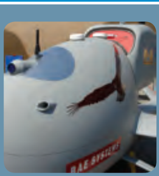
Cobham Antenna Systems
Microwave Antennas

COBHAM

Unmanned Systems and Control Centre Antennas
Airborne, Robots, Ground Vehicles. Fixed & Mobile Control Centre

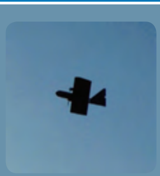
The most important thing we build is trust

Ground Control Centre, Fixed and Mobile



Critical and efficient communications

Control links and robotics



Antennas used worldwide on all types of unmanned airborne vehicles and target drones

Remote Air or Ground Based Platforms

Unmanned Vehicle Antennas and Applications

Unmanned helicopter

Unmanned Vehicle Antennas

Unmanned Systems (UMS) are providing an increasing number of operational functions including airborne and remote ground surveillance, video transmission, border patrol and tactical systems. Uninterrupted communication to the control centre is vital.

As the demand for Unmanned Systems increases, so does the need for a wider range of antennas for payloads, data communications systems, command and control.

Performance requirements and cost criteria are an important consideration when selecting the antenna. Cobham Antenna Systems, Microwave Antennas has a range of standard cost-effective, entry-level, high performance antenna designs that are already used on Unmanned Systems.

As frequencies increase from L-band to Ku-band to provide wider bandwidths enabling higher data rates, the antenna selection is critical to ensure system performance, battery-life and transmission range.

Ground Control Centre Antennas

(see page 8)

Antennas are available for both control centre as well as remote platforms.

The control centre antenna usually provides the higher gain part of the link and may be a medium to high gain omni, medium gain sector or a high gain directional antenna.

A directional antenna is likely to require a two-axis steering system. A less complex but compact multi-sector antenna array provides intermediate range coverage for communicating with a UAV. This type of arrangement can be used for quick deployment, tactical applications.

A full range of multi-sector and multi-omni arrays are available.

Cranfield Aerospace Prototype Boeing X-48B Blended Wing Body UAV

Cranfield Aerospace built two complete working prototypes of the X-48B BWB (Blended Wing Body), an unmanned airborne scale model, which is a joint venture between Boeing Research & Technology, NASA and the US Air Force Research Laboratory.

After 80 flights, the X-48B is demonstrating that the BWB can be designed to overcome the challenges of low speed flight.

The blade antennas weigh less than 20 grams, are robust, weatherproof and measure 105x30x2mm. Mounted on a cross spar, each antenna covers a different frequency and is part of the telecommand, telemetry and AV systems.

SBA-1480/1297
1.43 - 1.52 GHz

SBA-1790/1298
1.75 - 1.82 GHz

SBA-2295/1299
2.20 - 2.39 GHz

- High gain, vertically polarised omni antennas are installed in aerodynamic foil structures
- Common Data Link (CDL) Ku-band omni antennas have circular polarisation and up to 4dBiC gain
- Directional antennas for communications between an airborne towed target and the towing aircraft
- Radar cross-section enhancement and radar detection
- Pattern data is available for all antennas
- Development projects undertaken

Swedish Space Corporation science gondola and balloon

The scientific instrument MIPAS/B-Tellis was launched from the Esrange Space Center in northern Sweden reaching a height of 34km and landed after 14 hours in eastern Finland. The rugged antenna EVD2-1450/124 mounted beneath the gondola and completely exposed, helped provide scientists with the data required.

EVD2-1450/124
(page 4)

Content	Page

Unmanned Vehicle Antenna Types

Predator UAV

Unmanned Vehicle Antennas

The antennas that are used on unmanned vehicles are, in general, rugged, flexible dipole or blade antennas with omni-directional coverage.

Directional blade antennas have been developed for specialist applications.

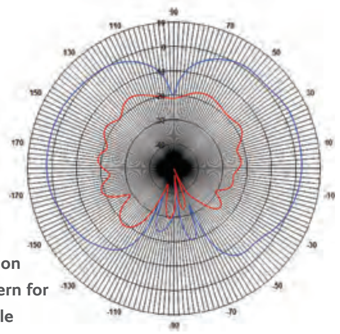
Standard flange mounting arrangements are available, however special mounting arrangements can be designed. Durable and robust, every effort is made to ensure the antenna meets the required specification to avoid link breakdown.

See page 7 for information on polarisation mismatch.

Omni - Rugged Dipole

Rugged dipoles typically have N-type (F) connectors.

Monopole and dipole antennas have a 360° coverage in azimuth and typically 80° coverage in elevation.



Typical elevation radiation pattern for 2dBi gain dipole

EVD2-3.2/1401 (page 5)

Omni - Slim Flexible Dipole

Traditional dipole antennas have omni-directional coverage, being either slim, rugged, or flexible.

- Dipole Antennas
- Omni coverage
- Vertical polarisation
- Gain 2dBi with elevation HPBW 80°
- Frequencies 300MHz to 12GHz
- SVD2 are slim and semi rigid, with an abrasion resistant rubberised coating; most have SMA connectors
- EVD2 rugged dipoles have rigid glass fibre radomes; most have N-type connectors

SVD2-3450/426 (page 5)

Blade - Omni Directional

- Blade antennas can be as little as 2mm thick
- Aerodynamic
- They may be housed in protective radomes
- Light weight
- Specification as for dipole antenna
- Coverage can be omni-directional or directional

Left to right

SBA-2.3V/1470 (page 5)

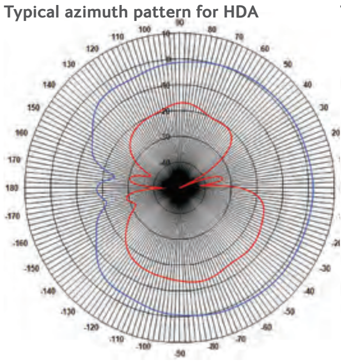
SBA-900/1249 (page 4)

Blade - Directional

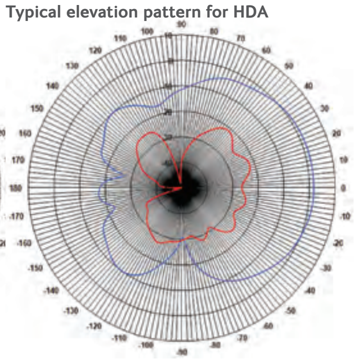
Directional blade antennas are suitable for integration into airborne systems, drones and robots.

Wing-tip design for airborne comms HDA-1275/1148 (page 4)

Typical azimuth pattern for HDA



Typical elevation pattern for HDA



Remote Air or Ground Based Platforms

Omni Antennas

Talon at work

Omni antenna

VOA4-918/052

Vertically polarised omni antenna with flange

VOA4-1400/1130

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Beamwidth Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
Antennas - Omni less than 1GHz for Unmanned Systems								
EVD2-320/116	0.31 - 0.32	2	360	80	Vertical	584x25 Ø	N(F)	
SBA-0.4V/1469	0.41 - 0.43	2	360	80	Vertical	40x40x171	SMA(F)	
SVD2-915/432	0.87 - 0.96	2	360	80	Vertical	155x12 Ø	SMA(M)	
EVD2-915/260	0.87 - 0.96	2	360	80	Vertical	248x25 Ø	N(F)	
VOA4-918/052	0.87 - 0.96	4	360	40	Vertical	705x57 Ø	N(F)	above
VOA4-918/1318	0.87 - 0.96	4	360	40	Vertical	705x57 Ø	N(F)	
SBA-900/1249	0.90 - 0.93	2	360	100	Vertical	98x77x44 Ø	TNC(F)	page 3
Antennas - Omni 1GHz to 2GHz for Unmanned Systems								
HDA-1275/1148	1.20 - 1.35	4	75	175	Horizontal	120x74x1	SMA(M) 90°	page 3
VOA4-1270/037	1.22 - 1.32	4	360	40	Vertical	658x57 Ø	N(F)	
SVD2-1270/074	1.24 - 1.30	2	360	80	Vertical	212x19 Ø	N(M)	
EVD2-1300/018	1.24 - 1.34	2	360	80	Vertical	241x25 Ø	N(F)	
EVD2-1300-N(M)/1214	1.24 - 1.34	2	360	80	Vertical	240x14 Ø	N(M)	
EVD2-1300-short/019	1.24 - 1.38	2	360	80	Vertical	170x25 Ø	N(F)	
EVD2-1300/1395	1.27 - 1.35	2	360	70	Vertical	220x45 Ø	N(F)	▲
SVD2-1.4V/1396	1.29 - 1.41	2	360	80	Vertical	174x11 Ø	SMA(M)	
VOA7-1373/361	1.33 - 1.41	7	360	20	Vertical	905x57 Ø	N(F)	
EVD2-1400-NM/1264	1.35 - 1.43	2	360	80	Vertical	222x26 Ø	N(M)	
SVD2-1304-SMA(M)/1307	1.35 - 1.43	2	360	80	Vertical	190x11 Ø	SMA(M)	
EVD2-1400/1340	1.35 - 1.45	2	360	80	Vertical	207x29 Ø	N(F)	▲
EVD2-1400/329	1.35 - 1.45	2	360	80	Vertical	258x13 Ø	N(F)	▲
SVD2-1.4V/1443	1.35 - 1.45	2	360	80	Vertical	200x21 Ø	N(M)	
EVD2-1400-D1/1248	1.35 - 1.45	2	360	80	Vertical	220x45 Ø	N(F)	▲
OA4-1.4V/1483	1.36 - 1.55	5	360	40	Vertical	525x57 Ø	N(F)	▲
VOA4-1400/1130	1.37 - 1.40	3	360	50	Vertical	360x150 Ø	N(F)	above

EVD2-1300/1395

EVD2-1400/1340

EVD2-1400/329

EVD2-1400-D1/1248

OA4-1.4V/1483

EVD2-1.5V/1646

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Beamwidth Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
EVD2-1450/124	1.40 - 1.50	2	360	60	Vertical	258x14 Ø	N(F)	page 2
EVD2-1.5V/1646	1.40 - 1.525	2	360	70	Vertical	205x45 Ø	N(F)	▲
EVD2-1.5/1432	1.42 - 1.52	2	360	80	Vertical	205x14 Ø	N(F)	
SVD2-1.5V/1657	1.43 - 1.52	2	360	80	Vertical	163x11 Ø	SMA(M)	
SBA-1480/1297	1.43 - 1.52	2	360	80	Vertical	120x22x2	SMA(F)	page 2
SBA-1500-502/445	1.45 - 1.55	2	360	80	Vertical	72x14x126	SMA(F)	▲
SVD2-1800-SMA(M)/841	1.70 - 1.88	2	360	80	Vertical	110x6 Ø	SMA(M)	
EVD2-1800/595	1.70 - 1.88	2	360	60	Vertical	191x25 Ø	N(M)	
VOA4-1800/131	1.70 - 1.90	4	360	40	Vertical	405x36 Ø	N(F)	▲
VOA4-1800/1319	1.70 - 1.90	4	360	40	Vertical	445x36 Ø	N(F)	▲
SBA-1790/1298	1.75 - 1.82	2	360	80	Vertical	105x30x2	SMA(F)	page 2

SBA-1500-502/445

VOA4-1800/131

VOA4-1800/1319

Omni Antennas

Robust, high gain, omni antenna

OA5-3.3L/1402

Robust, omni antenna

EVD2-3.2/1401

Antennas - Omni 2GHz to 3GHz for Unmanned Systems

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
SVD2-2100/868	2.00 - 2.19	2	360	80	Vertical	106x6 Ø	SMA(M)	▲
VOA4-2150/1335	2.00 - 2.25	4	360	40	Vertical	329x36 Ø	N(F)	
SBA-2.3V/1470	2.00 - 2.50	2	360	50	Vertical	89x40x3	SMA(F)	page 3
EVD2-2200/295	2.10 - 2.30	2	360	80	Vertical	175x25 Ø	N(F)	
SBA-2295/1299	2.20 - 2.39	2	360	80	Vertical	90x30x2	SMA(F)	page 2
EVD2-2.3/1406	2.20 - 2.40	2	360	80	Vertical	175x25 Ø	N(F)	▲
SVD2-2300/1204	2.20 - 2.40	2	360	80	Vertical	110x10 Ø	SMA(M)	▲
VOA10-2340/459	2.28 - 2.38	10	360	10	Vertical	1008x57 Ø	N(F)	
RCO5-2400/195	2.30 - 2.50	5	360	40	Right Circular	344x104 Ø	N(F)	
SVD2-2400/786	2.35 - 2.45	2	360	80	Vertical	109x7 Ø	SMA(M)	
EVD2-2450-D2/631	2.35 - 2.55	2	360	80	Vertical	150x14 Ø	N(F)	▲
EVD2-2460-NM/740	2.35 - 2.55	2	360	80	Vertical	170x25 Ø	N(M)	
EVD2-2460/086	2.35 - 2.55	2	360	80	Vertical	170x25 Ø	N(F)	
VOA4-2450-HEL/817	2.40 - 2.50	4	360	40	Vertical	250x70 Ø	N(F)	▲
VOA4-2450/184	2.40 - 2.50	4	360	40	Vertical	290x36 Ø	N(F)	
RCO5-2450/156	2.40 - 2.55	5	360	40	Right Circular	346x104 Ø	N(F)	

SVD2-2100/868

EVD2-2.3/1406

SVD2-2300/1204

EVD2-2450-D2/631

VOA4-2450-HEL/817

With helicopter mount for video transmission

EVD2-3.2/1398

Antennas - Omni 3GHz to 4GHz for Unmanned Systems

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
EVD2-3.2/1398	3.10 - 3.35	2	360	80	Vertical	123x45 Ø	N(F)	▲
EVD2-3.2/1401	3.10 - 3.35	2	360	80	Vertical	150x26 Ø	N(F)	above
OA4-3.2V/1399	3.10 - 3.35	4	360	43	Vertical	300x36 Ø	N(F)	
OA5-3.3L/1402	3.25 - 3.35	5	360	38.5	Left Circular	318x79 Ø	N(F)	above
RCO5-3450-H1/494	3.30 - 3.55	4	360	40	Right Circular	380x104 Ø	N(F)	▲
RCO5-3450-MO1/518	3.35 - 3.55	4	360	40	Right Circular	200x140 Ø	N(F)	▲
RC010-3450/487	3.35 - 3.55	8	360	12	Right Circular	717x79 Ø	N(F)	
EVD2-3.5/1433	3.40 - 3.50	2	360	80	Vertical	174x13 Ø	N(F)	▲
EVD2-3450/225	3.40 - 3.50	2	360	80	Vertical	178x14 Ø	N(F)	▲
RCO10-3500/931	3.40 - 3.60	9	360	12	Right Circular	647x79 Ø	N(F)	▲
SVD2-3450/426	3.40 - 3.65	2	360	80	Vertical	75x7 Ø	SMA(M)	page 3
VOA4-3450-HEL/237	3.40 - 3.80	4	360	40	Vertical	189x70 Ø	N(F)	
SBA-38/919	3.80 - 4.00	4	360	60	Vertical	112x25x3	SMA(F)	▲

RCO5-3450-H1/494

With helicopter mount

RCO5-3450-MO1/518

EVD2-3.5/1433

EVD2-3450/225

RCO10-3500/931

SBA-38/919

Remote Air or Ground Based Platforms

Omni, Ultra Wideband Antennas

Control and data links for robotics applications

Antennas - Omni 4GHz to 6GHz for Unmanned Systems

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
LCO6-4600-D1/908	4.40 - 4.80	6	360	22	Left Circular	342x109 Ø	N(F)	
EVD2-4.7/1471	4.40 - 5.00	2	360	80	Vertical	110x45 Ø	N(F)	
EVD2-47-TNC/1181	4.40 - 5.00	2	360	80	Vertical	120x14 Ø	TNC(F)	
EVD2-4700/1174	4.40 - 5.00	2	360	80	Vertical	120x29 Ø	N(F)	▲
EVD2-4700/1334	4.40 - 5.00	2	360	80	Vertical	120x25 Ø	N(M)	
OA6-4.7V/1481	4.40 - 5.00	6	360	23	Vertical	329x38 Ø	TNC(F)	▲
VOA6-4.7V/1489	4.40 - 5.00	6	360	24	Vertical	226x32 Ø	N(M)	▲
VOA6-47/914	4.40 - 5.00	6	360	23	Vertical	224x31 Ø	N(F)	▲
VOA8-47/1170	4.40 - 5.00	8	360	17	Vertical	375x70 Ø	N(F)	▲
EVD2-5300/1285	5.15 - 5.45	2	360	80	Vertical	122x26 Ø	N(M)	

EVD2-4700/1174

OA6-4.7V/1481

VOA6-4.7V/1489

VOA6-47/914

VOA8-47/1170

Antennas - Ultra Wideband Omni for Unmanned Systems

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
XPO3V-500-1300-LP/586	0.50 - 1.30	2	360	80	Vertical	283x80 Ø	N(F)	
XPO2V-880-2175/1060	0.88 - 2.17	2	360	50	Vertical	221x31 Ø	N(F)	▲
XPO2V-1680-2280/140	1.65 - 2.50	2	360	80	Vertical	253x25 Ø	N(F)	
XPO2V-1.0-6.0/1442	1.00 - 6.00	2	360	70	Vertical	134x59 Ø	N(F)	▲
XPO2V-2.0-18.0/1397	2.00 - 18.00	2	360	70	Vertical	104x39 Ø	N(F)	▲
RCO4-149/1447	14.40 - 15.35	4	360	30	Right Circular	74x69 Ø	TNC(F)	▲
RCO4-149/1385	14.40 - 15.35	4	360	30	Right Circular	74x69 Ø	SMA(F)	
RCO4-149/1389	14.40 - 15.40	4	360	40	Right Circular	74x69 Ø	N(F)	

XPO2V-880-2175/1060

XPO2V-1.0-6.0/1442

XPO2V-2.0-18.0/1397

RCO4-149/1447

Ku-band, Common Data Link circular polarised omni

Antennas - Ultra Wideband Directional Planar Spiral for Unmanned Systems

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
PSA0218L/1084	2.00 - 18.00	-3(2-4) 2(4-18)	75	75	Left Circular	65x68 Ø	SMA(F)	▲
PSA0818L/1045	8.00 - 18.00	4	90	90	Left Circular	21x24 Ø	SMA(F)	▲

PSA0218L/1084

Planar spiral antenna to Mil-Spec for helicopters

PSA0818L/1045

Specification Criteria - Link to Ground Station

Antenna for data and telemetry mounted beneath scientific balloon gondola for Swedish Space Corporation

Polarisation Mismatch

The most difficult challenge with a UAV/UGV (unmanned platform) link to a ground station is the polarisation as the link is dependent on the alignment of the unmanned platform.

With linear links, vertical to vertical, or horizontal to horizontal, as a plane banks the signal drops due to polarisation mismatch; it can drop by 25dB in each direction.

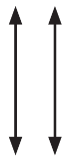
The best way to counteract this is to have a circular polarisation match at both ends (right circular to right circular, or left circular to left circular) so that the link budget is maintained irrespective of the position of the antennas.

Circular to circular will maintain the link, but the problem is that circular polarisation antennas can have a large diameter and are therefore difficult to mount on an unmanned platform because of weight, size, and lack of aerodynamics.

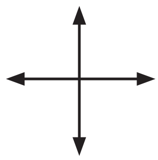
The best option is to have linear polarisation (usually vertical) on the unmanned platform for wide angle coverage, and circular polarisation on the ground. As long as a 3dB reduction is allowed for in the link budget in calculations to work out platform range, the orientation of the UAV becomes irrelevant as it will work at all angles.

Typical Link Values	dB
Linear / Linear	-60
Linear Vertical / Mismatched Linear	-85
Right Circular / Right Circular	-60
Left Circular / Left Circular	-60
Linear / Circular	-63

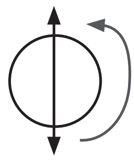
- "Circular to Linear"
  The best option to avoid polarisation mismatch, i.e. poor links, use Linear Vertical Polarisation on the unmanned platform and Circular Polarisation on the ground.



Linear Polarisation Vectors aligned



Linear Polarisation Vectors misaligned



Circular and Linear Polarisation Vectors

What is Polarisation

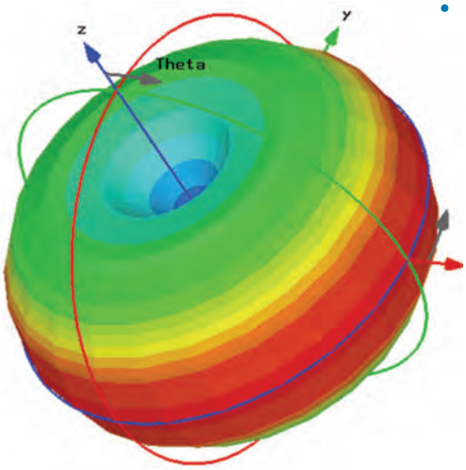
All electromagnetic radiation is polarised. The polarisation of an antenna describes the orientation of its electrical field and can be circular or linear.

Linear polarisation is usually vertical or horizontal.

Dual polar antennas can produce vertical and horizontal polarisation via separate ports.

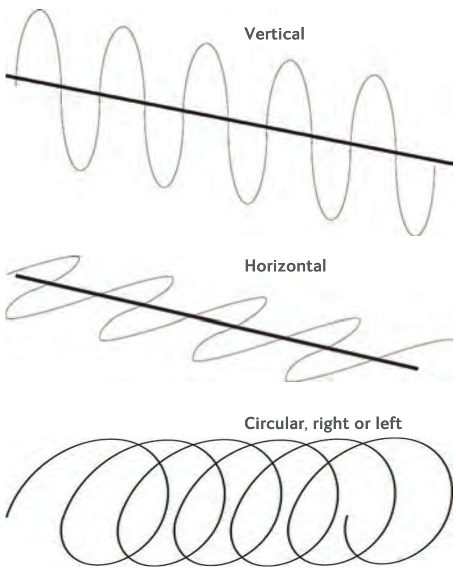
Dual slant antennas are essentially the same as dual vertical and horizontal antennas but with the polarisation rotated by 45°.

Circular polarisation is produced when the E-plane of the antenna spins and depending on the direction of the spin the polarisation is right or left.



3D pattern of dipole antenna

- Vertical
- Horizontal
- Dual Vertical & Horizontal
- Right Circular
- Left Circular
- Dual Circular
- Dual ±45°



Ground Control Centre Antennas

Antennas, Link Margin Analysis


Ground to
helcopter uplink

Ground Control Centre Antennas

Antennas are available for the control centre as well as the remote platform.

The control centre antenna usually provides the higher gain part of the link and may be a medium to high gain omni antenna, medium gain sector or high gain directional antenna.

A directional antenna is likely to require a two-axis steering system. A less complex but compact multi sector antenna array provides intermediate range coverage for communicating with a remote platform. This type of arrangement can be used for quick deployment, tactical applications.

A selection of directional (panel), multi sector and omni-directional antennas is listed in this leaflet, with more available in our main catalogue.

Control centre antennas can be mounted on fixed and mobile communicaion systems.

Please contact us direct for assistance.

Link Margin (Fly-By) Analysis

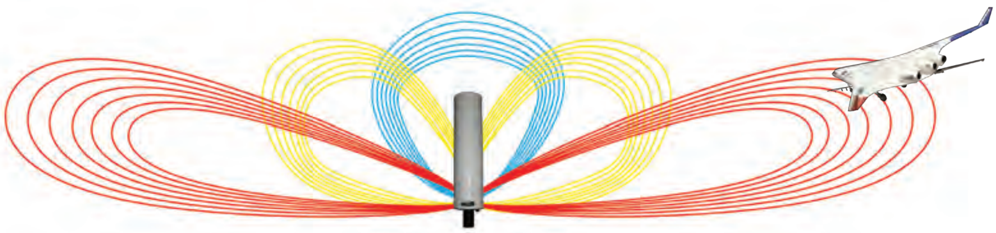
Link margin (fly-by) analyses can be performed for many airborne systems. The method is applicable to helicopter, unmanned airborne systems (UAS) and missile applications. These calculations are based upon real measured 3D antenna patterns, and can be used to assist in system planning. The region over which coverage is required is considered, and the path losses to points within the region are calculated. The gain of the antenna at the angle of each location is added to the path loss which provides data for plotting graphs of Relative Signal Strength vs. Range at different altitudes.

As the Cobham Antenna Systems library of measured antenna performance is so extensive, the optimum antenna combination can be considered for a given requirement. Such planning can assist in deciding when to use switched sector instead of omni-directional antennas, how many separate antennas to have provide elevation coverage, and whether or not to use an additional overhead antenna to ensure links are maintained for communication at high elevation angles.

The ideal antenna combination will vary according to the specifics of the requirement.

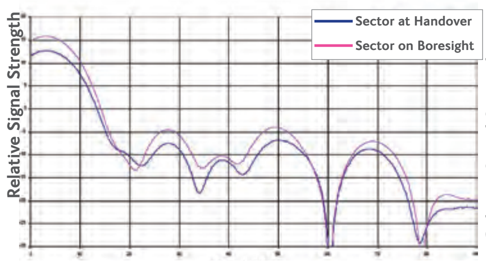
Generally, a number of altitudes within the desired operational ceiling are considered, and link margins at all ranges within the required envelope are calculated at these altitudes.

The worst case handover angle between sector antennas will be used, and any effects of polarisation mismatch loss through antenna misalignment can be factored in.

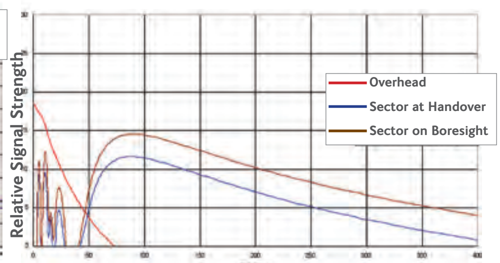


A single, multiple element antenna comprising several omni or omni and sectors can be designed to provide optimum coverage for a given operational requirement.

Typical Elevation Pattern of Sector Antenna used to Calculate Signal Strength



Calculated Output showing 40,000ft Altitude Signal Strength vs. Range



Sector, Multi Sector and Omni Antennas

Unmanned helicopter

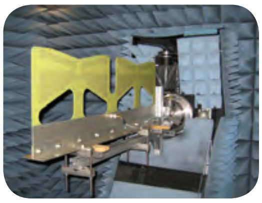
Sector

Multi Sector

- Azimuth coverage from 30° to 210°, Gain up to 20dBi
- Null-fill, electrical tilt and sidelobe suppression available

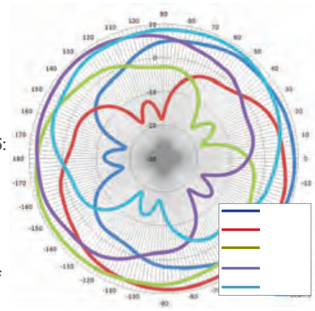
Sector antennas provide wide area coverage for military and security base station applications. They have clearly defined, wide, azimuth coverage, 30° to 210° in the horizontal plane with narrow elevation profiled vertical coverage.

SA7-150-0.36V/1572 sector under test during development



Multi Sector arrays - a multiple beam antenna in one housing - provide high gain wide area (up to 360°) and overhead coverage if required.

MSA6-2.4V/1795: sector azimuth patterns show 9dBi peak gain, 120° beamwidth and high level of overlap



Omni-Directional

- Robust. High gain, up to 10dBi
- Polarisation - circular or linear

Omni antennas radiate 360° in the horizontal plane with peak gain on or close to the horizon. All our omnis are centre-fed making them ground-plane independent with stable radiation patterns across the band. High gain collinear omnis can be produced. Sidelobes can be controlled and the elevation beam can be shaped to provide null-fill or electrical tilt. Collinear antennas are light weight with rigid glass fibre radomes and aluminium spigots for stable mounting.

Sector Antennas for Control Centres

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
SA7-150-0.36V/1572	0.34 - 0.37	6	173	35	Vertical	1090x386x3	N(F)	above
SA13-60-0.9V/1462	0.90 - 0.93	13	73	16.5	Vertical	560x250x30	N(F)	▲
SA11-120-1.3V/1384	1.15 - 1.40	11	120	16	Vertical	870x95.6 Ø	N(F)	▲
SA9-120-1.3V/1445	1.20 - 1.45	9	120	36	Vertical	490x95.6 Ø	N(M)	
▲SA17-18V/417	1.71 - 1.88	17	70	9	Vertical	1204x140x21	N(F)	
SA16-19V/230	1.85 - 1.99	16	75	10	Vertical	782x150x20	N(F)	▲
SA17-22V/555	2.00 - 2.30	17	65	8	Vertical	1140x150x14	N(F)	▲
SA12-110-2.4V/1480	2.00 - 2.70	12	112	17	Vertical	569x79 Ø	TNC(F)	▲

SA13-60-0.9V/1462

SA11-120-1.3V/1384

SA9-120-1.3V/1445

SA16-19V/230

SA17-22V/555

SA12-110-2.4V/1480

SA16-60-25V/858	2.40 - 2.70	16	60	10	Vertical	725x130x11	N(F)	▲
SA16-60-35V/579	3.40 - 3.70	16	60	10	Vertical	474x88x9	N(F)	▲
SA17-60-4.7V/1419	4.40 - 5.00	17	55	8.5	Vertical	470x106x23	N(F)	▲
FPA10-4.7R/1564	4.40 - 5.00	9.5	54	58	Right Circular	10x84 Ø	TNC(F)	▲
SA15-90-104V-D1/1124	10.10 - 10.65	15	84-87	7	Vertical	330x15x14	N(F)	
SA17-13R/1077	13.40 - 14.00	17	75	6	Right Circular	220x50x11	SMA(F)	▲

SA16-60-25V/858

SA16-60-35V/579

SA17-60-4.7V/1419

FPA10-4.7R/1564

SA17-13R/1077

Ground Control Centre Antennas

Multi Sector Antennas

Multi Sector Antennas for Control Centres

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
MSA5-1400/1131	1.31 - 1.43	12 sector	88	19	Vertical			
		6.5 o/head	57	56	Right Circular	743x197 Ø	N(F)	
MSA6-2.4V/1795	2.00 - 2.70	8 sector	110	36	Vertical			
		7 o/head			Right Circular	300x155 Ø	SMA(F) x6	▲
MSA7-16-2350R/829	2.30 - 2.40	14 sector	70	10				
		6.5 o/head	60	53	Right Circular	812x231 Ø	N(F)	▲
MSA5-10-24R/389	2.30 - 2.50	10 sector	90	40				
		6 o/head	90	90	Right Circular	210x140 Ø	SMA(F) x5	
MSA4-24R/199	2.30 - 2.50	13	90	20	Right Circular	606x156 Ø	N(F)	▲
MSA5-24L-ECS/1293	2.30 - 2.50	13 sector	90	20				
		7 o/head	80	80	Left Circular	582x156 Ø	N/a	
MSA5-24R/223	2.30 - 2.50	13 sector	80	20				
		7 o/head	80	80	Right Circular	706x156 Ø	N(F)	
MSA5-26L/117	2.48 - 2.68	13 sector	90	20				
		7 o/head	80	80	Left Circular	706x156 Ø	N(F)	
MSA5-3.3L/1407	3.20 - 3.40	12.5 sector	68	16.7				
		8 o/head	64	62	Left Circular	582x156 Ø	N/a	

MSA6-2.4V/1795

MSA7-16R-2350R/829 with 6 sectors and one overhead

MSA4-24R/199

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
MSA5-3.4V/1435	3.35 - 3.55	13	80	16.5	Vertical	482x162 Ø	SMA(F) x5	
MSA7-16-35R/497	3.40 - 3.50	15 sector	70	10				
		7 o/head	70	60	Right Circular	681x158 Ø	N(F)	▲
MSA5-34L/963	3.40 - 3.60	13 sector	80	20				
		7 o/head	80	80	Left Circular	606x156 Ø	N(F)	
MSA5-34R-ECS/374	3.40 - 3.60	13 sector	80	20				
		7 o/head	80	80	Right Circular	706x156 Ø	N(F)	▲
MSA6-15-46L/879	4.40 - 4.80	15 sector	70	8.4				
		8.5 o/head	60	55	Left Circular	527x158 Ø	N(F)	▲
MSA6-4.7V/1484	4.40 - 5.00	15 sector	70	8	Vertical			
		8 o/head	70	65	Right Circular	627x162 Ø	N(F)	
MSA6-90-4.7V/1554	4.40 - 5.00	13.8 sector	90	8	Vertical			
		8 o/head	70	65	Right Circular	627x162 Ø	N(F)	
MSA10-HEX-105V/250	10.30 - 10.80	10	80	40	Vertical	50x60 Ø	SMA(M) x6	▲

MSA7-16-35R/497

MSA5-34R-ECS/374

MSA6-15-46L/879

MSA10-HEX-105V/250

Omni Antennas


OA2-2.4V/1392
omni antenna

Omni Antennas for Control Centres

Part Number	Frequency GHz	Gain dBi	Beamwidth Azimuth°	Elevation°	Polarisation	Dimensions mm	Connector	Photo ▲
OA4-0.9V/1520	0.87 - 0.96	4.5	360	45	Vertical	605x57 Ø	N(F)	
OA8-1.4V/1251	1.35 - 1.525	9	360	12.6	Vertical	1208x57 Ø	N(F)	
OA6-1.44V/1508	1.43 - 1.45	7	360	19.5	Vertical	858x57 Ø	N(F)	▲
VOA10-1615/897	1.59 - 1.64	9	360	10	Vertical	1225x57 Ø	N(F)	▲
VOA10-1800/111	1.70 - 1.88	10	360	10	Vertical	1255x57 Ø	N(F)	▲
OA4-1.8V/1641	1.71 - 1.88	4.4	360	38	Vertical	391x51 Ø	QN(M)	▲
VOA10-1900/232	1.85 - 1.95	10	360	10	Vertical	1250x57 Ø	N(F)	▲
XVO9-2150-D2/870	2.00 - 2.30	9	360	8	Vertical	1006x106 Ø	N(F)	

OA6-1.44V/1508

VOA10-1615/897

VOA10-1800/111

OA4-1.8V/1641

VOA10-1900/232

VOA10UT4-VOA4UT25-LPA5-2265/827

VOA10UT4-	2.20 - 2.335	9.5	360	7.5	Vertical			
VOA4UT25-	2.20 - 2.335	4	360	30	Vertical			
LPA5-2265/827	2.20 - 2.335	6	360	70	Right Circular	1505x150 Ø	N(F) x3	▲
SVD2-2300/427	2.20 - 2.34	2	360	80	Vertical	103x11 Ø	SMA(M)	
OA2-2.4V/1392	2.25 - 4.00	2	360	65	Vertical	185x32 Ø	TNC(F)	above
LCO10-2350/720	2.27 - 2.43	10	360	10	Left Circular	800x104 Ø	N(F)	
VOA10-2340/459	2.28 - 2.38	10	360	10	Vertical	1008x57 Ø	N(F)	
OA4-2.5V/1542	2.28 - 2.70	4	360	40	Vertical	222x25 Ø	TNC(M)	▲
OA10-2.4V/1655	2.30 - 2.55	9	360	13	Vertical	908x57 Ø	N(F)	▲
VOA10-2450/177	2.40 - 2.50	10	360	80	Vertical	905x57 Ø	N(F)	▲
RCO10-2460/255	2.40 - 2.55	10	360	10	Right Circular	891x104 Ø	N(F)	
VOA11-26/1095	2.50 - 2.70	10	360	10	Vertical	1133x31 Ø	716(F)	
XV010-3450/065	3.30 - 3.55	10	360	10	Vertical	600x95 Ø	N(F)	
RCO10-3500/931	3.40 - 3.60	9	360	12	Right Circular	647x85 Ø	N(F)	▲
RCO10-3500-D1/1185	3.40 - 3.60	9	360	12	Right Circular	579x79 Ø	N(F)	
VOA7-36/1146	3.40 - 3.80	6	360	20	Vertical	356x31 Ø	N(F)	▲
XVO9-3880/944	3.70 - 4.06	9	360	7	Vertical	782x98 Ø	N(F)	
VOA9-45/1161	4.30 - 4.70	9	360	11	Vertical	550 x 31 Ø	N(F)	▲
OA9-4.6V/1701	4.49 - 4.80	9	360	12	Vertical	600x36 Ø	N(F)	

OA4-2.5V/1542

OA10-2.4V/1655

VOA10-2450/177

RCO10-3500/931

VOA7-36/1146

VOA9-45/1161

Other antenna brochures

Antenna Catalogue

Total Capability

Antenna Testing

Body Worn

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C-Band

Radar Systems

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UAS-GC Antennas Issue 1, 2011-05

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