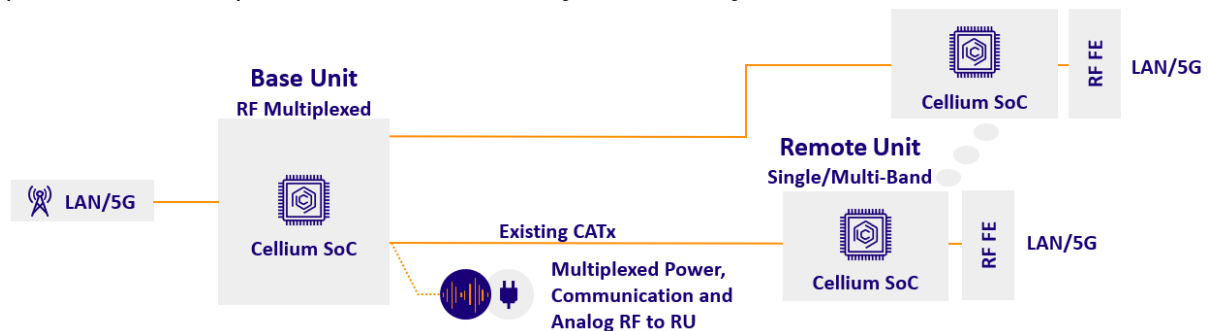


## Summary

Cellium's patented EdgeAir 'p' family solution for private networks provides a cost and power efficient solution for cellular 5G-NR (New Radio) coverage in buildings alongside legacy Ethernet for both LAN and WiFi with a very low TCO (Total Cost of Ownership). The EdgeAir system, based on Cellium's CEL1000/CEL2000 SoCs, offers an analog solution that is RAT (Radio Access Technology), RAN (Radio Access Network) vendor, and topology agnostic. For downstream traffic the EdgeAir Base Unit (BU) will down-convert the radio frequencies to frequencies suitable for transmitting over standard CATx copper cables and the EdgeAir Remote Unit (RU) will then up-convert the radio frequencies. For upstream traffic the frequency conversion is reversed. The legacy LAN/WiFi signals are not effected and are passed thru the same copper cables. The end-user will enjoy premium 5G-NR performance and latency without any cell handover issues.



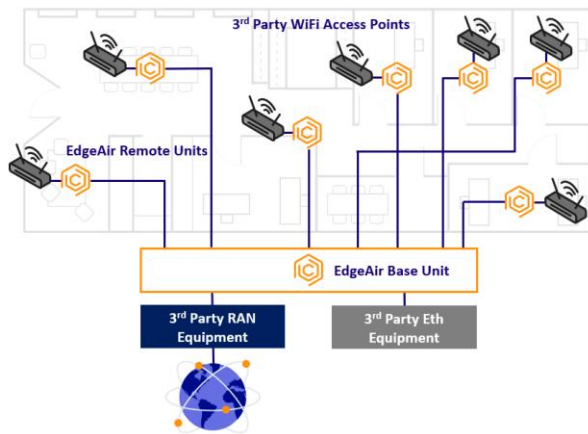
**Figure: EdgeAir Distributed IF Technology and SoC**

## Introduction

Wireless indoor connectivity has become mandatory for private networks. It is driven by the growth of emerging new applications such as Industry 4.0, connected healthcare, digitized education, mining, intelligent retail, IoT (Internet of Things), and the need to support AGV (Automated Guided Vehicles), sensors, actuators, and cameras. Facility and IT (Information Technology) managers have been challenged to deploy different systems and solutions for wireless coverage and capacity in an effort to provide indoor users and devices with the bandwidth, mobility, and user experience required.

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. The present need for private networks is to support 5G-NR cellular for those use cases where WiFi is not sufficient, and while in other use cases to provide converged solutions of both 5G-NR and WiFi. This has become a mandatory requirement for current and even more for future private networks. It has to be done in a cost efficient manner, by utilizing existing IT equipment, and with lowest CapEx (Capital Expenditures) and OpEx (Operating Expenses).

## Solution



**Figure: Indoor Deployment**

Cellium's patented technology, IF (Intermediate Frequencies) over Copper (IFoC), provides a RAT, RAN vendor, and topology agnostic solution for 5G-NR and indoor distribution over CATx copper. The EdgeAir 'p family is the solution for private network operators indoor antenna subsystem supporting 5G-NR cellular with legacy WiFi and Ethernet. It consists of four family members:

- The EdgeAir Base Unit (BU) has four RF ports to RAN equipment and connects eight indoor Remote Units over CATx copper cables. It has one up to 10GbE port that supports legacy LAN and WiFi.
- The EdgeAir Remote Unit (RU) is a radio unit consisting of antennas, filters, and FEMs (Front End Modules). It has one up to 10GbE port for 3<sup>rd</sup> party WiFi APs (Access Points).
- The EdgeAir Line Extender Unit (LU) allows to extend the distance from the BU to the RU by an additional leg (100m).

- The EdgeAir Expander Unit (EU) can be cascaded to each BU's RU port providing eight RU ports. Thus, a fully populated BU can provide 64 RU ports.

## 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 7 GHz.
- ✓ 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
pB4081	EdgeAir Base Unit, 4 x 5G-NR MIMO ports, RJ45 10GbE LAN port, 8 x RJ45 RU ports
pR4011	EdgeAir Remote Unit, 4 x 4 5G-NR MIMO, RJ45 10GbE LAN port, RJ45 BU port
pL4001, Future	EdgeAir Line Extender Unit, 4 x 4 5G-NR MIMO
pE4081, Future	EdgeAir Expander Unit, 8 RU ports

**Specifications**  
**pB4081 Specification**


Feature	Description
RAN split option towards RU	IF ("split 9")
Number of connected RUs	8 RJ45
Cascade mode	1 level EU
RAN interface	4 x SMA RF
LAN interface	RJ45 10GbE
RU interface	8 x RJ45 POE++ Type 3
Management port	RJ45 1GbE
LEDs	Power, Link, Activity
Reset	Push button
Operating temperature	0°C - 40°C
IP rating	IP30
Power supply	48 VDC/220-110V AC
Power consumption	<60 W (stand-alone) <900 W (with 8 RUs)
Dimensions	2U 19" rack
Weight	<10 kg
Mounting	Rack

## pR4011 Specification



Feature	5G-NR
<b>Radio</b>	
Bandwidth	Up to 100 MHz
Deployment options	NR only
3GPP compliance	Release 15
Tx path	4
Rx path	4
DL MIMO	4*
UL MIMO	4*
DL modulation	256 QAM
UL modulation	64 QAM
Synchronization	Signal source transparent
<b>Physical / Interfaces</b>	
BU Interface	RJ45, 10GbE, CATx, 100m reach
LAN Interface	RJ45, 10GbE
LEDs	Status, NR, Link, Activity
Reset	Push button
Antenna type	Internal
Operating temperature	0°C - 40°C
IP rating	IP30
Power supply	POE++Type 3
Power consumption	<51 W
Dimensions	<270 x <270 x 70 mm
Weight	<2.5 kg
Mounting	Ceiling / suspended ceiling
Cooling method	Passive cooling

\*In cooperative 4x4 MIMO (Network MIMO) the BU can transceive 2x2 MIMO to each of two RUs. The UE (User Equipment) interacts with the two RUs at the same time.