Nokia Compact Mobility Unit

The Nokia Compact Mobility Unit (CMU) delivers standards-compliant packet core SGW, PGW and MME functionality in a compact form factor. The Nokia CMU serves as the evolved packet core (EPC) in 4G/LTE private wireless networks for enterprises as well as smaller mobile operator networks. The CMU also provides an evolution path to 5G Core.

The CMU provides a comprehensive 3GPP feature set by leveraging the same Cloud Mobility Manager (CMM) and Cloud Mobile Gateway (CMG) software from the industry-leading Nokia Cloud Packet Core solution, with its field-proven deployments in Tier 1 operator networks globally. The following functionality is provided:

- **CMM**: Mobility Management Entity (MME)
- **CMG**: Serving Gateway/Packet Data Network Gateway (SGW/PGW).

**Features**

- Combined CMM (MME) and CMG (SGW/PGW) functionality in a compact form factor
- Support for centralized and distributed packet core architectures
- CMU software installed on Nokia AirFrame Rackmount (RM) 1RU servers
- Scalability, with support for:
  - 50,000 simultaneous attached users (SAU)
  - 250 eNodeBs
  - 10 Gb/s of combined uplink and downlink throughput.

**Benefits**

- Compact EPC ideally suited for enterprise private wireless networks
- Capacity to support 4G and 5G mobile broadband services
- Internet of Things/machine-type communication (IoT/MTC) services
- Lower OPEX for power, cooling and floor space
- Support for 5G non-standalone (NSA) today with an evolution to a 5G standalone (SA) core.

**Cloud Mobile Gateway**

The CMU Cloud Mobile Gateway (CMG) software supports the following network functions.

**SGW**

The SGW forwards user data packets and acts as the local mobility anchor for the user plane during LTE RAN handovers as well as handovers with other 3GPP technologies.

**PGW**

The PGW provides connectivity and the IP address for user equipment (UE) to external packet data networks and is the mobile network user plane anchor point. In addition to the packet forwarding function, the PGW can perform, for each packet flow:
- Packet inspection (Layer 3, Layer 4)
- Policy enforcement (both uplink and downlink QoS)
- Packet filtering
- Accounting and charging records.

**Cloud Mobility Manager**

The CMU Cloud Mobility Manager (CMM) software supports the following network functions.

**MME**

The MME performs the 3GPP UE mobility and packet core session management functions in LTE networks, including management of:
- UE registration, authentication and mobility
- UE bearer setup as well as data and Voice over LTE (VoLTE) services

**Evolved packet core for 4G/5G**

The CMU performs 3GPP EPC and 5G NSA core functions in 4G/LTE and 5G mobile networks. The CMU’s small form factor and scalability are ideally suited for an enterprise that wants to maintain control of IP and business-critical data by deploying and operating its own private wireless network or for a mobile network operator that offers a private wireless-as-a-service solution to an enterprise with the CMU EPC remaining on campus to maintain data privacy (see Figure 1).

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**Figure 1. CMU as EPC in 4G/5G networks**
**Cellular IoT support**

The CMU delivers an optimized 3GPP cellular IoT Serving Gateway Node (C-SGN) solution by combining the CMM and CMG functionality logically into a single function (see Figure 2). The CMU C-SGN configuration supports cellular IoT features up to 3GPP Release 15 that:

- Reduce network signaling
- Support both IP and non-IP addressable devices
- Improve device battery life.

Figure 2. Nokia CMU C-SGN supporting cellular IoT services

Key features include:

- Power Saving Mode (PSM)
- Extended Discontinuous Reception (eDRX)
- Bearer activation without service request
- Non-IP data delivery (NIDD)
- Low access priority
- Back-off timers
- Robust Header Compression (RoHC) for small IP data

- Extended NAS timers for CAT M1, M2
- PDN Connectivity Status Event Reporting (MONTE)
- Cache age-out of UE Context
- Support for all LTE cellular IoT device types:
  - LTE Cat1
  - LTE M (MTC)
  - LTE NB-IoT.
CMU management
The CMU is managed by the Nokia Networks Services Platform (NSP). The CMU utilizes the AirFrame Infrastructure Monitor (AIM), a tool that provides alarm management and performance to the Nokia NSP and supports SNMP management operations of both AirFrame servers via a single IP address. The NSP also provides network and element management of the CMU C-SGN for cellular IoT services.

The NSP together with Nokia NetAct provides a single, consolidated view of the entire LTE network. The NSP provides an interface to NetAct for fault management and performance monitoring. NetAct provides an end-to-end view of the entire mobile network: the LTE RAN and the remaining mobile core network functions.

CMU hardware
For rapid deployment and operational integration, the CMU is pre-integrated on a 1RU height, 19-in. Nokia AirFrame Rackmount Server. The server is optimized to lower data center operation cost through reduced energy consumption. The server runs on the latest generation of Intel® Xeon® processors and includes Nokia-specific enhancements that make it more efficient than existing x86-based servers to run demanding Telco applications.

The server supports redundant AC and DC power supplies as well as redundant cooling fans. Each server has four integrated 25-Gb/s SFP28/SFP+/SFP ports.

Stateful redundant configuration
The CMU operates in a stateful redundant mode where subscriber and session state is synchronized between the two servers to ensure that service and state is maintained when a failure occurs.

In redundant mode, two 25GE ports are interconnected between the two servers to allow the other two 25GE ports to still be used for external input/output, as shown in the following photo.
Technical specifications

Cloud Mobility Manager

Standards and protocols

3GPP standards

- TS 23.003
- TS 23.007
- TS 23.060
- TS 23.216
- TS 23.246
- TS 23.271
- TS 23.272
- TS 23.401
- TS 24.008
- TS 24.171
- TS 24.301
- TS 25.413
- TS 25.415
- TS 29.002
- TS 29.060
- TS 29.118
- TS 29.168
- TS 29.171
- TS 29.172
- TS 29.274
- TS 29.280
- TS 29.303
- TS 32.426
- TS 33.107
- TS 33.401
- TS 36.412
- TS 36.413
- TS 36.414
- TS 36.444

IETF standards

- RFC 1034 (DNS)
- RFC 1035 (DNS)
- RFC 4960 (SCTP)
- RFC 6241 (NETCONF)
- RFC 6733 (Diameter)

Cloud Mobile Gateway

Standards and protocols

3GPP standards

- TS 23.060
- TS 23.203
- TS 23.234
- TS 23.401
- TS 29.060
- TS 29.212
- TS 29.273
- TS 29.274
- TS 29.275
- TS 29.281
- TS 32.251
- TS 32.295
- TS 32.297
- TS 32.298
- TS 32.299
- TS 33.102
- TS 33.106
- TS 33.107
- TS 33.108
Table 1. Nokia AirFrame RM Server

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Details</th>
</tr>
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<tbody>
<tr>
<td>Dimensions</td>
<td>• Height: 43.2 mm (1.7 in)</td>
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<tr>
<td></td>
<td>• Width: 440 mm (17.3 in)</td>
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<tr>
<td></td>
<td>• Depth: 780 mm (30.7 in)</td>
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<tr>
<td>Weight (max. configuration)</td>
<td>15.0 kg (33.0 lb)</td>
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<tr>
<td>NEBS compliance</td>
<td>• Fire resistance based on GR-63-CORE, section 4.2</td>
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<tr>
<td></td>
<td>• Earthquake tolerance based on GR-63-CORE E, section 4.4</td>
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<td>• Acoustic noise based on GR-63-CORE, section 4.6 with the telecommunication equipment room criteria</td>
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<tr>
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<td>• EMC based on GR-1089-CORE, section 3.0 (EMI), section 4.0 (Lightning and AC Power Fault)</td>
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<td></td>
<td>• Safety based on GR-1089-CORE, section 7.0 (Electrical Safety), Section 9.0 (Bonding and Grounding)</td>
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<tr>
<td>ETSI compliance</td>
<td>ETSI thermal and humidity based on ETSI EN 300 019-2-3, Class 3.1</td>
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<tr>
<td></td>
<td>• Operating temperature range: 5˚C to 40˚C (ETSI EN300019-3-1 Class 3.1)</td>
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<td></td>
<td>• Non-operating temperature range: -40˚C to +70˚C</td>
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<tr>
<td></td>
<td>• Operating relative humidity: 5% to 85% (ETSI EN300019-3-1 Class 3.1)</td>
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<tr>
<td></td>
<td>• Non-operating relative humidity: 10% to 95%</td>
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<tr>
<td>Power supply</td>
<td>• 800W Titanium redundant PSU, 100 to 240V AC, 50/60 Hz, AC support</td>
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<td></td>
<td>• 1100W redundant DC PSU, -39 to -72V DC, 37A max.</td>
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<tr>
<td>System rating</td>
<td>• 100–120 or 200–240V AC, 50/60 Hz, 7.4/4A or 240V DC, 3.7A per PSU inlet) for PSU: 800W</td>
</tr>
<tr>
<td></td>
<td>• -39 to -72V DC, 28A max. (per PSU inlet)</td>
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<tr>
<td>Cooling</td>
<td>8 dual rotor fans (15+1 redundant)</td>
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<tr>
<td>Input/output</td>
<td>2 x 25GE dual-port NICs</td>
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<tr>
<td>Storage</td>
<td>2 x 960G SATA 3dwpd 2.5-in solid state drives</td>
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<tr>
<td>Server management</td>
<td>IPMI v2.0 compliant, on-board Baseboard Management Controller</td>
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Ordering information
The Nokia CMU orderable items consist of the 1RU AirFrame RM Server hardware with AC or DC power, the operating system software and a range of application subscriber license options. For ordering questions, please contact your Nokia sales representative.

Learn more
For more information about the Nokia Cloud Packet Core, please visit: https://networks.nokia.com/solutions/packet-core