

## 2.4 GHz BreezeACCESS II Antenna Co-location Guidelines

### Introduction

This application note provides the necessary guidelines required for antenna installation co-location in order to ensure a base for optimal system performance. The following antennas have been considered.

- Andrew DataMaster DMP18WNR060-V, 60 degree, 18 dBi sector antenna.
- Radio Waves SEC-25V-60-17, 60 degree, 17 dBi sector antenna.
- Til-Tek TA2304-2, 60 degree, 17.5 dBi adjustable beam width sector antenna.

All antennas considered are using vertical polarity, and Outdoor Unit (ODU) RF Power was limited to keep the EIRP within the 36-dBm FCC limit.

### Antenna Configurations

Based on several orientations, the following two configurations yield the best results for sectorial antenna co-location.

1. The first orientation is for 6 antennas spaced every 60 degrees, between adjacent antennas and all 6 on the same level horizontally (Figure 1).
2. The second orientation is for 6 antennas spaced every 60 degrees, alternating horizontal height on every other antenna (Figure 2).

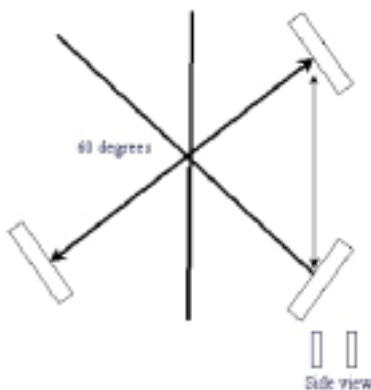


Figure 1.  
Horizontal Separation Configuration

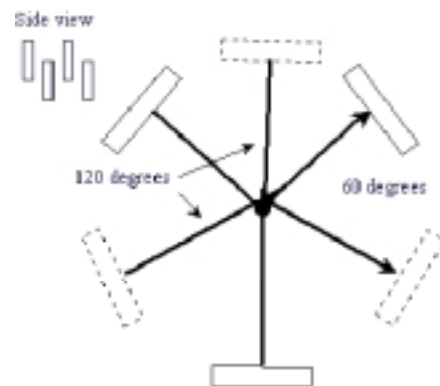
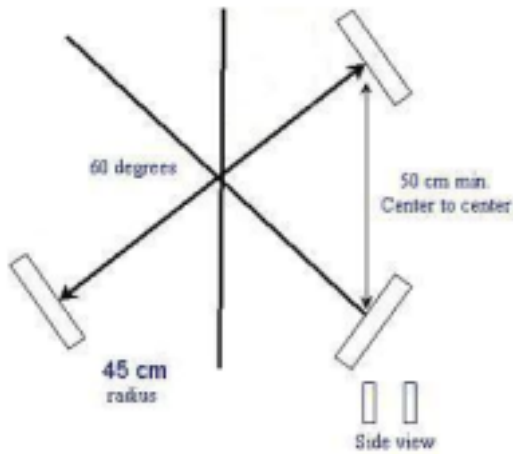


Figure 2.  
Staggered Antenna Configuration

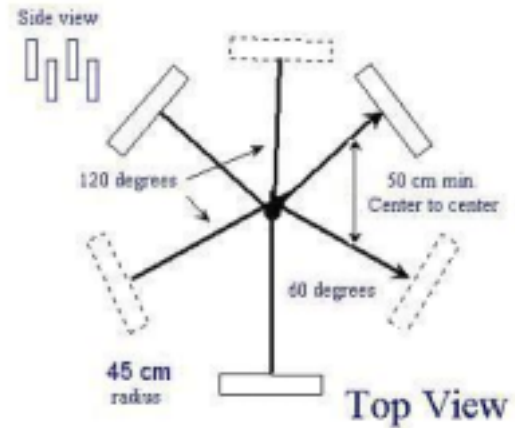
## Andrew DATAMASTER Antenna Installation

Two configurations are recommended, Horizontally separated “A” (same level), and Staggered “B” (two levels with vertical separation).

### Configuration “A” Antennas are at the same level



### Configuration “B” Antennas are at two levels vertically separated (Improved isolation compared to “A”)



### 6 sector antenna arrangement

- Configuration “A”, 1 layer
  - Back to back antennas are a min. of (45 cm radius) separated
  - Adjacent sectors are a min. of 0.5 meters separated.
- Configuration “B”, 2 layers
  - Layer 1, 120 degree spacing, 1.5 meters vertical spaced from layer 2 (center to center).
  - Layer 2, 120 degree spacing with bore site 60 degree offset from layer 1 above.

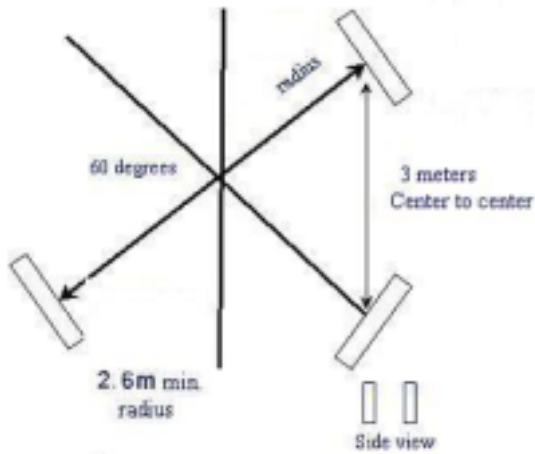
Table 1

Antenna Andrew DataMaster DMP18W060-V	Horizontal Separation 1, 2 & 3 Mb Operation	Staggered Horizontal & Vertical Separation 1, 2 & 3 Mb Operation	Comments (36 dBm EIRP)
<b>Distance Center to center</b>	0.5 m. 20 in.	0.5 m. (H) x 1.5 m. (V) 20 in. (H) x 59 in. (V)	Measured from center to center of each antenna
<b>Radius</b>	0.45 m. 18 in.	0.45 m. 18 in.	Measured arm from center pole/mast
<b>Spacing (Degrees)</b>	60 Degrees	120 Degree (Layer 1) 120 Degree (Layer 2) with 60 degree offset	

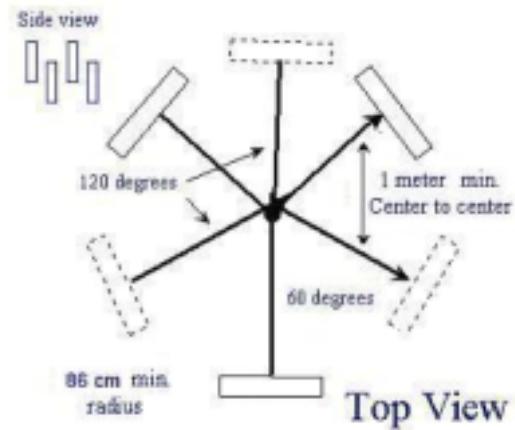
## Radio Waves Antenna Installation

Two configurations are recommended, Horizontally separated “A” (same level), and Staggered “B” (two levels with vertical separation).

### Configuration “A” Antennas are at the same level



### Configuration “B” Antennas are at two levels vertically separated (Improved isolation compared to “A”)



### 6 sector antenna arrangement

- Configuration “A”, 1 layer
  - Back to back antennas are a min. of 2.6 m radius separated
  - Adjacent sectors are a min. of 3 meters separated.
- Configuration “B”, 2 layers
  - Layer 1, 120 degree spacing, 1 meter vertical spaced from layer 2 (center to center).
  - Layer 2, 120 degree spacing with bore site 60 degree offset from layer 1 above.

Table 2

Antenna Radio Wave SEC-25V-60-17	Horizontal Separation 1, 2 & 3 Mb Operation	Staggered Horizontal & Vertical Separation 1, 2 & 3 Mb Operation	Comments (36 dBm EIRP)
Distance Center to center	3 m. 9.8 ft	1 m. (H) x 1 m. (V) 3.3 ft (H) x 3.3 ft. (V)	Measured from center to center of each antenna
Radius	2.6 m. 8.5 ft.	0.86 m. 2.8 ft	Measured arm from center pole/mast
Spacing (Degrees)	60 Degrees	120 Degree (Layer 1) 120 Degree (Layer 2) with 60 degree offset	

## TilTek Antenna Installation

Two configurations are recommended, Horizontally separated “A” (same level), and Staggered “B” (two levels with vertical separation).

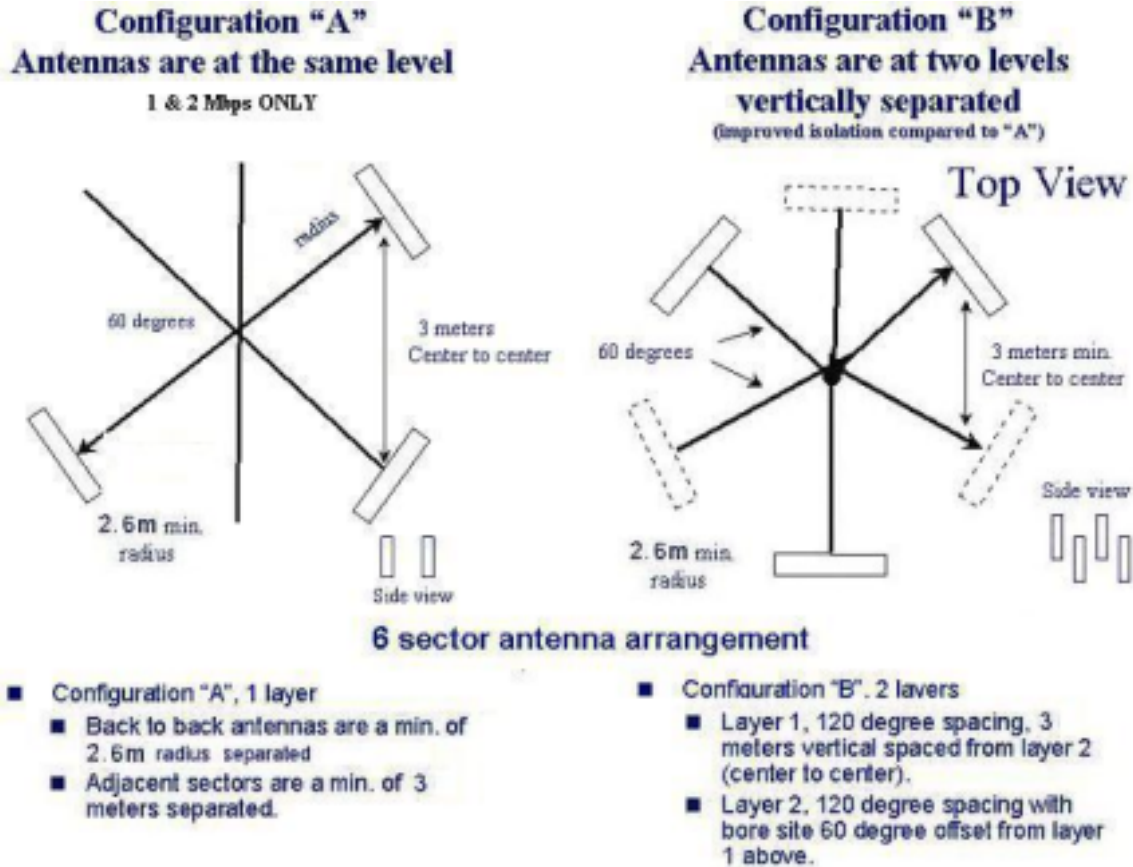


Table 3

Antenna Til-Tek TA-2304-2 (60x17)	Horizontal Separation 1 & 2 Mb Operation ONLY	Staggered Horizontal & Vertical Separation 1, 2 & 3 Mb Operation	Comments (36 dBm EIRP)
Distance Center to center	3 m. 9.8 ft	3 m. (H) x 3 m. (V) 9.8 ft. (H) x 9.8 ft (V)	Measured from center to center of each antenna
Radius	2.6 m. 8.5 ft.	2.6 m. 8.5 ft.	Measured arm from center pole/mast
Spacing (Degrees)	60 Degrees	120 Degree (Layer 1) 120 Degree (Layer 2) with 60 degree offset	

## Andrew antenna - Specifications and pattern plots

### Electrical Specifications

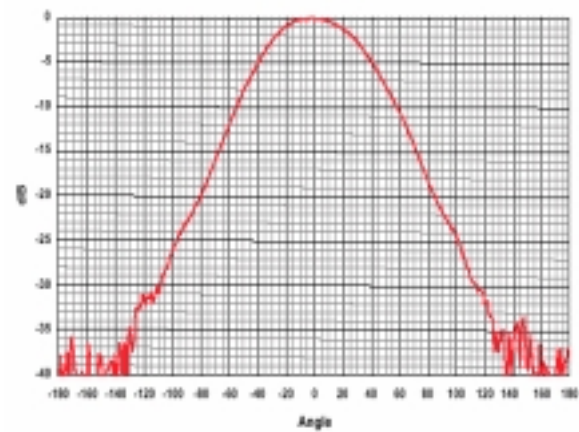
Gain, dBi	18
Frequency Band, MHz	
Type <b>DMP18NQ060-H</b>	2150-2162
Type <b>DMP18NQ060-V</b>	2150-2162
Type <b>DMP18W060-H</b>	2500-2700
Type <b>DMP18W060-V</b>	2500-2700
Azimuth Beamwidth, degrees	60
Polarization	Horizontal or Vertical
Impedance, ohms	50
Front-to-Back Ratio (135° to 225°), dB	-32
Input Power Rating, Average, watts	200
Lightning Protection	dc ground
Return Loss, dB (VSWR)	>14 (1.5:1)

### Mechanical Specifications

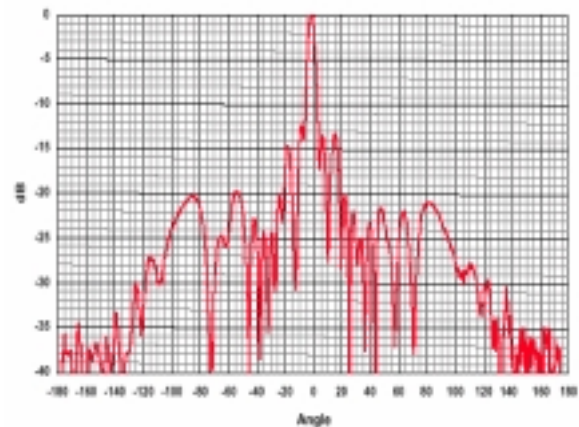
<b>Type No.</b>	<b>DMP18 (18 gain)</b>
Mounting	Side Mount (tilt)
Input Connector	7-16 DIN
Dimensions, in (mm)	40 x 13.50 x 3.25 (1016 x 343 x 82)
Weight, lb (kg)	27 (12)
Radome Material	ABS
Radome Color	Gray
Environmental	
Survival Wind Speed, mph (km/hr)	125 (200)
Temperature Range, °C (°F)	-40 to +70 (-40 to 158)
Humidity	0 to 100% Condensing

### Antenna Pattern Performance

**Azimuth H or V**



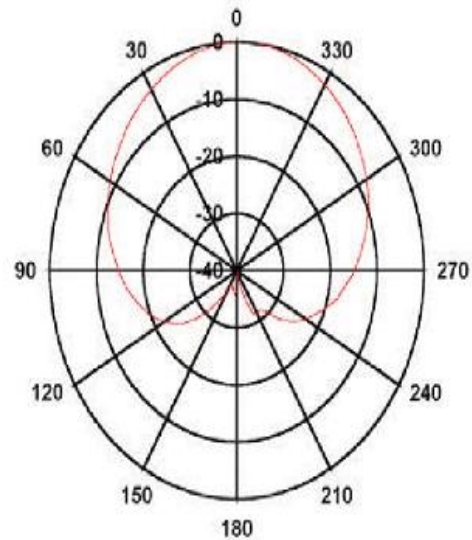
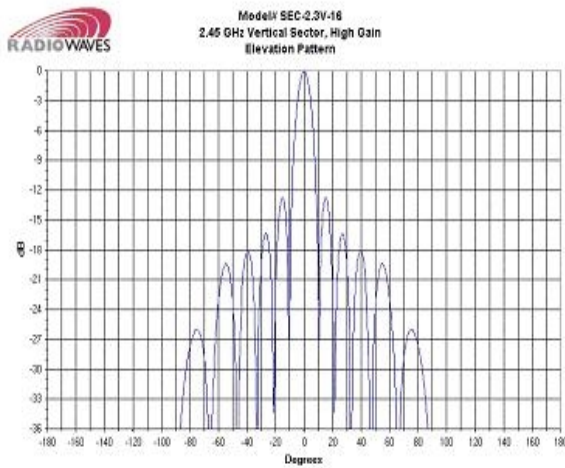
**Elevation H or V**



## Radio Waves antenna - Specifications and pattern plots

### Electrical Specifications, typical

Model #	SEC-25V-60-17	SEC-25H-60-17
Frequency, GHz	2.40-2.70	2.40-2.70
Polarization	Vertical	Horizontal
Gain, dBi (nominal)	17.5	17.5
Beamwidth -3dB		
Azimuth, deg.	60	60
Elevation, deg.	8	8
X-Pol. Rejection, dB	25	25
F/B Ratio, dB	>25	>25
VSWR, Max	1.5:1	1.5:1
(R.L., dB)	(14.0)	(14.0)
RF Interface	"N" (F)	"N" (F)



## TiTeK - Specifications and pattern plots.

### Electrical Specifications

**Frequency Range:** 2400-2483 MHz  
**Gain: (dBi)** 17.5 @ 60° 15.5 @ 90°  
 14.5 @ 120° 13 @ 160°  
**VSWR:** 1.5:1 max.  
**Front/Back Ratio:** 20 dB min.  
**Polarization:** Vertical  
**Power Rating:** 200 Watts  
**H-Plane Beamwidth:** 60, 90, 120, 160 degrees  
**E-Plane Beamwidth:** 7.2 degrees  
**Cross Pol. Discrimination:** 20 dB min.  
**Impedance:** 50 ohms nominal  
**Termination:** N female (7/16 DIN optional)

Typical Mid band values. (For details, contact factory)

### Mechanical Specifications

**Length:** 40 in. (1016 mm)  
**Width:** 4.9 in. (124 mm)  
**Depth:** 4.6 in. (117 mm)  
**Weight (Incl. Clamps):** 8 lb. (3.6 kg)  
**Rated Wind Velocity:** 125 mph (200 km/h)  
**Hor. Thrust at rated wind:** 86 lb. (39 kg)  
**Mechanical Downtilt:** 0 - 15 (optional)  
**Mounting Pipe:** 0.75 - 3.0 in. (19 - 76 mm)

### Materials

**Radiating Elements:** Plated copper on PCB  
**Reflector:** Irridited aluminum  
**Radome:** Gray UV stabilized ASA  
**Clamps:** Aluminum and HDG steel

### E-Plane

H-Plane

