Application Note
Distributed Antenna System (DAS) Applications

The ever-growing demand for access to wireless communications and data systems is driving the need for improvements in wireless infrastructure. This can be said for indoor, outdoor and subterranean environments where line-of-sight coverage is not feasible. Furthermore, these systems must support the various wireless networks: 4G, GSM, LTE, and Tetra to name a few, in both urban and rural areas. The solution is a Distributed Antenna System (DAS). Below is just one example of a DAS system and its associated components.

A DAS becomes a necessity in locations such as: hospitals, large office buildings, stadiums, convention centers, university campuses, airports, farms, subway and metro stations, etc. Access to wireless communication not only aids the public, but is also mandatory for law enforcement, emergency medical, and fire services. As realization of the importance of DAS became apparent, so has backing by local and federal governments through rule making. One benefit of these governmental actions has been an increase in the speed and efficiency of DAS deployment.

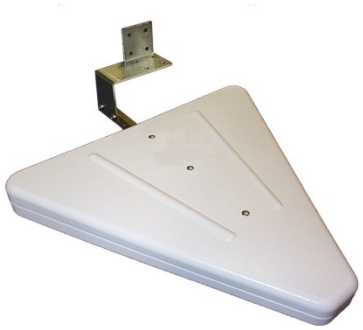
A main component of any DAS is the selected antennas. These antennas must offer a wide operational frequency range, and good RF performance to cover WiFi and all cellular and wireless services.

In addition, these antennas must be unobtrusive, easy to install and maintain, durable, and high quality. Due to the number of installed antennas, these factors all play a major role in the selection of antennas.

To meet these demands, AR's SunAR RF Motion has developed a series of antennas to address DAS requirements. More specifically, these antennas are more directional than standard DAS antennas allowing them to excel in applications such as subway tunnels, hotel hallways, or directed at crowds at a sports venue. In addition, these antennas are broadband, allowing them to cover a larger number of communication bands, potentially reducing the number to deployed DAS antennas in a system, versus standard narrowband DAS antennas. The SunAR DAS antennas' innovative design and manufacturing techniques result in long-lasting strength, excellent performance, and provide an aesthetic appearance. These antennas can be used in large, small, passive, active, and hybrid systems.

SunAR offers four antenna models for DAS.

Model LP425R is a directional antenna designed for transmitting and receiving wireless communications signals. The broadband characteristics of the log-periodic structure enable it to operate over a very wide frequency range with constant gain. This DAS antenna out performs many antennas in this class, and is designed for more rugged environments. Below is an image of the LP425R.



LP425R 400 MHz – 3 GHz

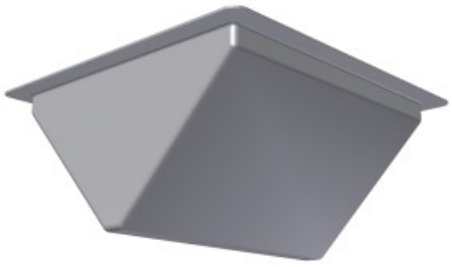
Model's LP425PCB, LP6530PCB, and LP6560PCB are low-profile directional antennas designed for transmitting and receiving wireless communications signals. These antennas are etched onto a low-loss microwave substrate material and mounted in a weather resistant housing that is only 1/2" inch thick. Like the LP425R, the broadband characteristics of the enclosed antenna structures enable it to operate over a very wide frequency range with constant gain. There are four mounting holes for installation onto any flat, non-conductive surface, such as an office wall or ceiling. Below are images of the LP425PCB, LP6530PCB, and LP6560PCB.

LP425PCB 400 MHz – 3 GHz

LP6530PCB 650 MHz – 3 GHz

LP6560PCB 650 MHz – 6 GHz

The MIMO antenna, shown below, is actually two antennas, cross polarized, in a single package with two RF connectors. This design provides polarization diversity in a MIMO environment. The MIMO configuration has more throughput than a single antenna.



LP6530PCB-MIMO 650 MHz – 3 GHz

Broadband Directional Antenna

Each antenna is innovative and uses manufacturing techniques that result in long-lasting strength and performance.

The table below shows the specifications for each model.

Model	Freq. Range	Gain (dBi)	BW (deg.)	Ω	VSWR	Conn. *	Input Pwr. (W)	Length x Width (inches)	Weight in lbs (kg)
LP425PCB	400 MHz – 3 GHz	5.5	70° V Plane 100° H Plane	50	<2:1	N Female	25	15.5 x 11.5	2 (0.7)
LP425R	400 MHz – 3 GHz	7	70° V Plane 100° H Plane	50	<1.8:1	N Female	200	19 x 16	2 (1)
LP6530PCB	650 MHz - 3 GHz	7	70° V Plane 100° H Plane	50	<1.5:1	N Female	25	15.5 x 11.5	2 (0.7)
LP6560PCB	650 MHz - 6 GHz	6	70° V Plane 100° H Plane	50	<1.5:1	N Female	15	15.5 x 11.5	2 (0.7)

* optional connectors include 7/16 DIN and 4.3-10

Conclusion:

With today's evolving wireless and cellular demands, it is important to deliver these services to all environments. In places where traditional distribution services cannot provide the required signal strength, DAS can be used. Deploying a DAS is made easier by choosing the right antennas. These antennas must be designed: using quality processes and components, reliable, consistent performance from unit to unit, and allow for easy installations in a wide variety of situations, both indoor and out. The DAS antennas described in this applicable meet these demanding requirements, and more. SunAR RF Motion, formally Sunol Sciences, has a long history of technically advanced, high quality, and reliable products. These DAS antennas represent a continuation of this core belief.