



## INNOVATION IN THE CELLULAR TECHNOLOGY SECTOR AND THE ROLE OF PROSE TECHNOLOGIES

ABiResearch

PROSE

Jake Saunders: Vice President  
Dean Tan: Industry Analyst

White Paper

# THE VERSATILITY OF A DAS

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## SINGLE AND MULTIPLE OPERATOR TENANCY

For indoor wireless infrastructure, there are two distinctive tenancies: a single operator tenancy and a multiple-operator tenancy. A single tenancy implies that the infrastructure only supports a single CSP's frequency bands and services, while the other allows services from multiple CSPs to be supported. In a multi-operator scenario, the cost of deployment could be shared among the parties. This helps make it more cost effective for deepening coverage and providing better QoS.

With indoor connectivity, landlords and building owners will need to assess the profile of the users within. For example, the assessment could include whether the users are from a single CSP or from different CSPs. This will determine the type of indoor wireless connectivity solution that best suits the needs of the users, while balancing the cost of deployment.

## DAS VERSUS SMALL CELLS

A DAS is a system of small-sized antennas distributed across the venue or building to provide coverage. The DAS feeds off a centralized RF signal connected via fiber, coax cable, and/or Cat 6 cable. It can support thousands of users, and is suitable for office towers, stadiums, airports, and other large venues. With 5G, new types of digital DASs, such as the Digital Radio Solution (DRS), which is an integrated radio antenna solution, have been released to meet capacity demand. Small cells are cellular radio access equipment categorized by output power range. A small cell with an output power of <1 Watt (W) is defined as a "femtocell" class small cell. Small cells with output power between 1 W and 5 W are "picocell" class small cells, and those with output power between 5 W and 10 W are "microcell" class small cells. For indoor coverage, the small cells are typically in the femtocell or picocell categories.

**Table 1: Types of Small Cells by Output Power Range**

(Source: ABI Research)

| CHARACTERISTICS             | FEMTOCELL (RESIDENT) | PICOCELL (ENTERPRISE)        | FEMTOCELL (STREET LEVEL)                                     | PICOCELL (STREET LEVEL)                                      | MICROCELL (ROOFTOP)                      | MACROCELL                      |
|-----------------------------|----------------------|------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|------------------------------------------|--------------------------------|
| Characteristics             | Femtocell (Resident) | Picocell (Enterprise)        | Femtocell (Street Level)                                     | Picocell (Street Level)                                      | Microcell (Rooftop)                      | Macrocell                      |
| Output Transmit Power (W)   | 10 mW to 100 mW      | 100 mW to 250 mW             | 900 mW to 1 W                                                | 1 W to 5 W                                                   | 5 W to 10 W                              | 10 W and above                 |
| No. of Users                | 4 to 8 Users         | 8 to 16 Users                | 16 to 64 Users                                               | 16 to 128 Users                                              | 100+ Users                               | 1,000+ Users                   |
| Coverage Radius             | 10 m to 100 m        | 250 m to 500 m               | 500 m to 750 m                                               | 0.5Km to 1.5Km                                               | 1 km to 3 km                             | 1 km to 25 km                  |
| Typical Deployment Scenario | Indoor Consumer      | Indoor Consumer & Enterprise | Indoor/Outdoor on Public Infrastructure (e.g., Street Lamps) | Indoor/Outdoor on Public Infrastructure (e.g., Street Lamps) | Building Façade, Rooftops, Utility Poles | Tower Masts, Rooftops, Outdoor |

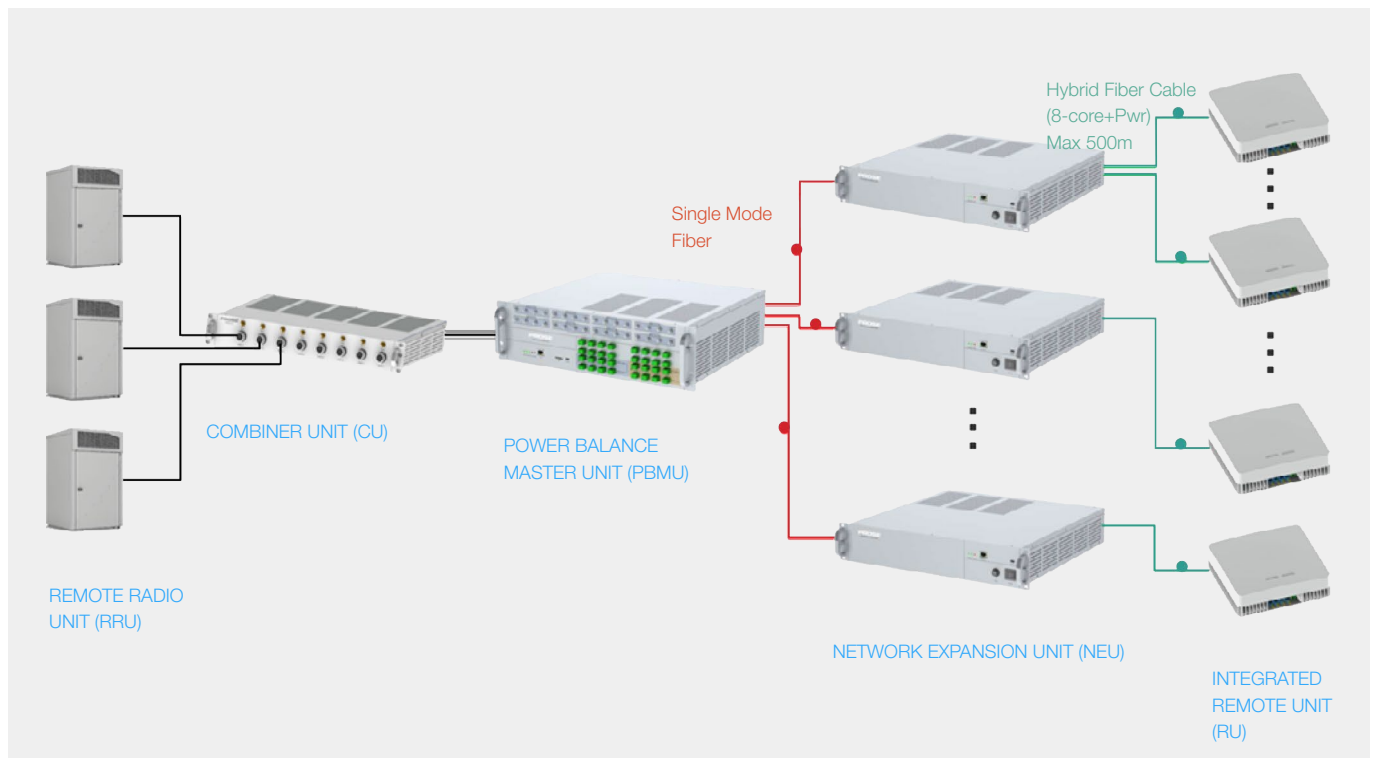
While small cells and DASs are both indoor wireless connectivity solutions, there are a few reasons why a DAS is still a go-to option today. In venues with thousands of users and the need to support different operators' frequencies, a DAS deployment can be the more cost-effective choice. For futureproofing, a legacy DAS can be upgraded to an active DAS, which allows it to work with new frequency and higher-order MIMO configurations. Other strategies include virtualization, spectrum refarming of legacy bands for 5G, and performing a system overlay.

## PROSE TECHNOLOGIES SOLUTION

In the 5G era, the 3,300 – 3,800 MHz band is the sweet spot for CSPs. It delivers enhanced capacity compared to the legacy bands (<3 GHz bands) and better coverage than the mmWave bands. However, legacy DASs are not equipped to support higher frequency bands and have limited MIMO capability. While the industry has a DAS solution capable of supporting up to the 4,000 MHz range with 4x4 MIMO, the cost and high losses profile resulted in its low adoption.

**Figure 8: Active DAS Architecture Supporting 4x4 MIMO**

(Source: Prose Technologies)



To meet these challenges and ensure competitiveness, Prose developed a cost-effective active DAS platform supporting multi-operators, multi-band, and 2x2 & 4x4 MIMO capabilities for the 5G era. This provides an instantaneous bandwidth of more than 1800 MHz per integrated remote unit. Additionally, CSPs can also benefit from a more cost-effective solution by overlaying the 4x4 MIMO active DAS onto the existing passive infrastructure to enable 5G connectivity.

**Source: ABI Research (2022). INNOVATION IN THE CELLULAR TECHNOLOGY SECTOR AND THE ROLE OF PROSE TECHNOLOGIES.**