Cobham Antenna Systems

Microwave Antennas

Specialist Antenna Design and Manufacture

Multi-Beam Antennas for Ultra Fast MIMO

The most important thing we build is trust

Antennas for Security and Surveillance

WiMAX, LTE and FRA Base Station Antennas

Antennas for Vehicles

Antennas for WLAN, RFID, Cellular, DAS

Multi-Beam Antennas for Ultra Fast MIMO

Multi-Beam Base Station

Multi-Beam Hub Base Station

Multi-Beam Hub Base Station antenna, MBA6-3.5DS45/2045, has been developed to enable MIMO (multiple input multiple output) radio system operators to meet their goal of 1Gbps/km2 anywhere within a cell.

Designed for high speed MIMO 4G (and beyond) urban access for backhaul, this was originally a European Union funded project that is now finished and available.

Next Generation Deployment

By removing barriers to next-generation network deployment, this multi, narrow beam antenna can allow a dramatic increase in capacity over existing communication systems. It is an essential component for improving infrastructure capacity density of the current mobile network by an order of magnitude (10x). Projected deployment for this antenna is to communicate with a network of "below-rooftop" Access Base Stations. The system strategy with these access base stations will allow self-backhauling.

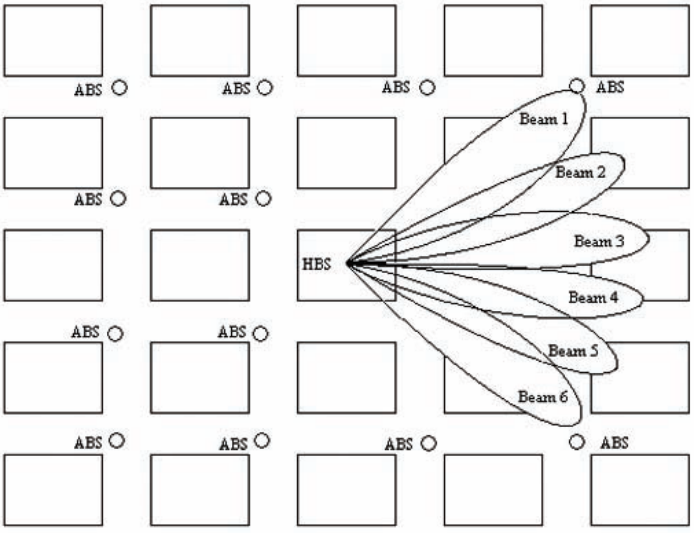
Patterns

This Multi-Beam antenna has 90° coverage (a 90° arc) using six individual narrow beam patterns each with a half power beamwidth of 15°. MIMO capability is provided with ±45° polarisation in each of the six 15° sectors.

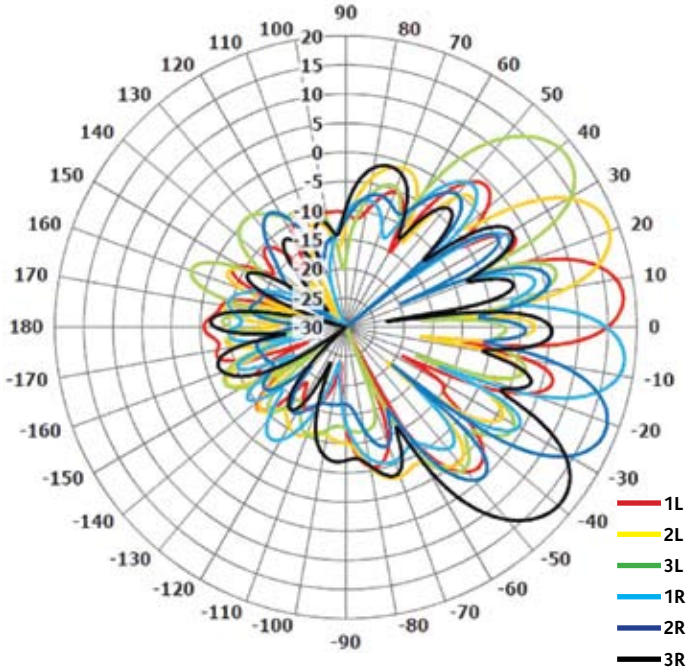
The advantage of this format is that a narrow beam can permit high density coverage within a specific narrow area for a high level of frequency re-use and is more efficient that installing 6 separate narrow beam directional antennas. By positioning four Multi-Beam antennas in a square formation, complete 360° coverage is achieved as this provides 24 dual-polarised beams. The current system benefits from meeting ETSI specification for Multi-Beam antennas (EN 302 326-3 V.1.1.2), providing low side-lobe levels for greater system efficiency.

HBS - Hub Base Station Multi-Beam antenna can provide 90° azimuth coverage in two polarisations from six high gain beams. Four Hub Base Stations are used at a central location for 360° coverage. The HBS communicates with a network of Hub Subscriber Stations (HSS).

Manhattan Grid" formation



Measured azimuth patterns for the 6 x 15° beams showing how little degradation of gain there is across the set of patterns. Note each beam has two polarizations (±45°)



HSS - Hub Subscriber Station antenna. Communicates with the nearest HBS

ABS - Access Base Station antenna. Co-located with the HSS antennas below roof top level

Security and Military Applications

For Security and Military applications the technology can be scaled to cover other frequency bands, with applications such as communications to multiple mobile platforms, ground or airborne. The benefit is that higher gain is provided over a wider angle than a single sector antenna. Communications are more secure and less prone to intercept and jamming.

Compact

The antenna is compact given that it provides 2 x 6 beams each with 17dBi peak gain. For dense urban deployment, this antenna will reduce wind-load on towers and the cost of installation compared with conventional alternatives.

Technology

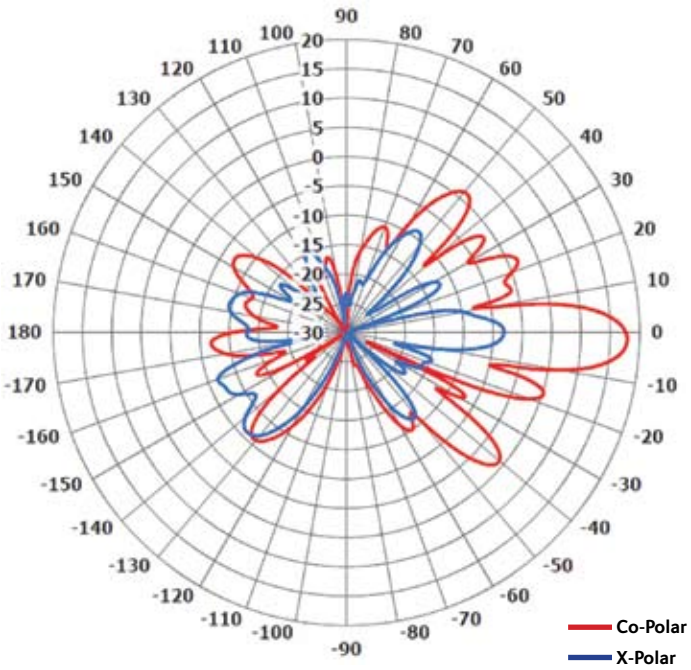
The antenna comprises 8 dual-polar (±45°) sector elements fed via two Butler matrices which are fully integrated into the antenna eliminating the need for 16 phased-matched cables making for a more efficient and cost-effective antenna.

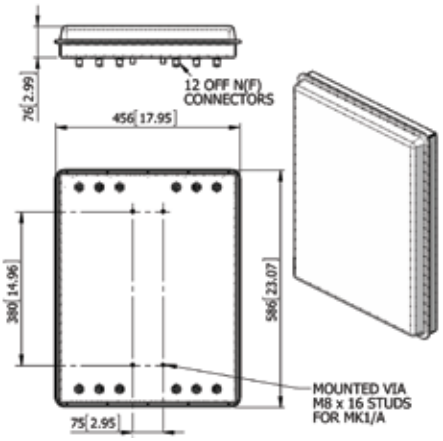
Electrical down-tilt is a nominal 2° across the band of interest, i.e. 3.40 – 3.60GHz with an elevation beamwidth of 10° to the half-power point.

Deployment

The Hub Base Station antenna is intended for deployment within an urban "Manhattan Grid" formation, for coverage through 360° by virtue of positioning four antennas just above roof-top height, each covering a 90° sector and working in the 3.40 – 3.60GHz band. These communicate with virtually line-of-sight dual-slant linear Hub Subscriber Station (HSS) antennas, sited below rooftop within the grid and sharing their location with (different frequency) Access Base Station (ABS) antennas which point up and down streets to communicate with (personal) mobile terminals. The installations are intended to be cost effective; multi-beam technology will be more efficient to install where antenna mounting considerations such as weight, wind speed, and mast/roof-top rental are paramount. HBS Multi-Beam antennas reduce interference within the system, increasing signal to noise ratios. Re-use of the spectrum for this dense data-rate means lower license fees for operators per bit of data transmitted. Below-rooftop deployment and co-location of the Hub Subscriber Antenna/ Radio and Access radio/antennas reduces the cost of installation and may allow quicker deployment.

Typical measured elevation pattern for each of the 6 beams within the array





MBA6-3.5DS45/2045

ELECTRICAL

Frequency	3.40 - 3.60GHz
Gain	17dBi
Polarisation	Dual slant 45°
Beamwidth, Azimuth	15°
Beamwidth, Elevation	9°
Cross Polar	15dBi
VSWR	2:1
Power Rating	20W
Electrical Tilt	2° down

MECHANICAL

Standard Finish	White
Mass	7.5kg (16.5lbs)
Temperature	-20 to +50°C
Wind Loading	40.4kg (88.9lbs) at 100mph

Spherical Near-Field Testing

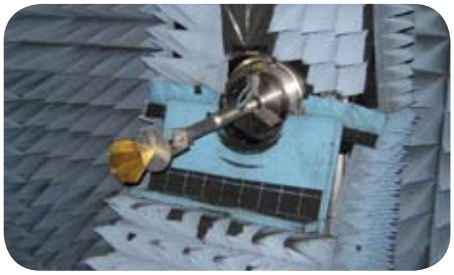
The on-site spherical near-field test facility supports our development facilities and technical service to customers.

It provides 3-D radiation pattern data to verify specifications and ensure compliance with stringent radiation pattern envelopes. The far field radiation pattern can be calculated in any direction, in any polarisation, circular or linear, at any angle.

Operating within 0.4GHz to 40GHz, it has dynamic range performance down to 0.8GHz, and sufficient sensitivity to test antennas in the lower frequency range.

Gain and directivity measurements can be provided as well as phase. This allows for phase and amplitude matching of batches of spiral antennas for Direction Finding systems.

An additional benefit is the ability to perform back projections on to a given plane within the measurement sphere to aid identification of potential material defects. It also help to determine if there is unwanted radiation off the feed circuit and the affects of coupling within a circuit that may otherwise cause amplitude or phase corruption within an array.



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