EdgeNectar 5G In-Building Solution

Introduction

As wireless connectivity becomes more crucial for businesses, venues, and residential complexes, the demand for reliable indoor coverage grows. Traditional cellular infrastructure often has difficulty providing seamless indoor connectivity due to signal attenuation caused by walls, glass, and other structural elements. An Indoor Neutral Host (INH) system offers a comprehensive solution to these challenges by allowing for shared wireless infrastructure. This document outlines the concept, benefits, and architecture of INH solutions.

INH and Private 5G Synergies

Private 5G networks and indoor neutral host solutions work together to address different yet related needs in modern connectivity. Private 5G networks offer secure, high-performance wireless communication tailored to an organization's requirements. This ensures reliable connectivity for critical applications such as manufacturing automation, healthcare, and enterprise IoT. In contrast, indoor neutral hosts provide shared infrastructure that allows multiple mobile network operators (MNOs) to deliver seamless coverage within venues like malls, stadiums, and office buildings, all while reducing deployment costs. Together, these technologies create a unified communication ecosystem that combines the customizability of private 5G with the cost-efficiency and scalability of shared networks.

The synergy lies in their ability to coexist and complement each other's functionality. For instance, a private 5G network can handle an enterprise's internal operations while the neutral host ensures ubiquitous public network access for employees, visitors, and customers. This dual setup enhances user experiences by providing consistent indoor coverage and supports diverse business models. Enterprises can leverage the neutral host infrastructure to offload connectivity requirements, minimizing the capital and operational expenses of expanding their private 5G networks. Moreover, the collaboration between private 5G and neutral host solutions aligns with the broader digital transformation goals, enabling innovative use cases that thrive on reliable, high-capacity, and flexible connectivity.

Key Features

- **Multi-Operator Support:** INH systems accommodate several MNOs while utilizing the same infrastructure.
- **Scalability:** Flexible design allows adaptation to venue size and capacity requirements.

- **Cost Efficiency:** Shared infrastructure reduces the overall cost for individual operators.
- **Advanced Management:** Centralized management ensures optimal performance and quick issue resolution.

Indoor Small Cells vs. DAS: Efficiency and Deployment

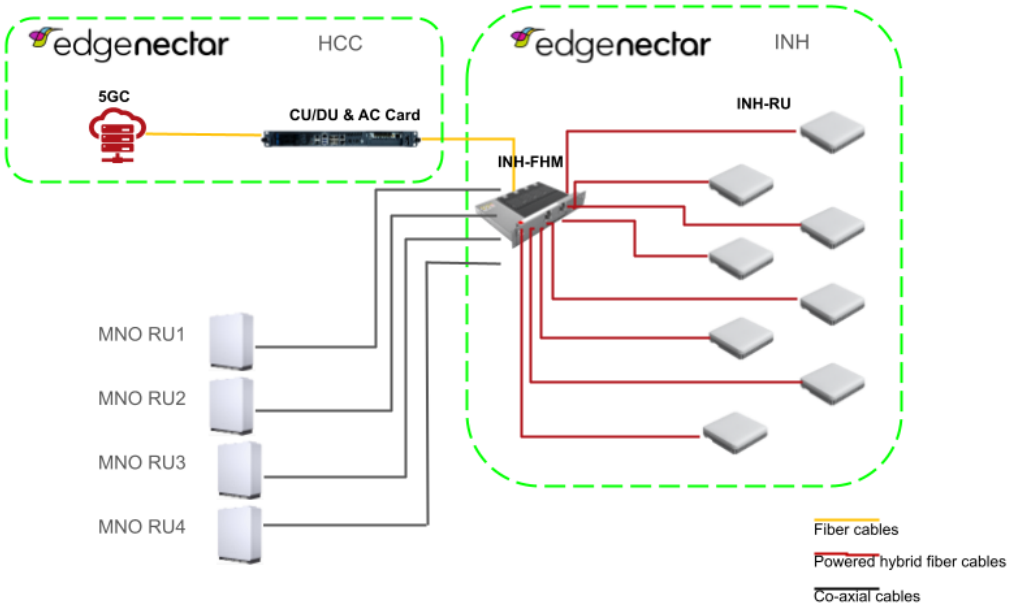
Indoor small cells offer several advantages over Distributed Antenna Systems (DAS) in terms of deployment flexibility and efficiency. Small cells are self-contained, plug-and-play solutions that provide localized coverage and capacity within a specific area, such as an office or a shopping mall. Their compact size and simplified deployment process make them cost-effective, especially for venues with lower budgets or more minor coverage needs. Unlike DAS, which requires extensive cabling and carrier coordination, small cells can be deployed quickly and scaled easily to accommodate increasing traffic or changing requirements.

Performance and Technology Benefits

In terms of performance, small cells support advanced features like carrier aggregation, dynamic spectrum sharing, and integration with 5G networks. These capabilities allow small cells to deliver better data speeds and improved user experiences compared to traditional DAS systems, which are often limited to amplifying existing signals without advanced processing capabilities. Furthermore, small cells offer the flexibility to support multiple carriers independently, while DAS typically requires collaboration with various stakeholders, increasing complexity. As a result, small cells provide a more adaptable and future-proof solution for indoor wireless connectivity.

EdgeNectar 5G in-building solution architecture and key components

The diagram below illustrates EdgeNectar's small cell-based in-building solution. It comprises EdgeNectar’s Integrated Network Hub (INH) solution and EdgeNectar’s Hyper Converged Core (HCC). While INH provides the neutral host RAN functionality, the HCC can provide 4G/5G core functionality and enables enterprises to add on different applications accordingly.



Indoor Neutral Host (INH)

EdgeNectar’s INH consists of two main components: INH-FHM and INH-RU. INH-FHM serves as the frontal gateway, featuring eight eCPRI ports to support multiband small cells. It can handle input from four bands provided by Mobile Network Operators (MNOs) and multiple digital inputs directly from baseband units (CU/DU). INH-RU consists of 8T8R multiband radios, each with a transmit power of 25 dBm per transmitter.

Hyper Converge Core (HCC)

While the solution can be deployed as an INH, it can also support Private 5G by connecting to EdgeNectar's HCC. It includes 5G Distributed and Central Unit (DU/CU) and 4G/5G core network components. In this setup, one of the bands designated for small cell support will be used for Private 5G, while other bands will be allocated to mobile operators for the INH.

Implementation Scenarios and Benefits

EdgeNectar's 5G in-building solution offers a complete private 5G network that enhances enterprise security and reliability. With inherent RAN neutrality, it supports coverage extension for existing MNOs without additional investment while delivering private 5G for businesses. EdgeNectar’s 5G in-building solution simplifies deployment and reduces costs through hybrid power over fiber.

Enterprises without a legacy solution to improve indoor coverage for mobile network operators (such as DAS) can incorporate this capability into their private 5G deployment at no additional cost. For enterprises with existing neutral host infrastructure, implementing the EdgeNectar solution will allow them to offer an advanced small cell solution as a neutral host for their hosted MNOs, significantly enhancing the experience for their tenants.

Due to their simplified architecture and lower infrastructure requirements, indoor small cell deployment is more cost-effective than traditional Distributed Antenna Systems (DAS) for 5G. Small cells are easier to install and configure, which helps reduce labor and installation costs. Additionally, they can be deployed incrementally based on coverage and capacity needs, providing greater flexibility and eliminating the high upfront investment associated with DAS. This modular approach makes small cells an efficient and cost-effective solution for delivering high-speed, low-latency 5G connectivity in indoor environments.

INH Product Specifications

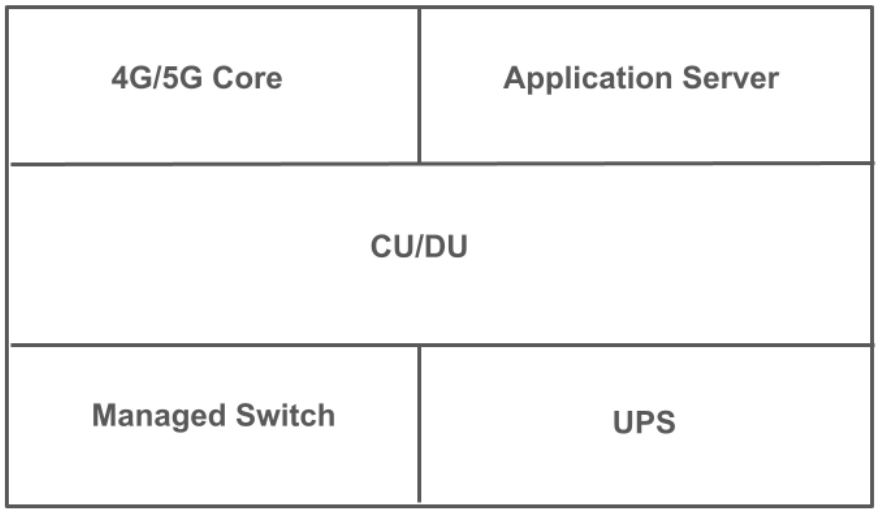
INH-FHM	
Interface	25G eCPRI Interface
Max Radio Unit per AU	8(without cascade)
VSWR	1.6
Power Supply	100-240v AC, 50Hz/48V DC
Power Consumption	< 85W
Operating Temperature	-10 °C ~ +45 °C| 14 °F ~ +122 °F
Dimension (L x W x H)	440 x 329 x 88mm| 17.32 x 12.95 x 3.46 in
Weight	8.5 kg | 18.74 lbs
Ingress Protection	IP30

INH-RU	
Technology	4G/5G
Channel Bandwidth	LTE: 5/10/15/20 MHz NR: 20/60/80/100 MHz
TRX Configuration	2T2R/4T4R
Composite Output Power	25dBm

EVM	64QAM/256QAM, ≤5%
Power Supply	12V DC/10A
Power Consumption	< 80W
Operating Temperature	-10 °C ~ +45 °C| 14 °F ~ +122 °F
Dimension (L x W x H)	280 x 280 x 75mm| 11.02 x 11.02 x 2.95 in
Weight	< 4.5 kg | 9.92 lbs
Ingress Protection	IP30

HCC Product Specifications

EdgeNectar's HCC consists of converged 4G/5G core and application server functionalities deployable on any server as bare-metal or on the cloud. CU/DU functionality for the private 5G network can be hosted on the same server. The hardware deployments will include managed switch and UPS.



EdgeNectar Inc.
111 N. Market Street, Suite 300
San Jose, CA 95113, USA

Tel: +1 669 225-8016
www.edgenectar.com