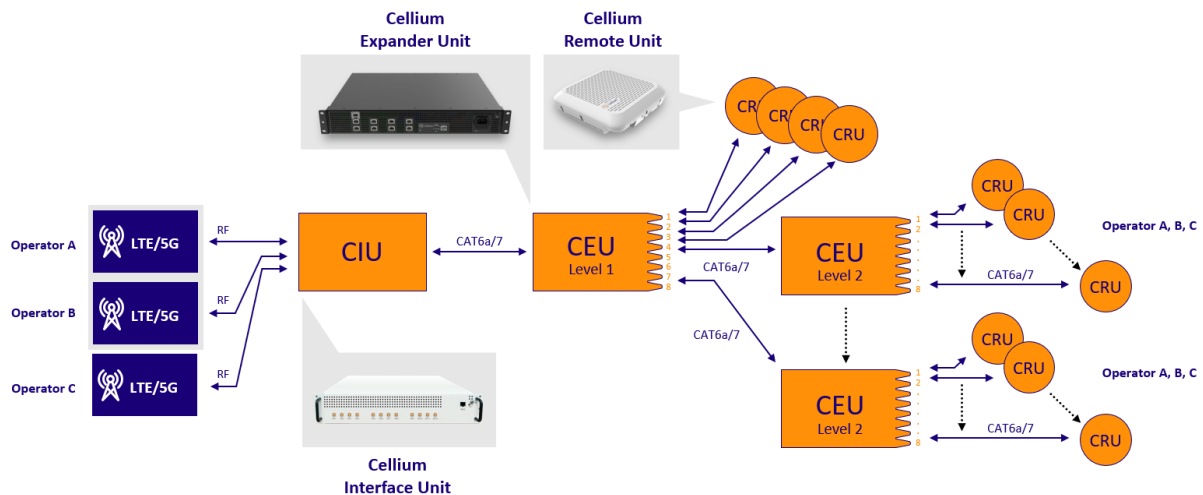


## Summary

Cellium’s EdgeAir “M” Multi-Tenant family solution for multi-MNOs (Mobile Network Operators) provides a cost and power efficient solution for cellular 5G-NR (New Radio)/LTE coverage in buildings with a very low TCO (Total Cost of Ownership). The EdgeAir system, based on Cellium’s CELI000/CEL2000 SoCs, offers an active DAS (Distributed Antenna System) like solution that is RAT (Radio Access Technology), RAN (Radio Access Network) vendor, and topology agnostic. For downstream traffic, the Cellium Interface Unit (CIU) will down-convert the radio frequencies to frequencies suitable for transmitting over standard CATx copper cables and the Cellium Remote Unit (CRU) will then up-convert the radio frequencies. For upstream traffic the frequency conversion is reversed. The end-user will enjoy premium 5G-NR/LTE performance and minimal latency without any cell handover issues. The Cellium Expander Unit (CEU) allows expanding the number of supported CRUs to a total of 64 CRU ports.



**Figure: EdgeAir “M” Family Solution**

## Introduction

Driven by the ever-growing number of smartphones, tablets, laptops and IoT (Internet of Things) wireless connected sensors, appliances, cameras, and other mobile devices, 80% of wireless data traffic originates or terminates indoor. Wireless indoor connectivity has become a mandatory utility like water, and electricity. Building owners, facility, and IT (Information Technology) managers have been challenged to deploy different systems and solutions for wireless coverage and capacity for indoor users and devices with the bandwidth, mobility, and user experience required.

## The Problem

In the past, the first indoor system to be deployed was WiFi service, due to its free use in unlicensed frequency bands, combined with the high number of devices supported by the WiFi protocols including phones, tablets, and laptops.

However, the challenges related to the WiFi services and networks such as lower mobility, low quality of service, lower security, and higher latency, all lead to the understanding that WiFi-only service is just not enough. This compared with the advantages of cellular networks such as mobility management, advanced quality of service, SIM based security, increased bandwidth enabled by the latest 5G-NR bands, and the advantages of IoT protocols such as low latency, low power consumption, and low cost. The need to provide 5G-NR and LTE cellular coverage indoor has risen due to the modern building use of low emission glass walls and other building materials that block the outdoor macro network cellular signals. In addition, the new 5G-NR bands use higher frequencies, with a smaller outdoor cell coverage, not reaching all buildings, and not penetrating indoor.

## Solution

Cellium’s patented technology, IF (Intermediate Frequencies) over Copper (IFoC), provides a RAT/RAN vendor, and topology agnostic solution for 5G-NR/LTE and indoor distribution over CATx copper. The EdgeAir “M” family supports 5G/LTE implementations.

It consists of five family members:

- The Cellium Interface Unit (CIU) has three RF interfaces (4 ports per interface) to Multi-Operator RAN equipment with a connection to a CEU over CATx copper cables. It is based on the Cellium CEL1000/CEL2000 SoCs..
- The Cellium Expander Unit (CEU) provides eight CRU ports. The CEU supports one level of cascading. Thus, eight CEUs connected to one CEU that is connected to the CIU can provide a total of 64 CRU ports.
- The Cellium Remote Unit (CRU) is a radio unit consisting of antennas, filters, and FEMs (Front End Modules). It is based on the Cellium CEL1000/CEL2000 SoCs.
- The Cellium Line Extender Unit (CLU) allows to extend the distance from the CEU to the CRU.
- The Cellium Fiber Extender Unit (CFU) converts the signal from electrical to optical thus allows extend the distance between CIU and CEU and CEU level 1 to CEU level 2.

## Benefits

The EdgeAir system provides the following market leading benefits:

- ✓ Analog solution that is both cost-efficient and provides high performance.
- ✓ RAT/RAN vendor, and topology agnostic.
- ✓ Allows both 5G-NR and LAN to share the same copper infrastructure.
- ✓ The EdgeAir system is based on the Cellium SoCs, thus reducing system costs, power consumption, physical size, and providing superior bandwidth and latency.
- ✓ Any band up to 7GHz.
- ✓ Automatic cable adaptation for solving cable impairments.
- ✓ Simple RF planning and installation.
- ✓ Single cell solution without any inter-cell interference.
- ✓ No need for handover between remote units.
- ✓ Scalable capacity and coverage.

## Ordering Information

Model	Description
<b>CIUM</b>	Cellium Interface Unit, 4 x 4 5G-NR/LTE TDD MIMO ports
<b>CEUM</b>	Cellium 1:8 Expander Unit, 4 x 4 5G-NR/LTE TDD MIMO
<b>CRUM</b>	Cellium Remote Unit, Triple 4 x 4 5G-NR/LTE TDD MIMO,
<b>CLUM, Future</b>	Cellium Line Extender Unit
<b>CFUM, Future</b>	Cellium Fiber Extender Unit

## CIUM Specifications



Feature	Description
<b>Radio</b>	
<b>Technology</b>	NR/LTE
<b>Duplex mode</b>	TDD
<b>Frequency*</b>	3300–3600MHz or 3700–4000MHz
<b>RAN RF connectivity</b>	12x NEX10 (F)
<b>Number of MNOs</b>	3
<b>Bandwidth per MNO</b>	Up to 100MHz
<b>Tx/Rx path</b>	4/4
<b>Max DL/UL MIMO</b>	4/4
<b>Synchronization</b>	Signal source transparent
<b>General</b>	
<b>CEU connectivity</b>	RJ45, CAT6a and above
<b>Power supply</b>	PoE
<b>Power consumption</b>	<70W
<b>Dimensions</b>	1.5U 19" rack (66x436x330mm)
<b>Weight</b>	<4kg
<b>Operating temperature</b>	0°C - 40°C
<b>LED</b>	Status
<b>Reset</b>	Push button
<b>IP rating</b>	IP30
<b>Mounting</b>	Wall, rack
<b>Cooling method</b>	Passive cooling

\* Additional frequencies are optional

## CEUM Specifications



Feature	Description
<b>CRUs/CEUs connectivity</b>	8 x RJ45 POE++
<b>Cascading capabilities</b>	Level 1 – up to 8 x CRUs, Level 2 – up to 64 x CRUs
<b>CIU connectivity</b>	1 x RJ45
<b>LAN connectivity</b>	8 x RJ45 10GbE
<b>Management port</b>	RJ45
<b>Operating temperature</b>	0°C – 40°C
<b>LED</b>	Status
<b>IP rating</b>	IP30
<b>Power supply</b>	220-110V AC / 48 VDC*
<b>Power consumption</b>	<60 W (stand-alone), <700W (with 8 x CRUs)
<b>Dimensions</b>	1.5U 19" rack (66x436x330mm)
<b>Weight</b>	<6kg
<b>Mounting</b>	Rack, wall
<b>Cooling method</b>	Active cooling

\* Different SKUs

## CRUM Specifications



Feature	Description
<b>Radio</b>	
<b>Technology</b>	NR/LTE
<b>Duplex mode</b>	TDD
<b>Frequency*</b>	3300-3600MHz or 3700-4000MHz
<b>Number of MNOs</b>	3
<b>Bandwidth per MNO</b>	Up to 100MHz
<b>Tx/Rx path</b>	4/4
<b>Max DL/UL MIMO</b>	4/4
<b>Max EIRP</b>	2W [33dBm]
<b>General</b>	
<b>CEU connectivity</b>	RJ45, 10GbE, 1x CAT6a and above
<b>Power supply</b>	PoE++ or DC**
<b>Power consumption</b>	<35W
<b>Dimensions</b>	270x270x70 mm (10.6x10.6x2.7")
<b>Weight</b>	<3.5Kg
<b>Operating temperature</b>	0°C - 40°C
<b>LED</b>	Status
<b>Reset</b>	Push button
<b>IP rating</b>	IP30
<b>Mounting</b>	Ceiling / suspended ceiling
<b>Cooling method</b>	Passive cooling

\* Additional frequencies are optional

\*\* Different SKUs

Cellium Technologies Ltd.  
 26 Habarzel St., Tel Aviv 6971036, Israel  
[info@cellium.net](mailto:info@cellium.net) | [www.cellium.net](http://www.cellium.net)