacity to suit most of the private network connectivity requirements.

- **Integration into Telco packet core network**: the solution is vendor agnostic and therefore it can interface to a Casa-specific or Telco's packet core control plane of choice in a telco edge or regional data center.

Real-world use cases

The use cases below are based on several deployments. The covered verticals are:

- Smart Cities / Mobility
- Manufacturing/Industry 4.0
- Ephemeral events / Exhibitions / Conventions
- Video Surveillance / Private security / Public Safety services
- Gaming / Content Delivery

The solution includes but is not limited to the following CNFs.

- **EPC/5G-NSA/5G-SA for Non-Public Mobile Networks (NPN**): Provided by Casa Systems, fully containerized, cloud-native and modular.
- **Disaggregated gNB radio:** Provided by Casa's, fully containerized, cloud-native, and modular CU, DU and RU solution for sub-6GHz Split 2 and 7.2 topologies.

The applications that can be deployed through our partner companies are the following:

- **Edge Cloud Gaming**: Top games are rendered at the Edge Servers and content is delivered FHD/60fps to the customers gaming from their mobile devices, tablets, or laptop, with minimum latency.
- **Augmented Reality / Industry** : Remote assistance application in which a qualified engineer can see live video of a field technician and annotate the video with comments and drawings. The field technician can see the annotations, live, on top of the video being captured.
- **Augmented Reality / Tourism**: Virtual video wall to be shown through the smartphone or tablet at selected locations of the city, in front of touristic spots. Users can browse videos uploaded by other visitors, and record and upload their own content that is rendered and merged into the video wall at the edge.
- **Video Analytics / Facemask detection** : In the COVID context, used to detect people not properly wearing masks.
- **Video Analytics / Social distancing** : In the COVID context, used to detect groups of people not properly respecting social distancing regulations.
- **Video Analytics / Object classification**: Detecting, classifying, and counting different groups of objects: vehicles, pedestrians and bicycles.
- **IoT analytics**: Different advanced edge analytics components and southbound protocol integration to acquire device information (i.e. Modbus)
- **Outdoor location**[2]: Advanced GPS signal processing at the edge to provide high precision location services (precision: 10cm) to mobile subscribers – useful for city services and logistics to track assets.
- **Content Delivery (Edge CDN)**: Video content delivery for live broadcasting of events with superior quality (4K at least) and reduced backhaul bandwidth requirements.

Why Lenovo

Lenovo infrastructure is built on a global manufacturing, services and support footprint, and is ranked #1 globally in both server reliability and customer support. Our CoSP and partner validated solutions are built on open standards and interfaces to preclude vendor lock-in.

We know that any compelling solution must be built on reliability; reliable products and services, delivered with speed and efficiency. Our reputation for trusted reliability is only one of the reasons Lenovo has attained #1 PC market share position, has the fastest-growing OEM and Hyperconverged business in the industry and has achieved #5 server market share[3].

Lenovo has deployed more than 20 million servers worldwide and achieved the highest level of "five nines" reliability amongst all mainstream server platforms[4].

Lenovo's technology capabilities, and our partnerships with the most innovative companies such as Nearby Computing and Casa Systems uniquely position us to provide added value to CoSPs.

For more information

To learn more about Lenovo for CoSP solutions and validated partner configurations, contact your Lenovo Business Partner or visit https://www.lenovo.com/cosp.

Footnotes

1 Intel's Converged Edge Reference Architecture (CERA): https://www.intel.com/content/www/us/en/communications/network-transformation/converged-edge-reference-architecture-animation.html

2 Tentative – integration ongoing at the time this solution brief was published

3 According to IDC (Mar 2021): https://www.idc.com/promo/servers

4 See the latest ITIC Reliability Study: https://lenovopress.com/lp1117-itic-reliability-study

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