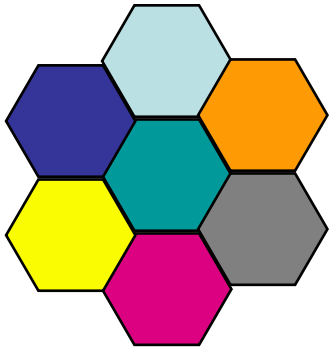


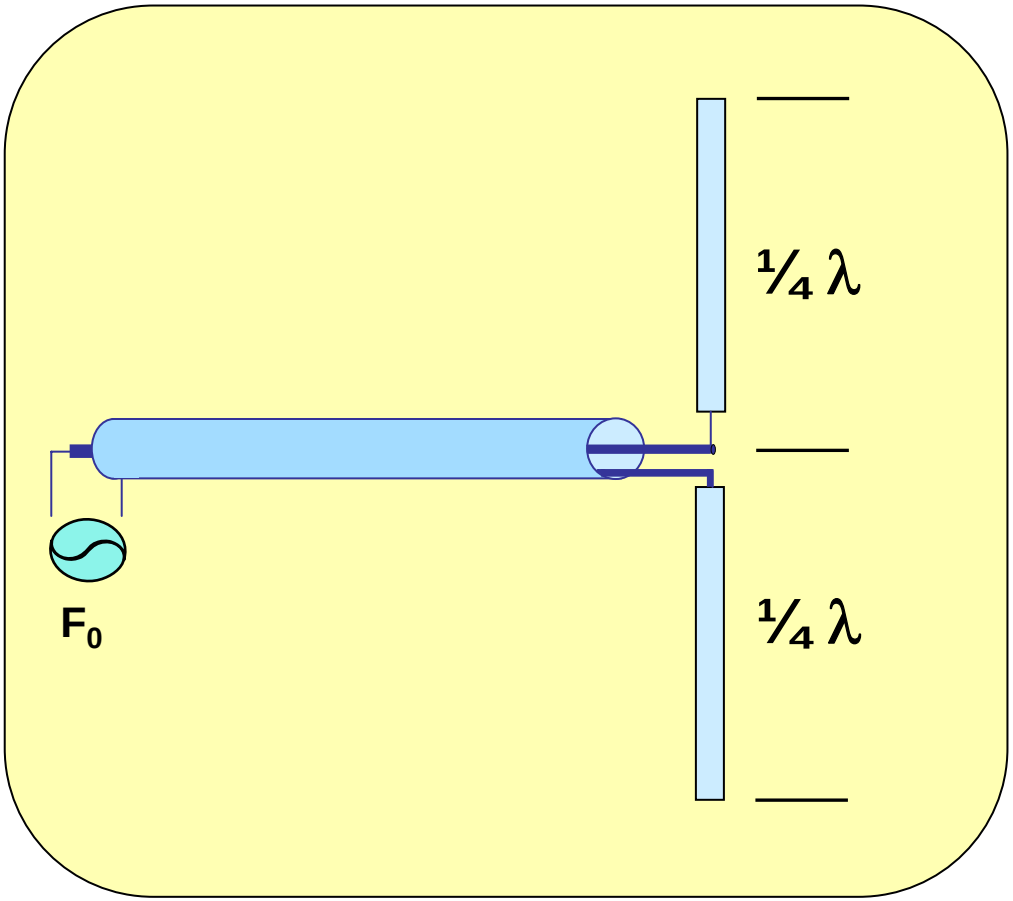
“Tecnologías de antenas fijas para redes móviles”

Jorge B. Osow

Ingeniero en Telecomunicaciones

Senior Member I.E.E.E

DIPOLOS



F_0 (MHz)	λ (Meters)	λ (Inches)
30	10.0	393.6
80	3.75	147.6
160	1.87	73.8
280	1.07	42.2
460	0.65	25.7
800	0.38	14.8
960	0.31	12.3
1700	0.18	6.95
2000	0.15	5.90

Diagrama antena 10 dBd omni

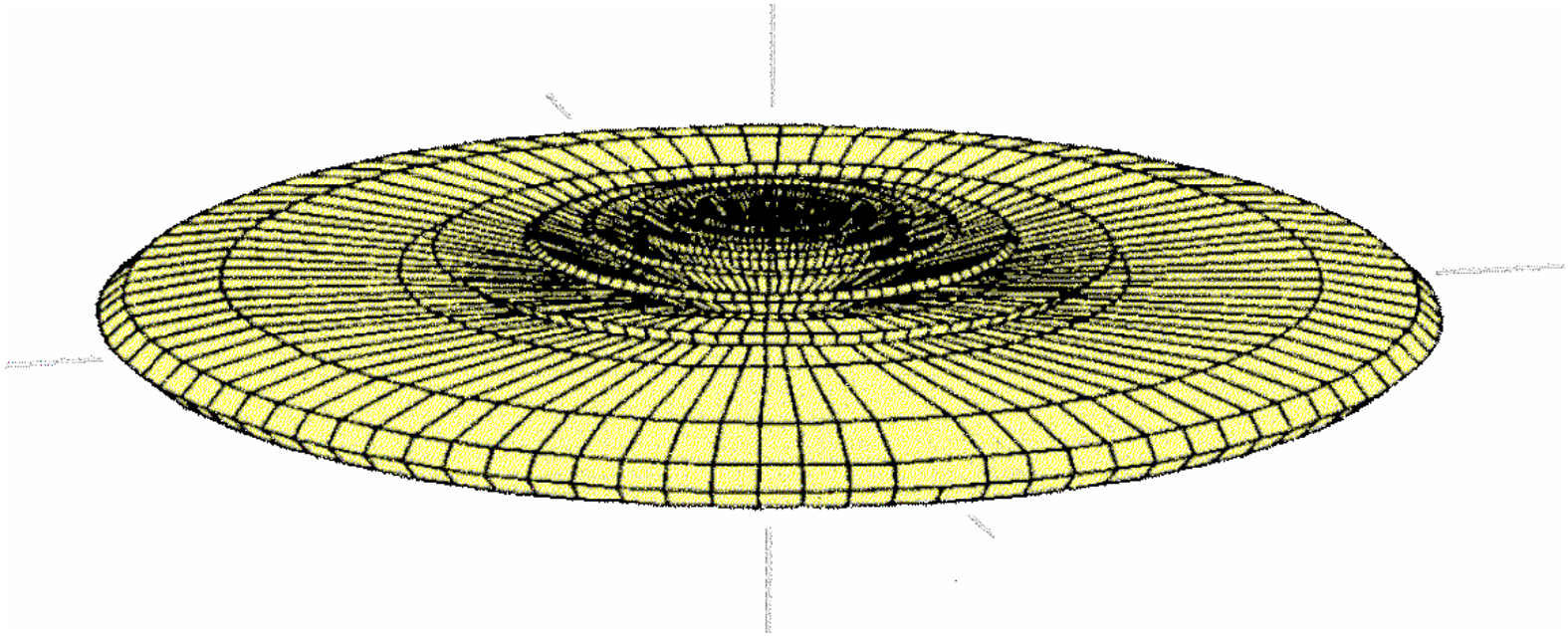
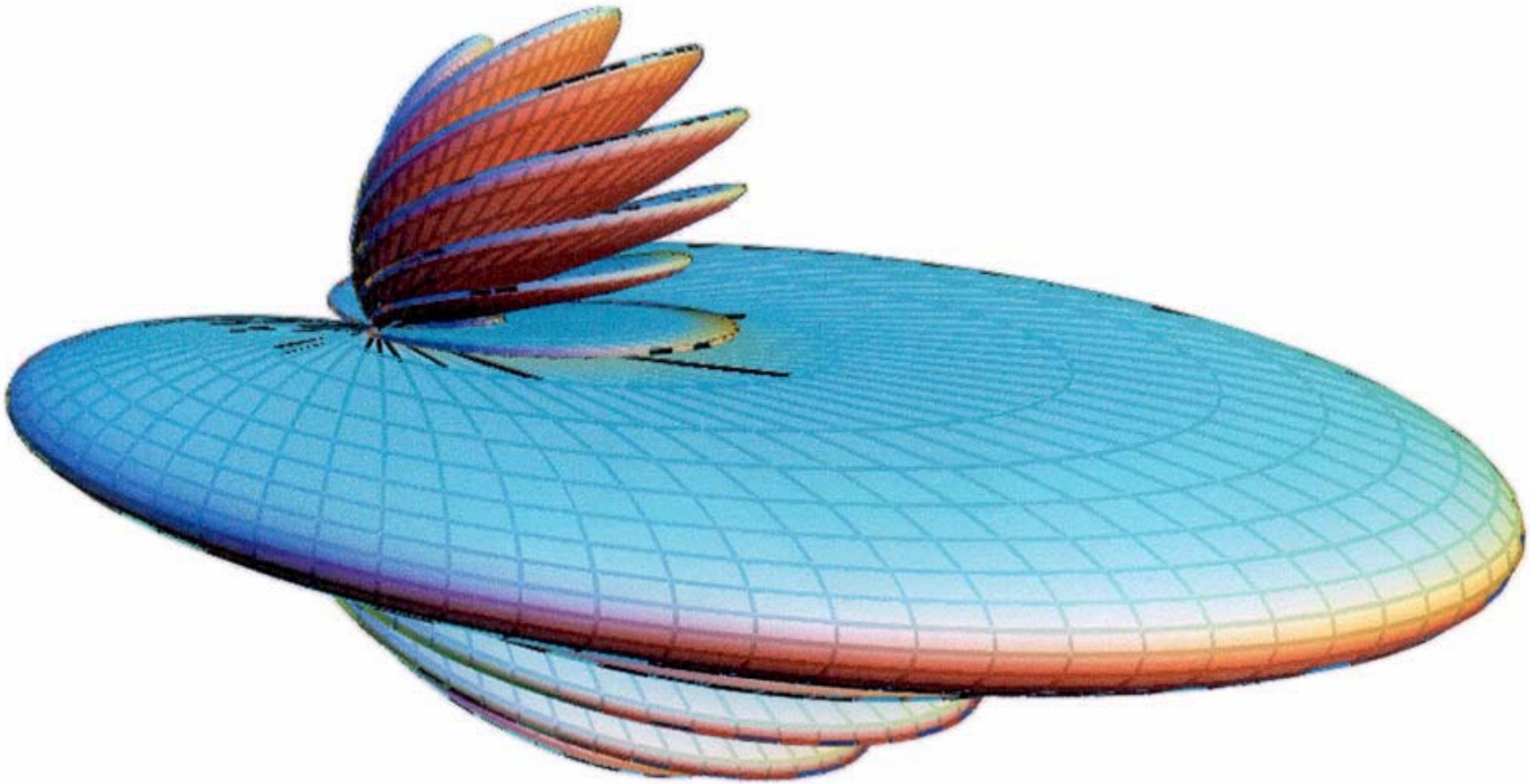
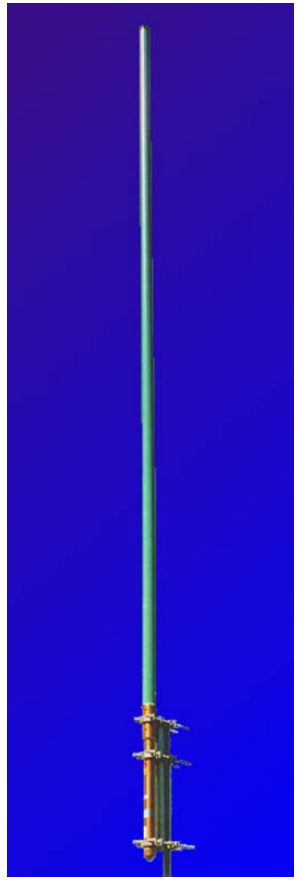


Diagrama idealizado de antena panel

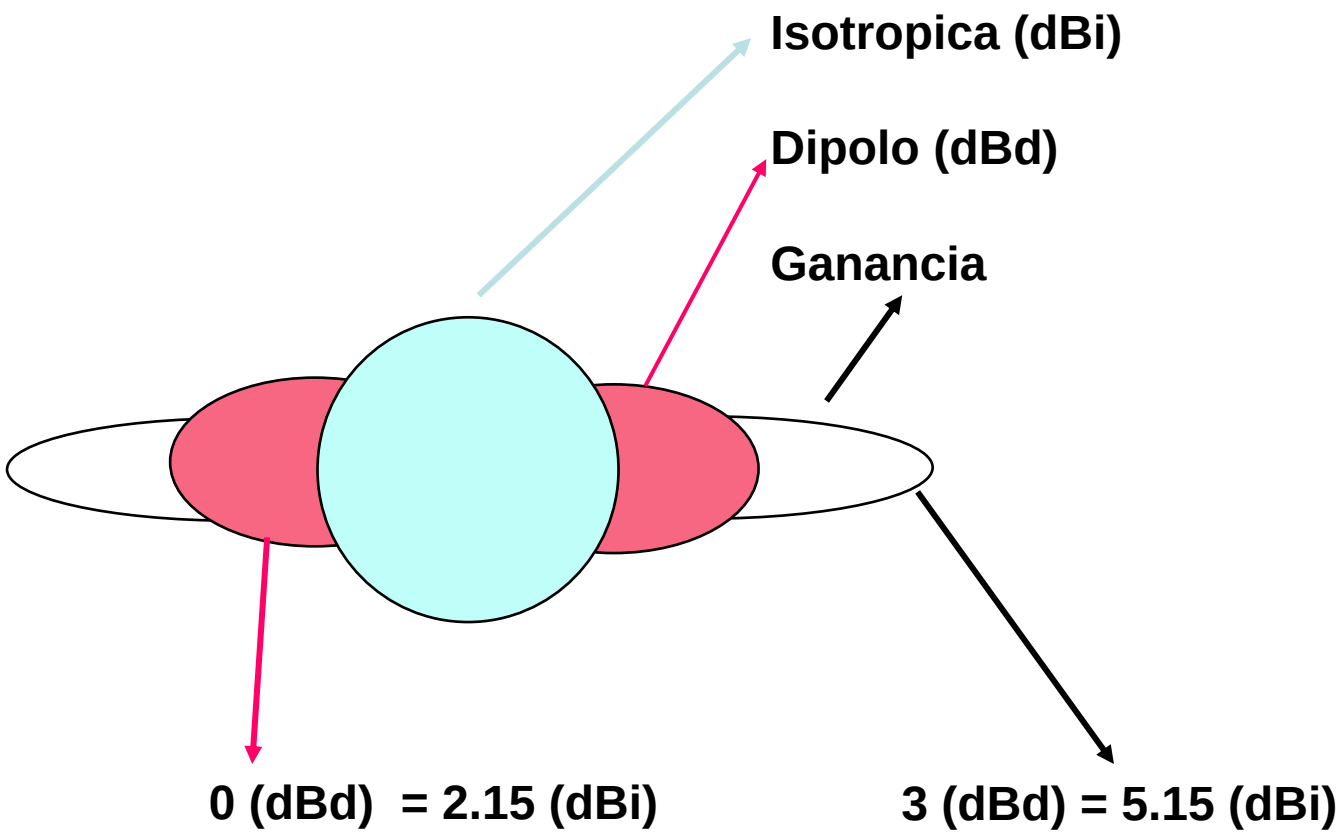


Tipos de antenas fijas para sistemas móviles



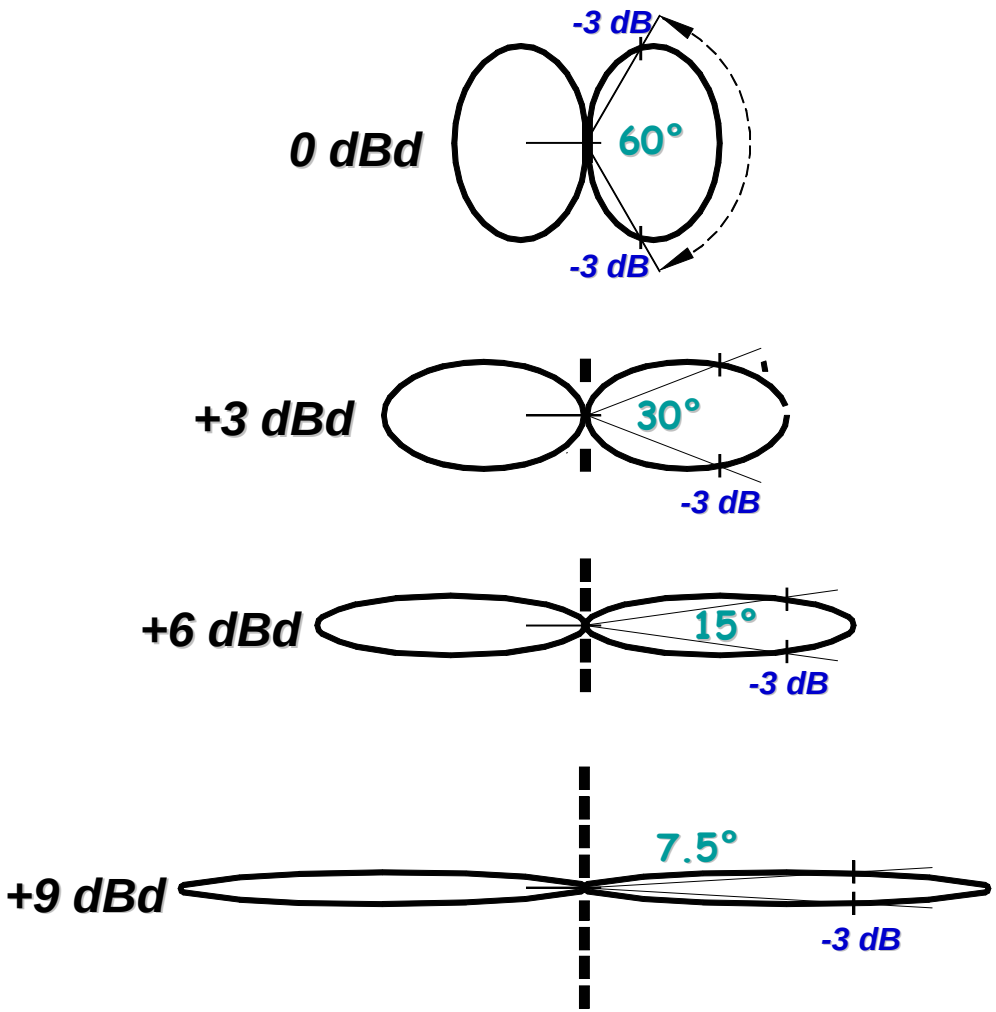
Ejemplos de sistemas irradiantes fijos para móviles

Dbd y Dbi

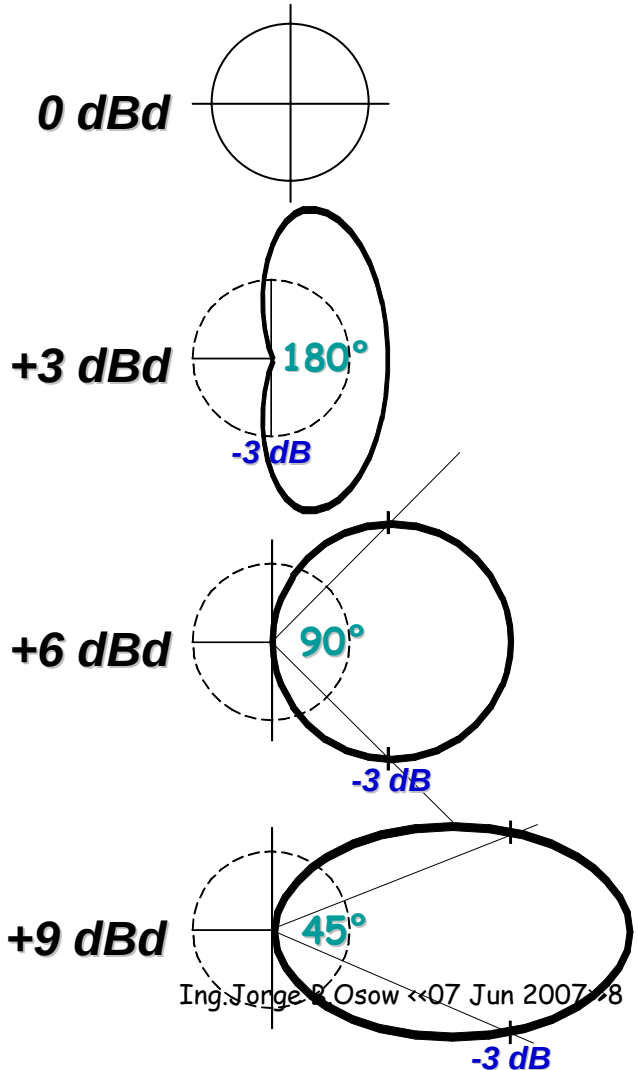

Isotropica (dBi)
Dipolo (dBd)
Ganancia
0 (dBd) = 2.15 (dBi)
3 (dBd) = 5.15 (dBi)

Principio Ganancia de Antenas

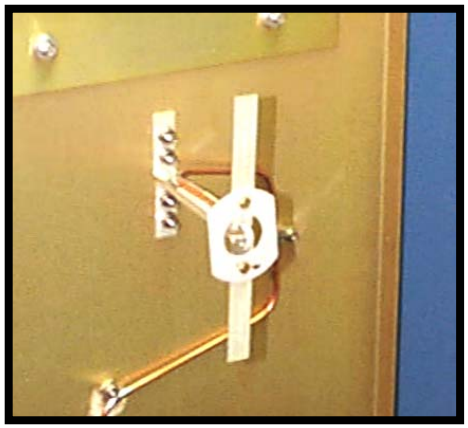
Antena Omni
Diagrama vertical



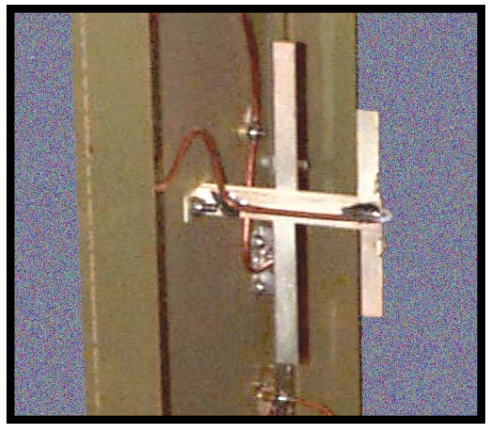
Antena direccional
Diagrama horizontal



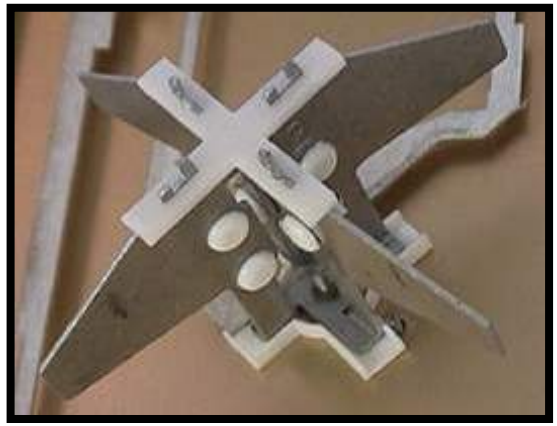
Elementos Irradiantes Básicos



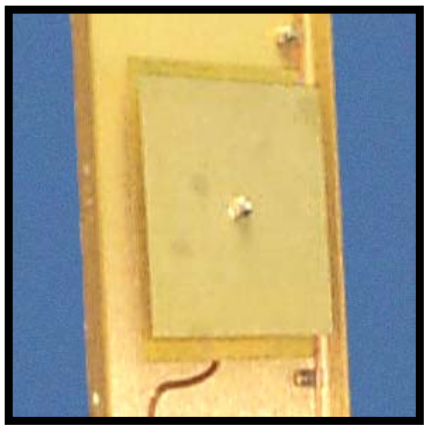
Dipolo



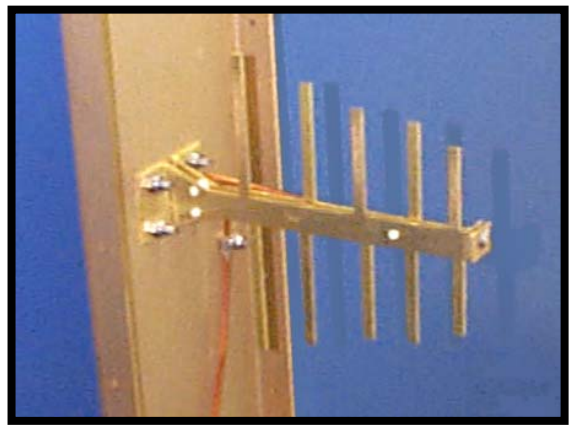
Log Corta



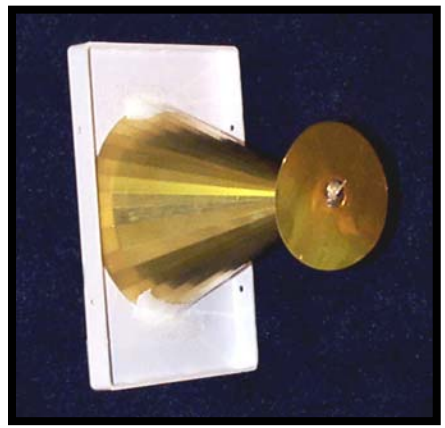
Doble 45°



Placa



Logarítmica

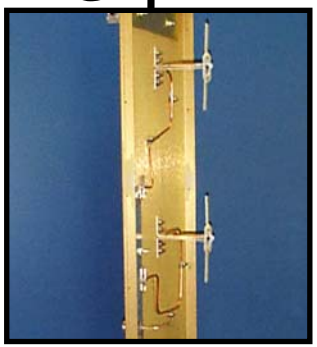


Cónica

Antenas de dipolos apilados

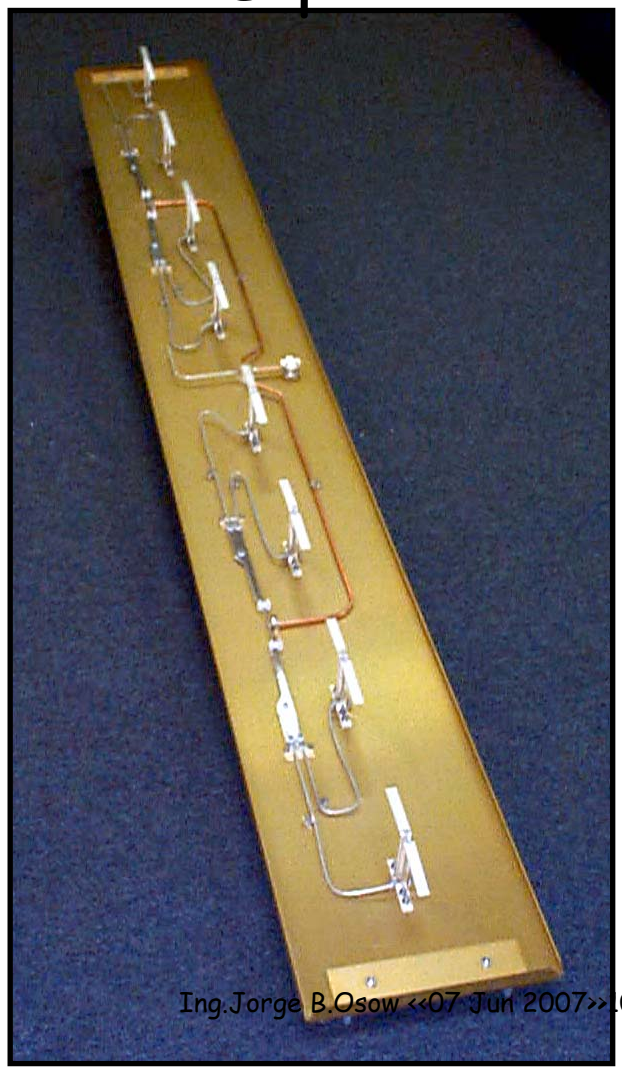
1 Dipolos

2 Dipolos

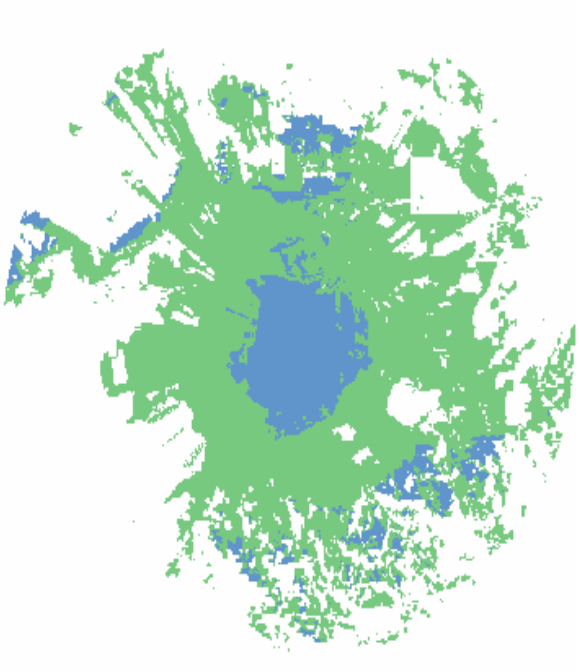


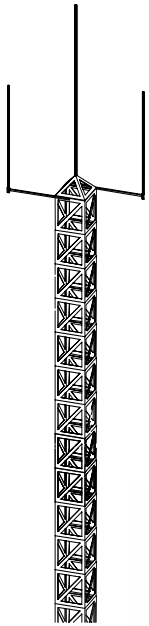
4 Dipolos

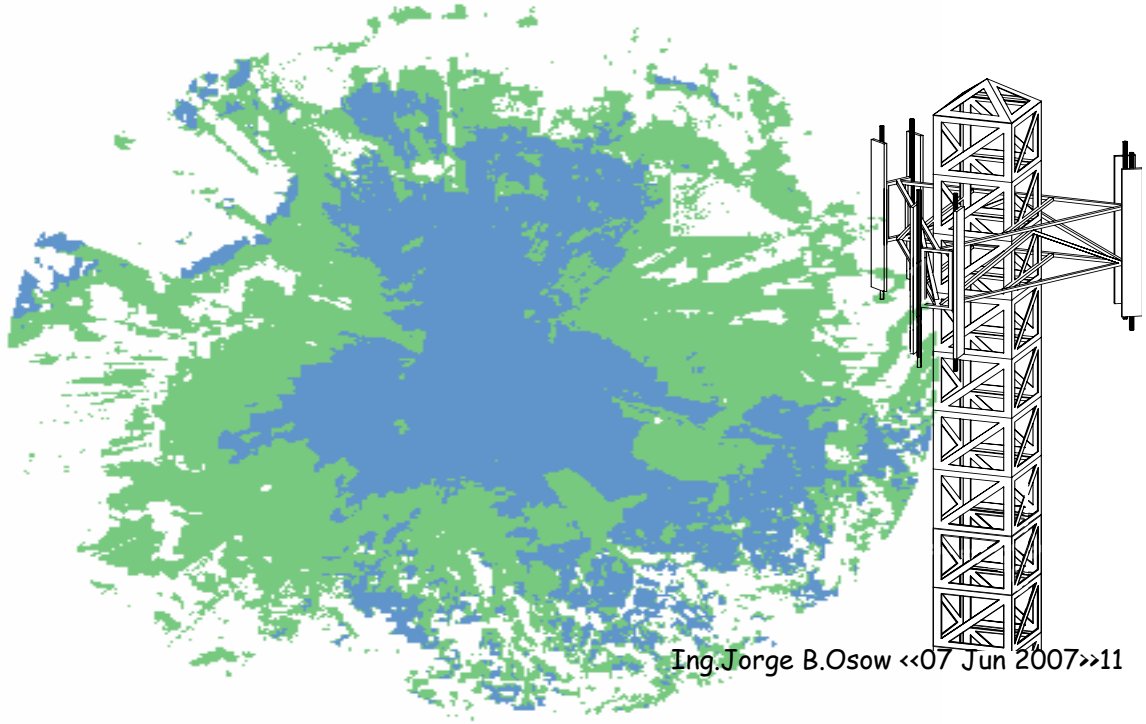
8 Dipolos

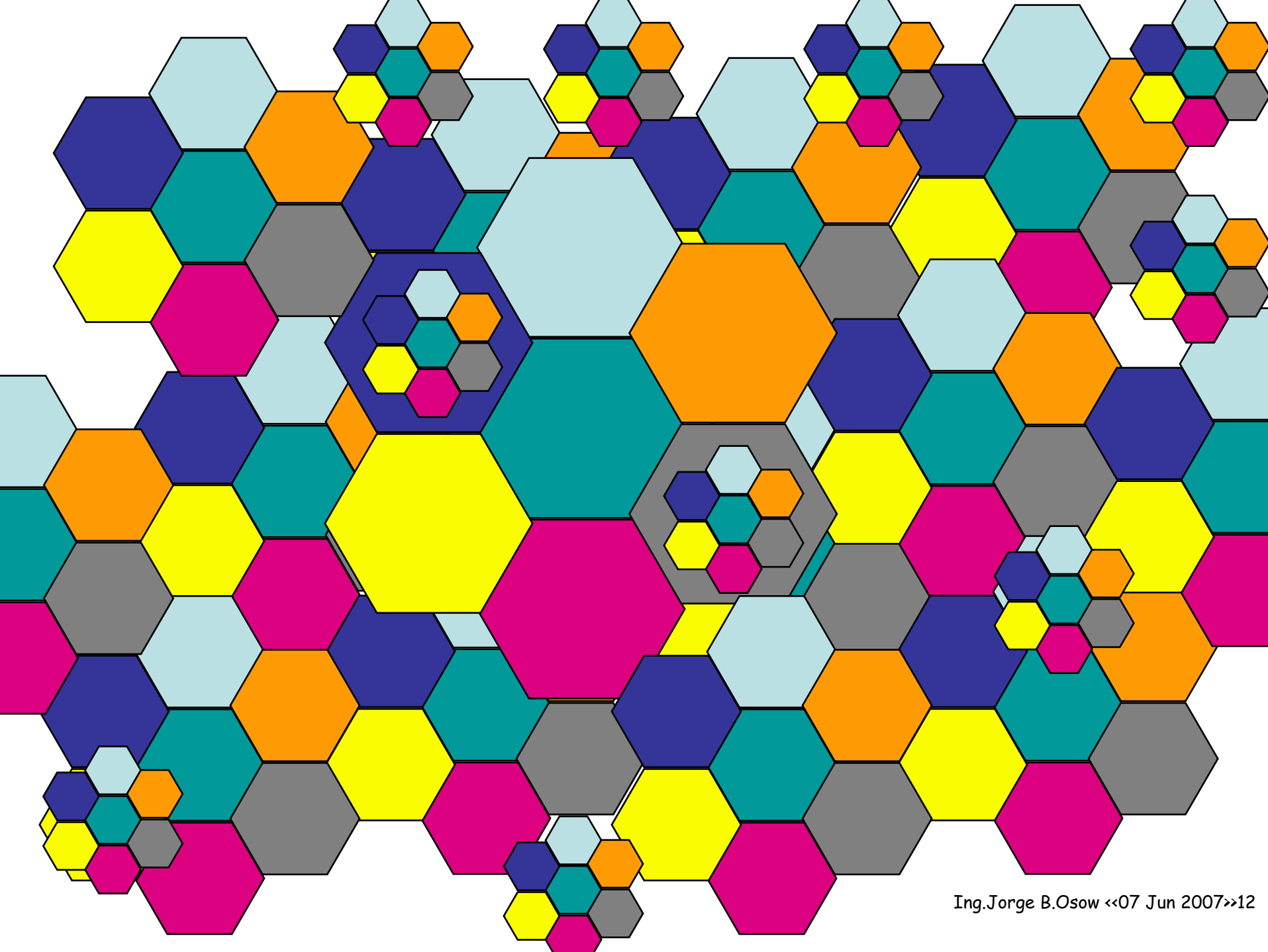


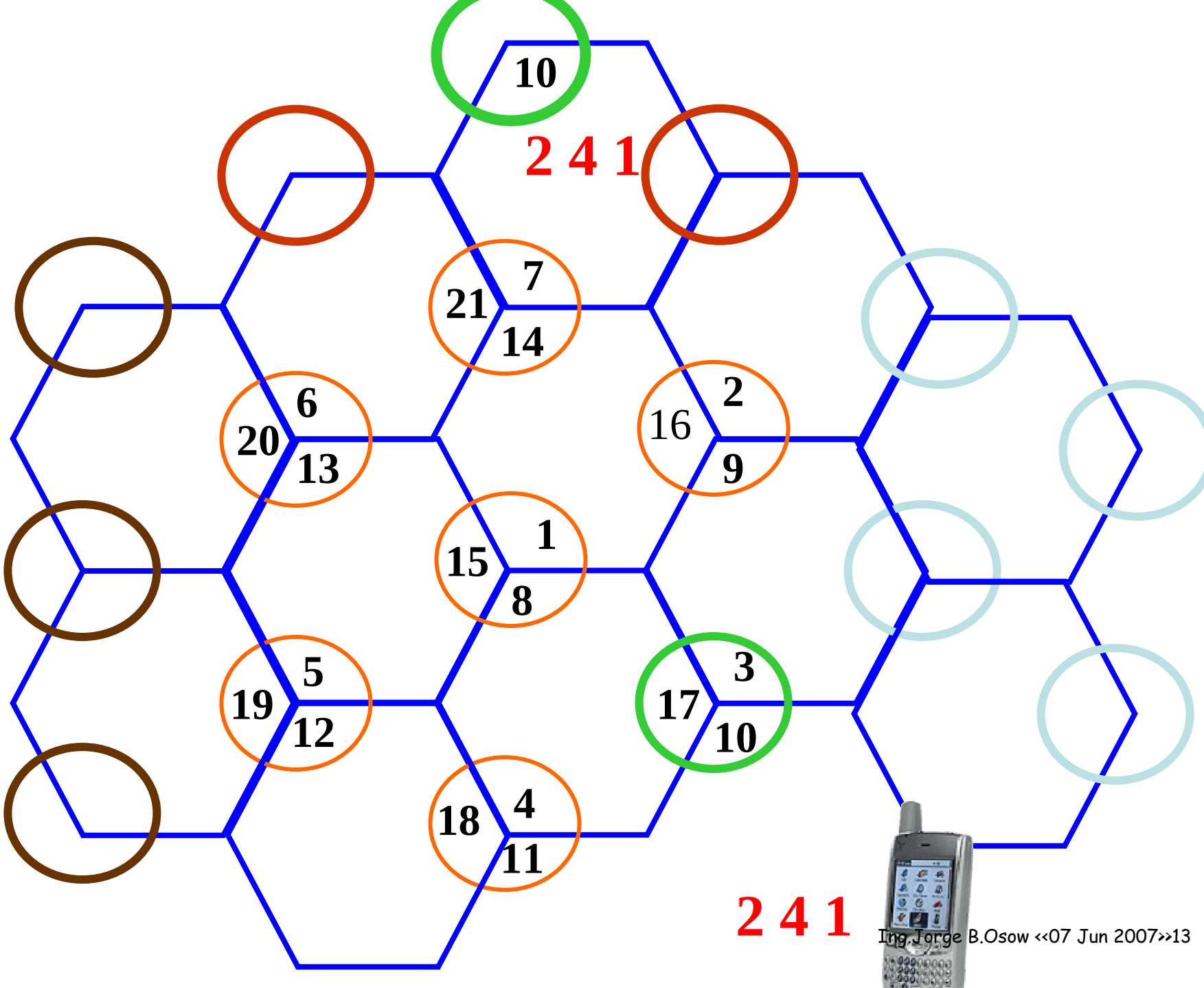
Criterios de Planificación



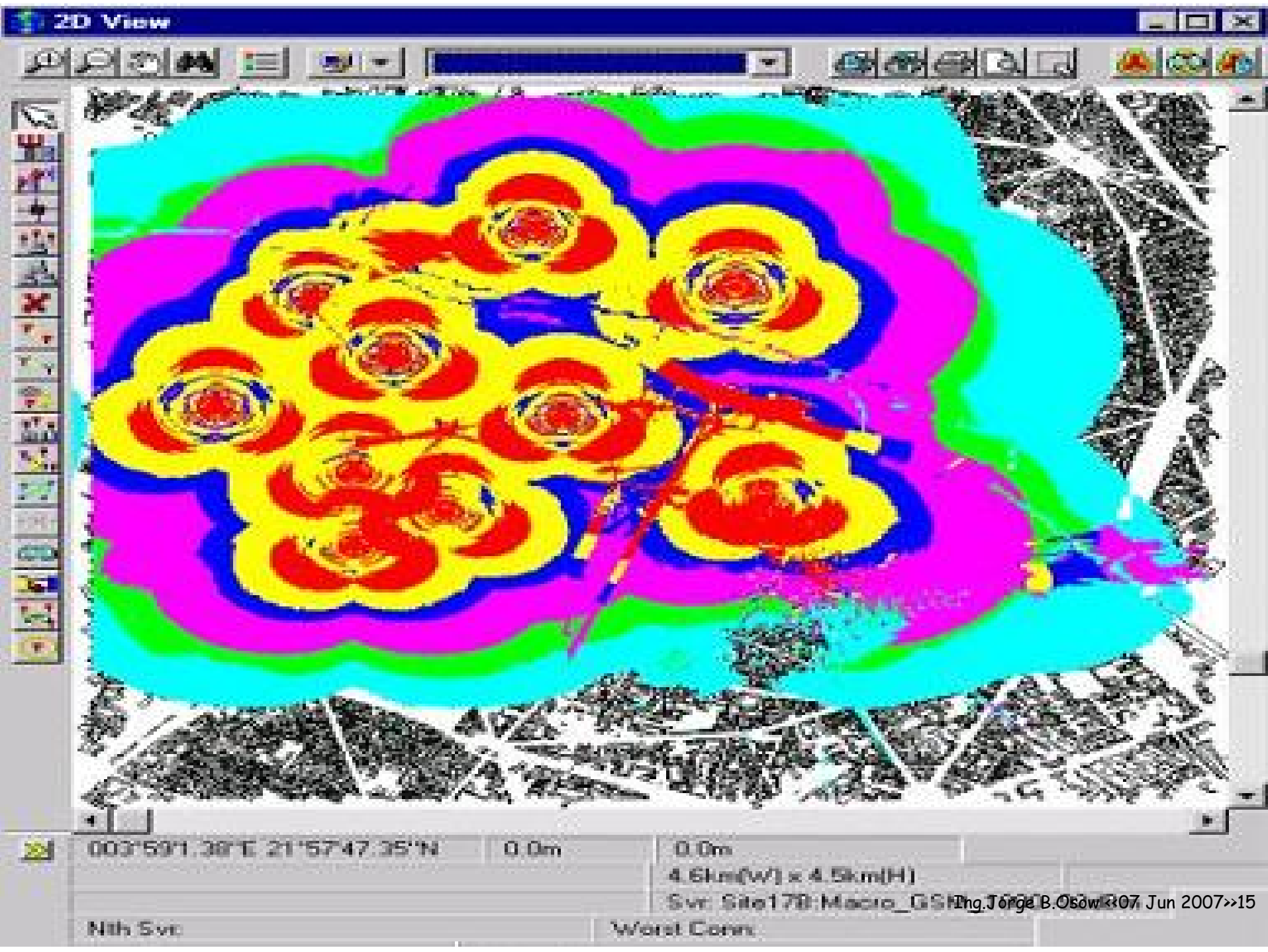


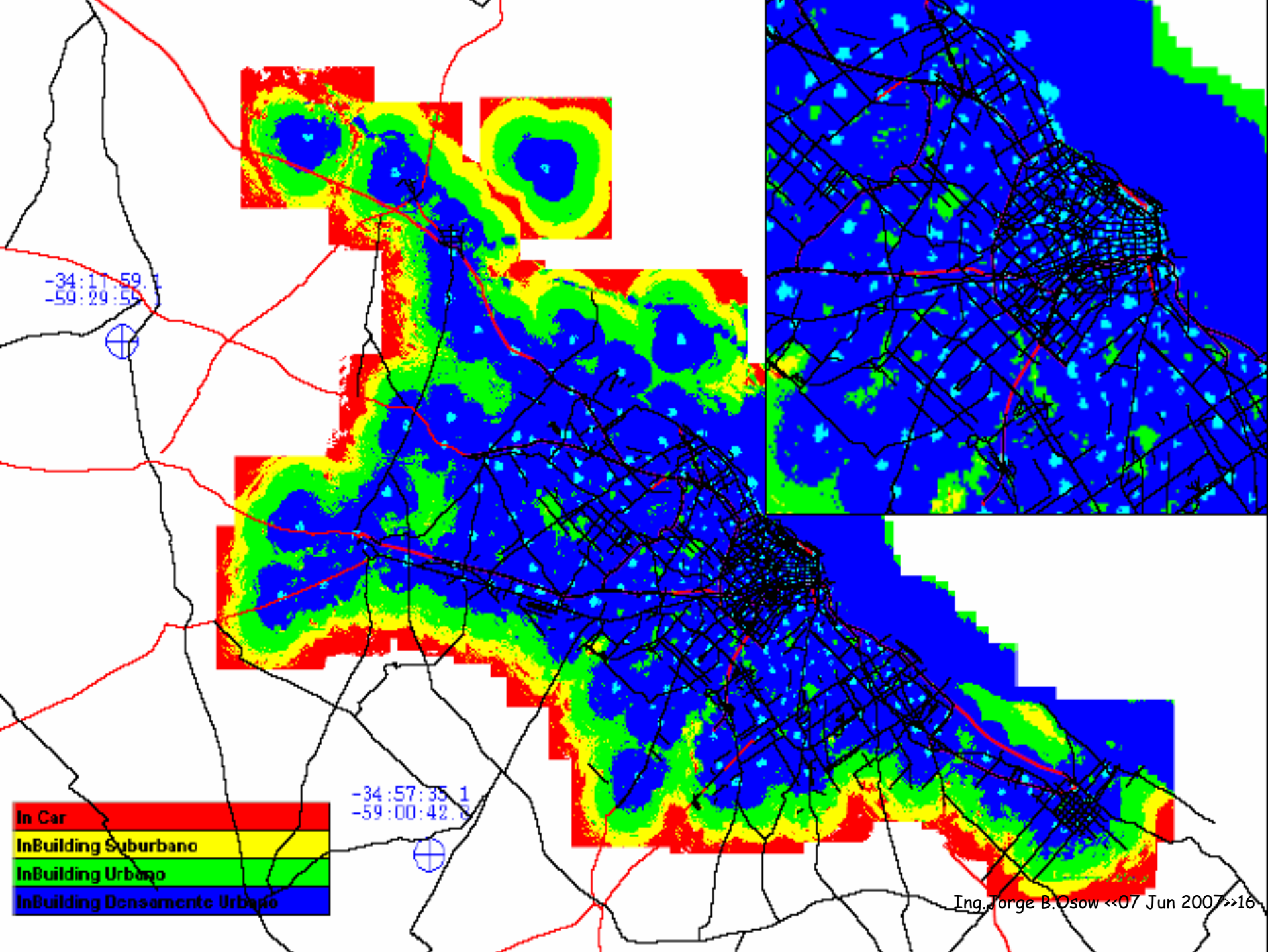



Ing.Jorge B.Osow <<07 Jun 2007>>12

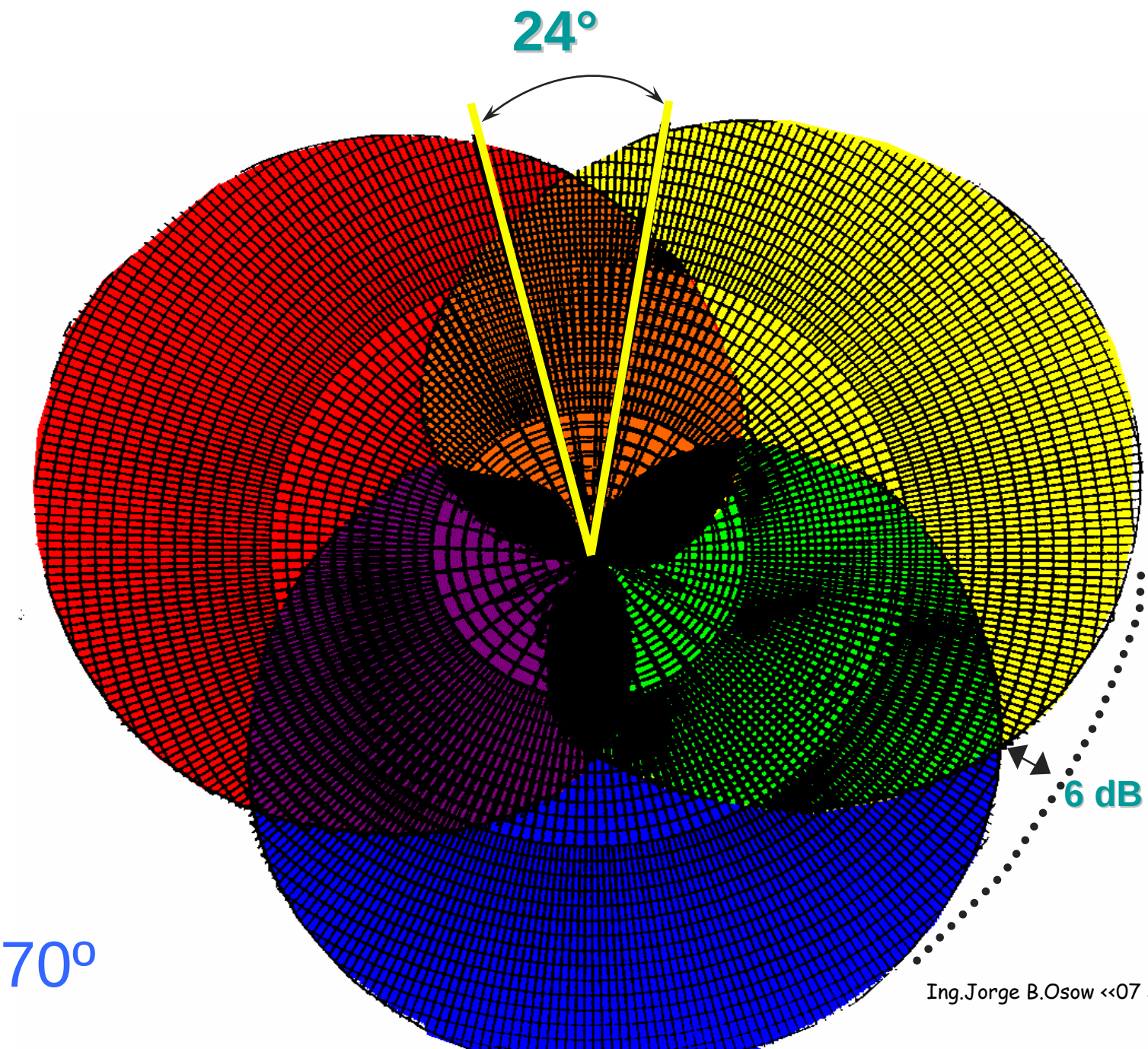

10
2 4 1
7
21
14
6
20
13
2
16
9
1
15
8
5
19
12
3
17
10
4
18
11
2 4 1

Ing.Jorge B.Osow <<07 Jun 2007>>14

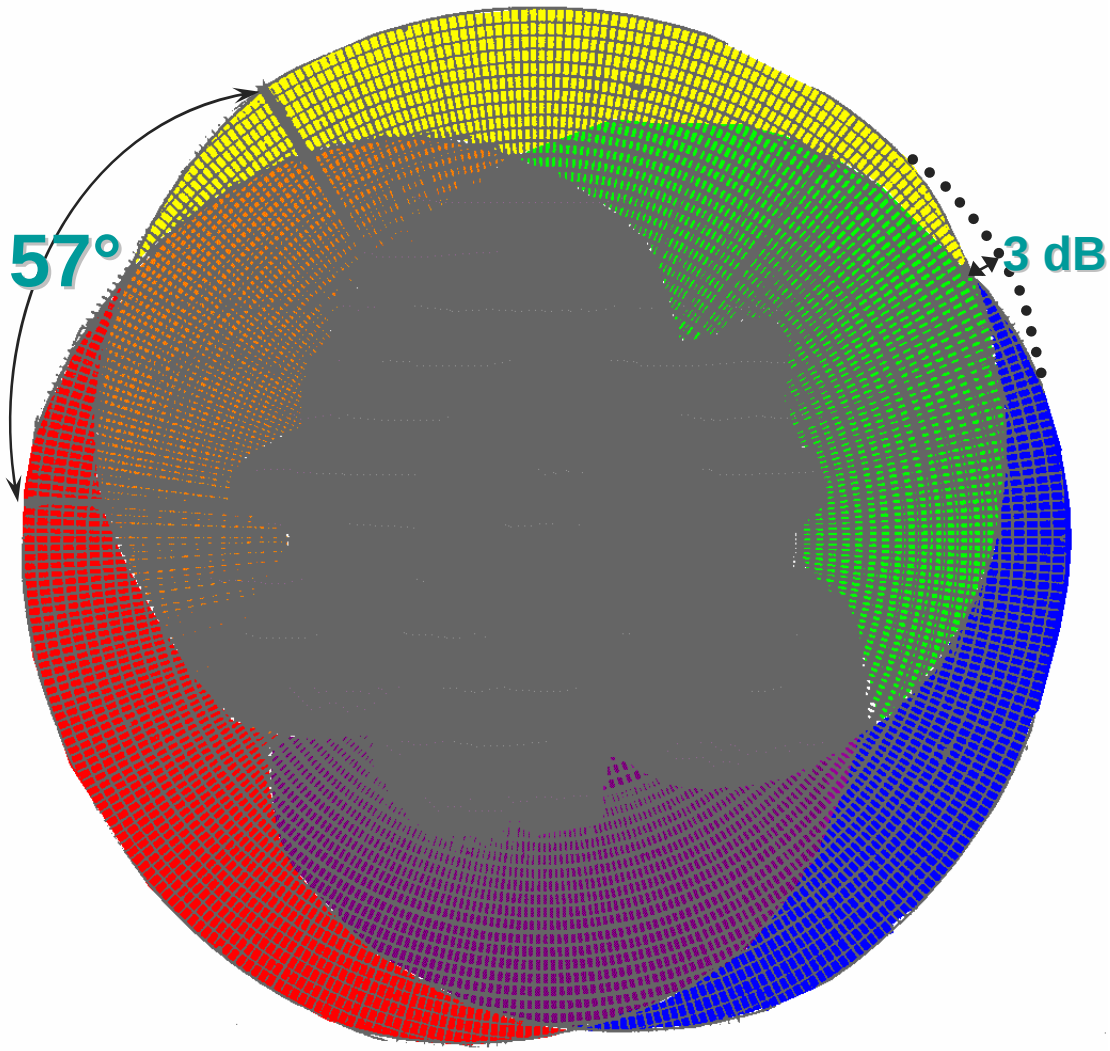

2D View
003°59'1.38"E 21°57'47.35"N
0.0m
0.0m
4.6km(W) x 4.5km(H)
Nth Svc
Worst Conn


-34:17:59.1
-59:29:56.1
-34:57:35.1
-59:00:42.6
In Car
InBuilding Suburbano
InBuilding Urbano
InBuilding Densamente Urbano

Configuraciones de sistemas irradiantes fijos para móviles



3 x 70º



3 x 120°

Antena Panel con Dieléctrico Aire

- Polarización Vertical
- Apertura horizontal 60º
- Pobre relación frente espalda

Ejemplo antena panel con inclinación eléctrica

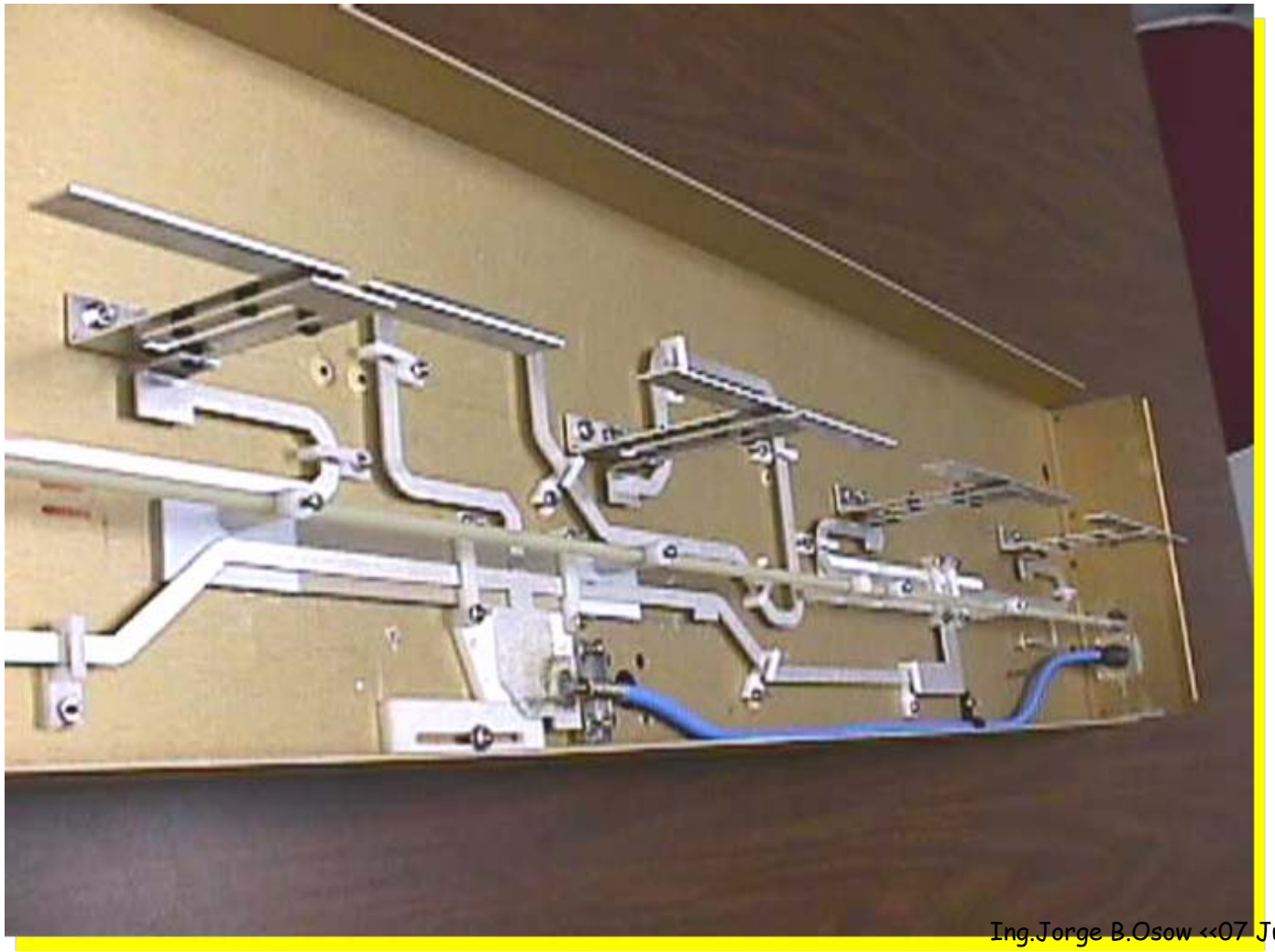
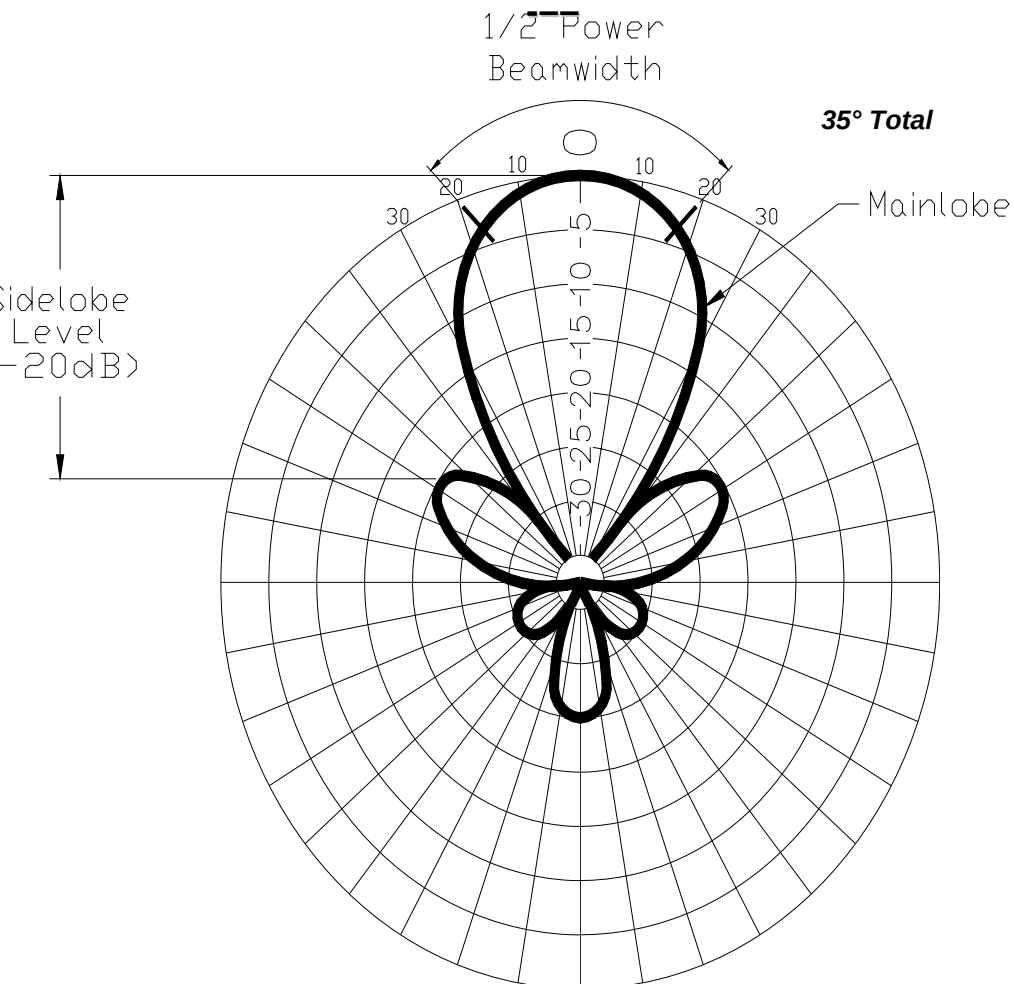
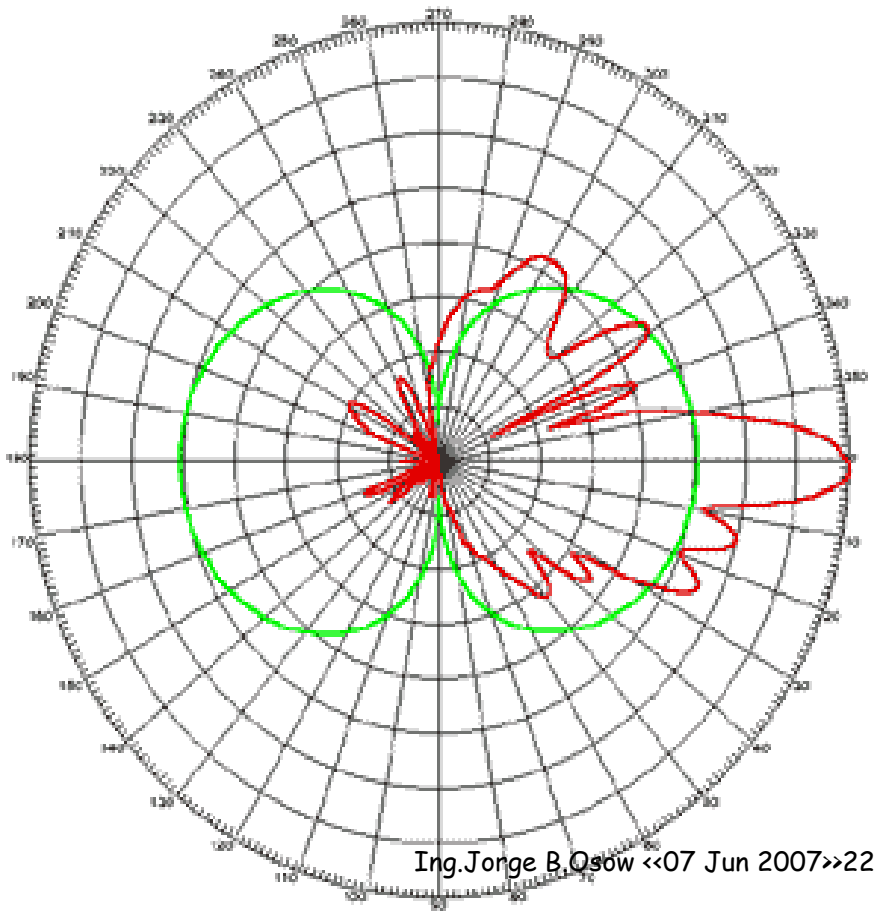


Diagrama Horizontal antena panel

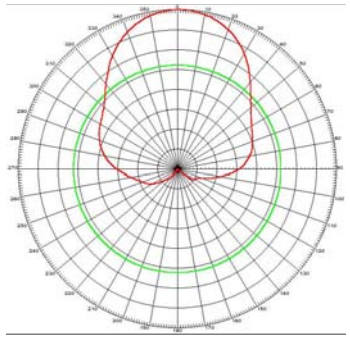
Diagrama Vertical antena panel



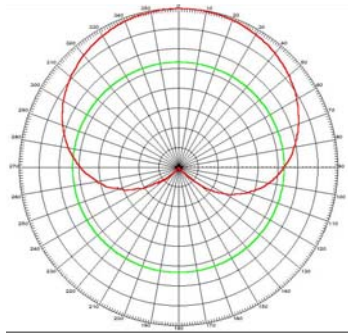


Ejemplos de diagramas horizontales de antenas panel logarítmicas

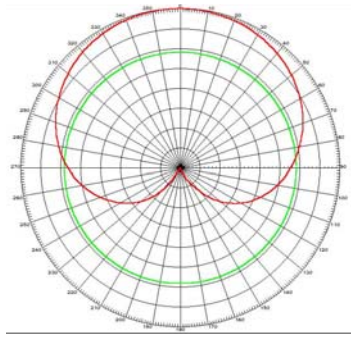
40°



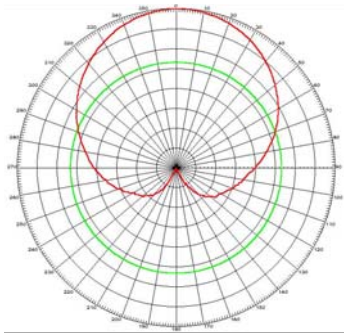
80°



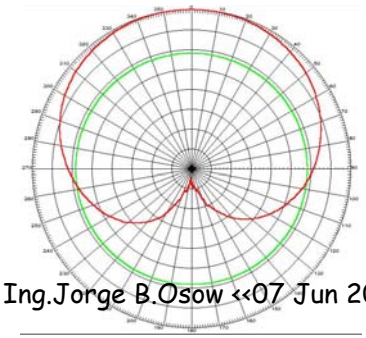
90°



65°

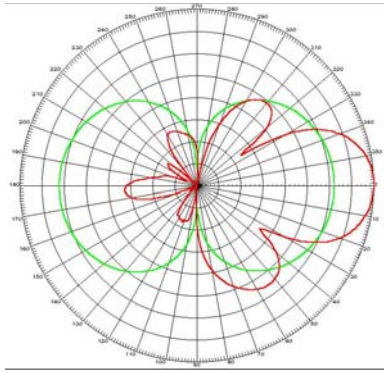


105°

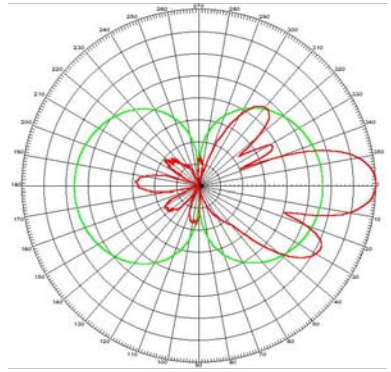


Ejemplos de diagramas verticales antenas panel logarítmicas

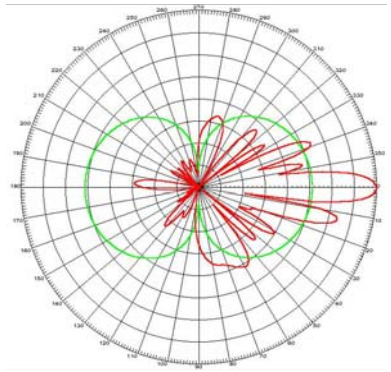
9 dBd



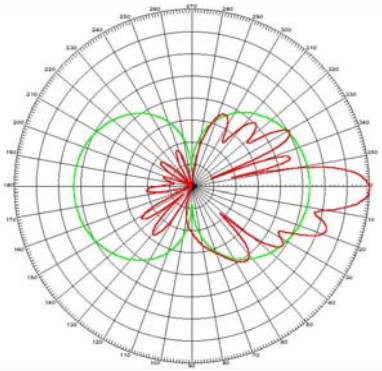
12 dBd



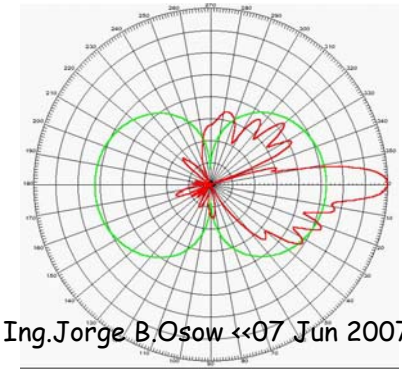
14,5 dBd



13,5 dBd

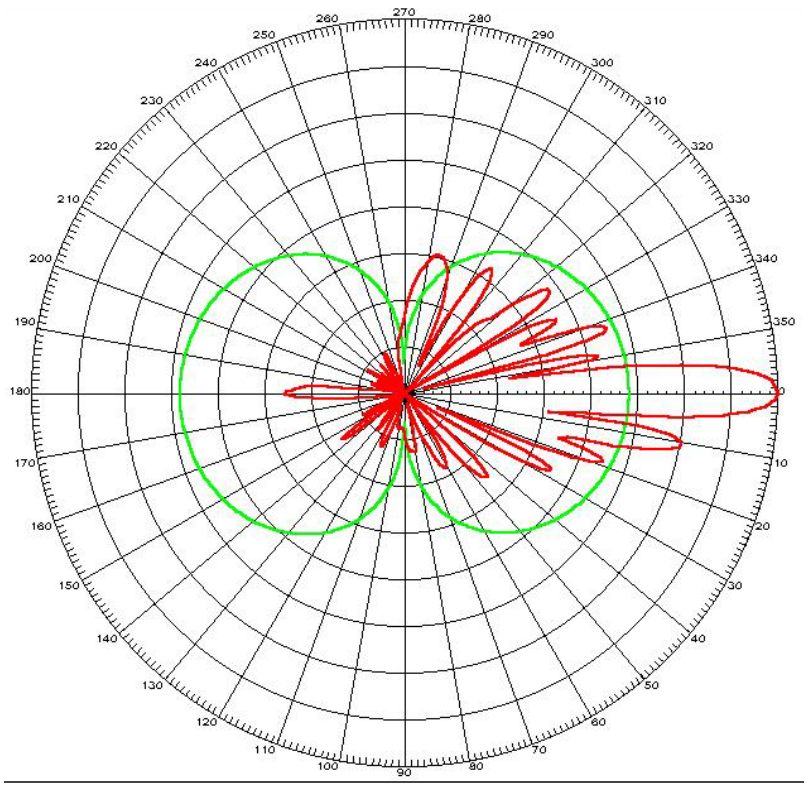


13,9 dBd

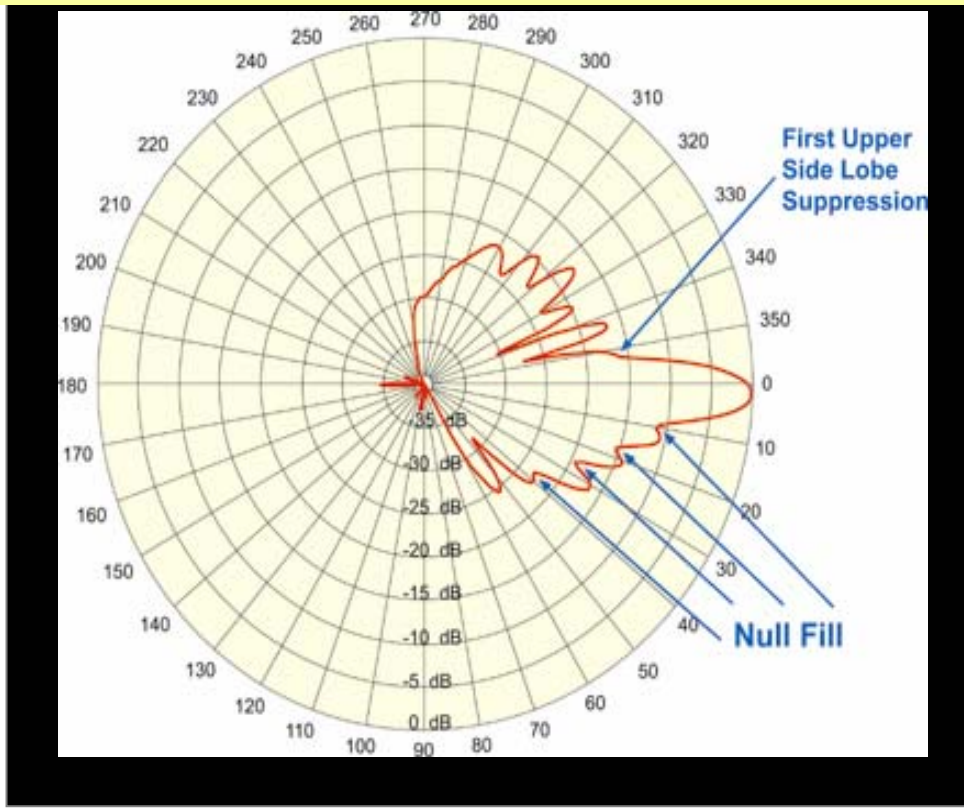


Ejemplos de Optimización "Ganancia Maxima " o "Ceros Llenos"

Ganancia Máxima

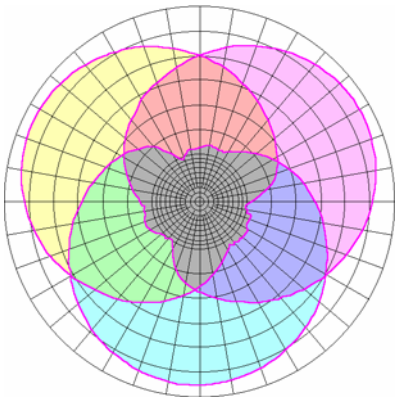


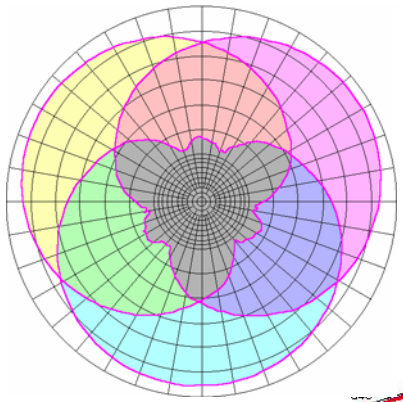
Ceros Llenos



Relación de potencia por sector

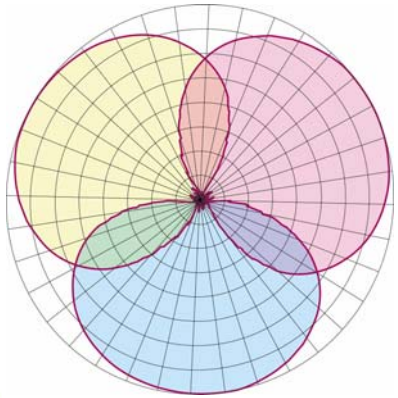
Paneles Tradicionales

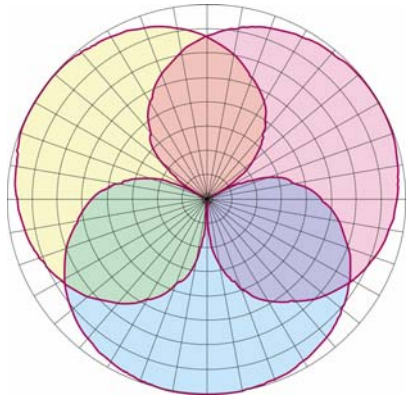




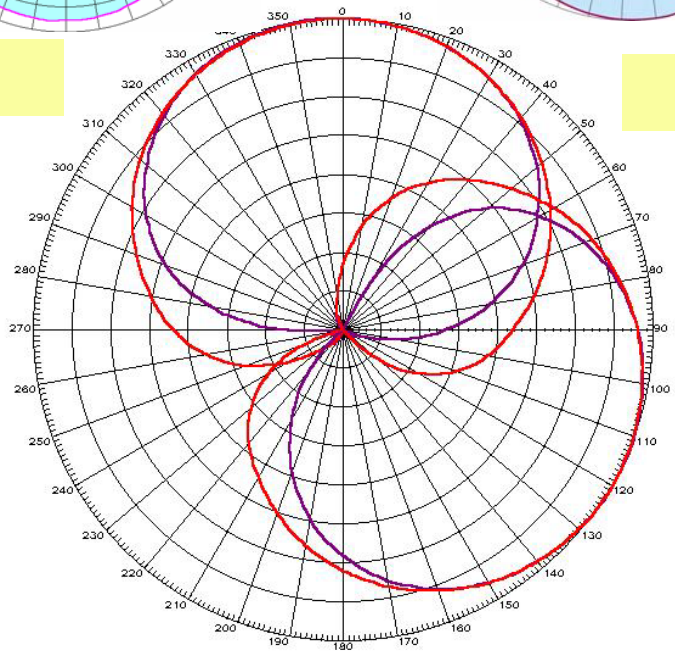
65° 90°

Paneles Logarítmicos



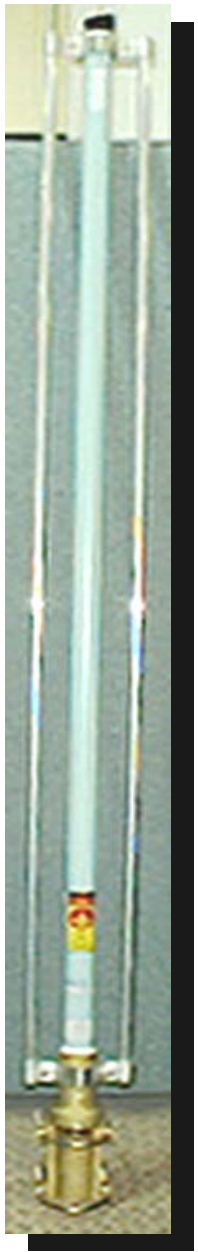


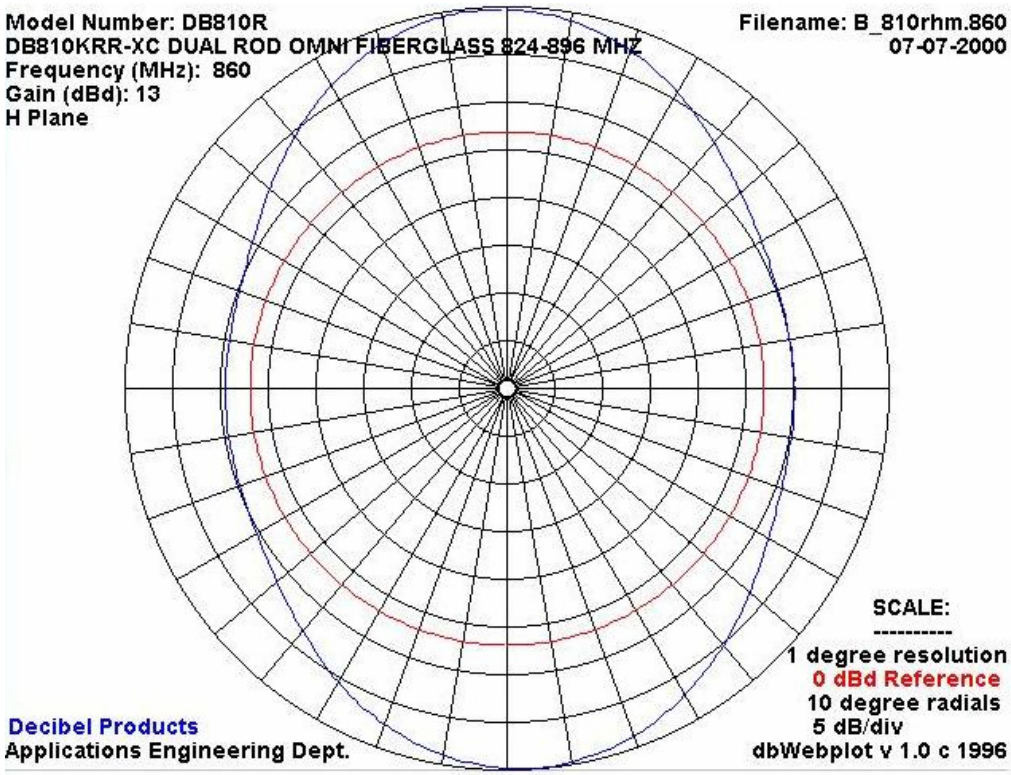
65° 90°



Sistemas irradiantes "tradicionales"

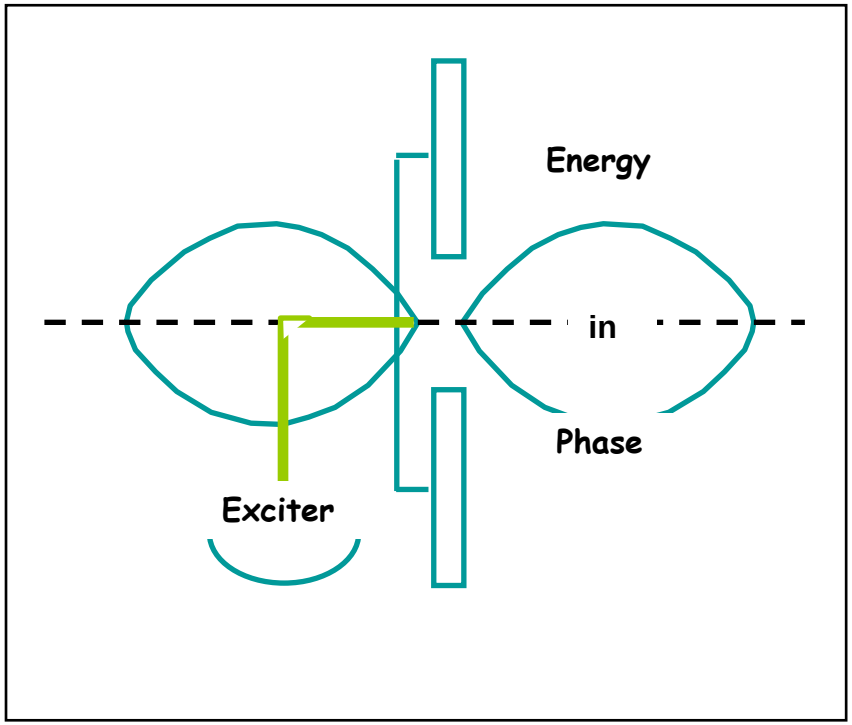
Ejemplos de antenas "elíptica" y direccional



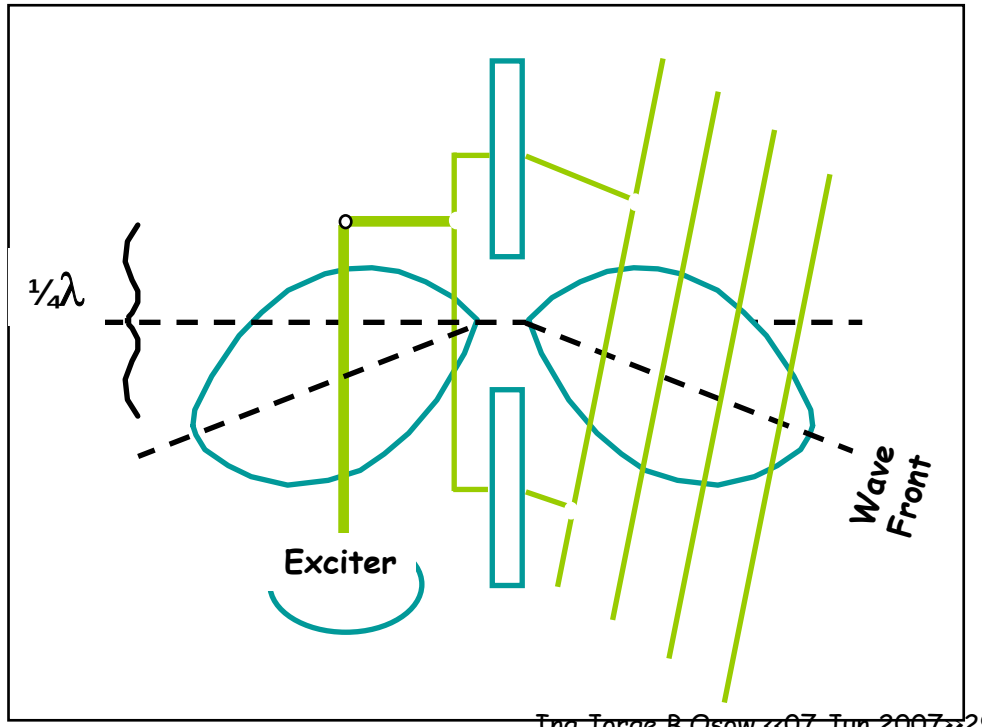


Principio de Inclinación Eléctrica

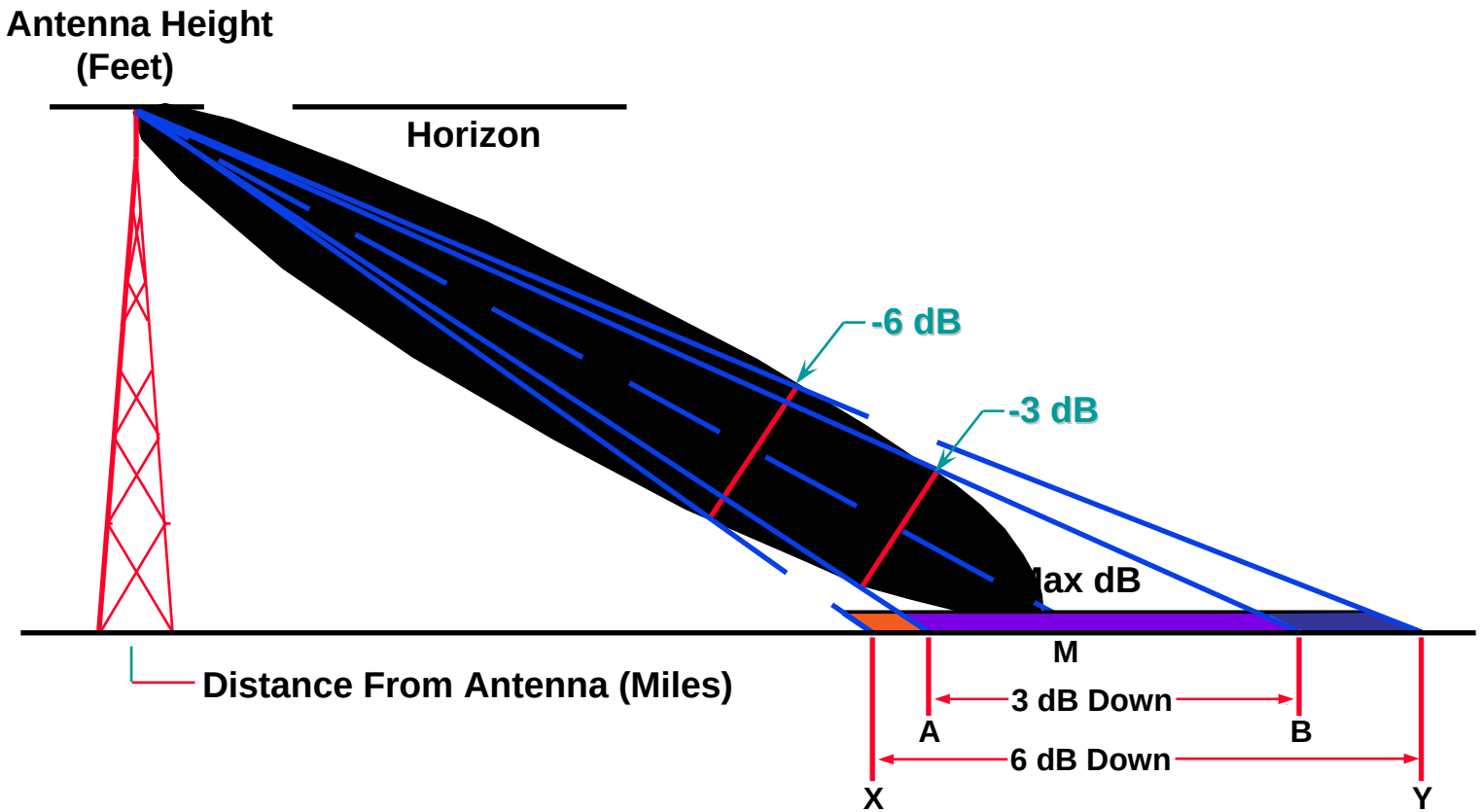
Alimentación en fase



Alimentación fuera de fase

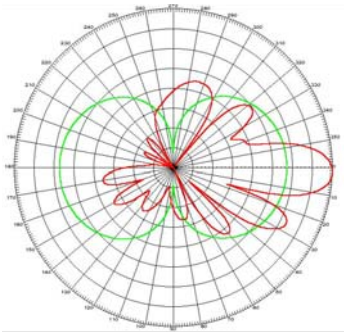


Intensidad de señal de antenas inclinadas

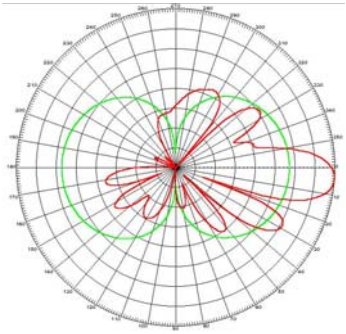


Ejemplo de inclinación eléctrica ajustable en antena panel

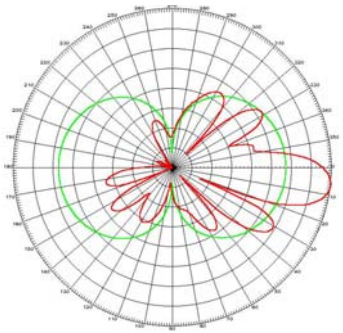
2°



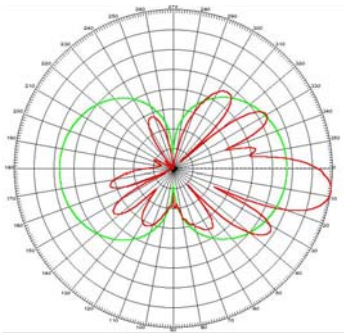
4°

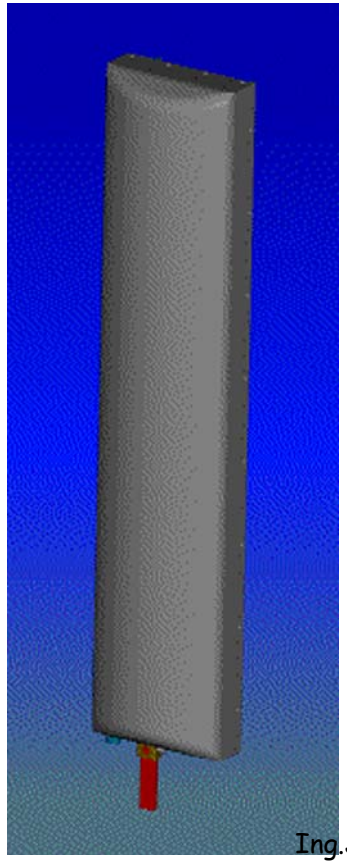


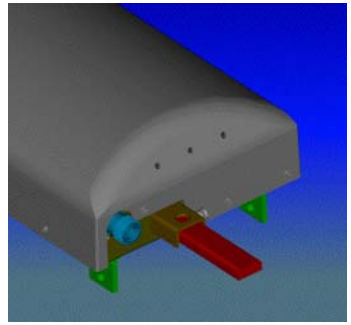
6°



8°

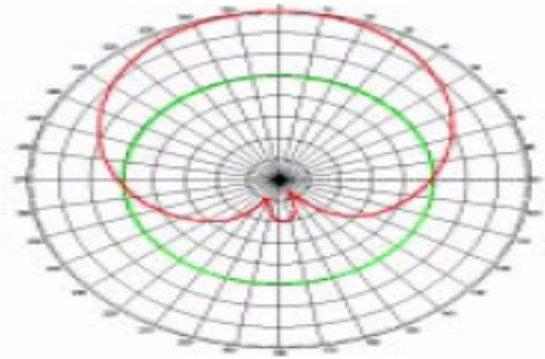




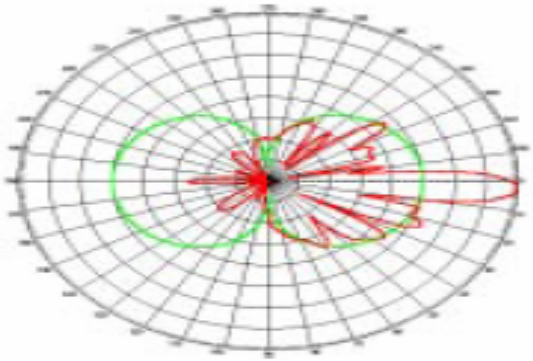


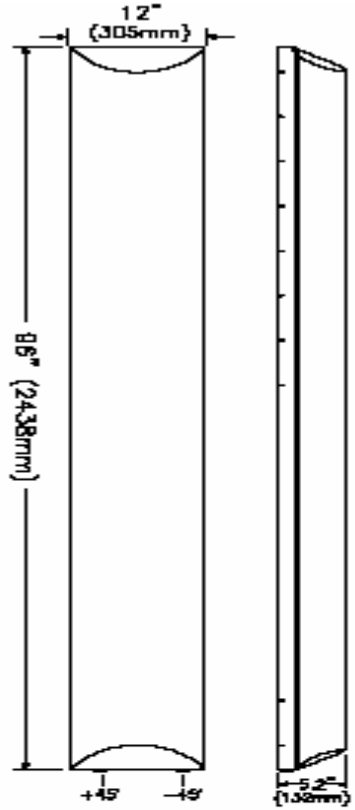
Antena Panel inclinación fija 3°

Azimuth (Horizontal)



Elevation (Vertical)





PRELIMINARY

Electrical

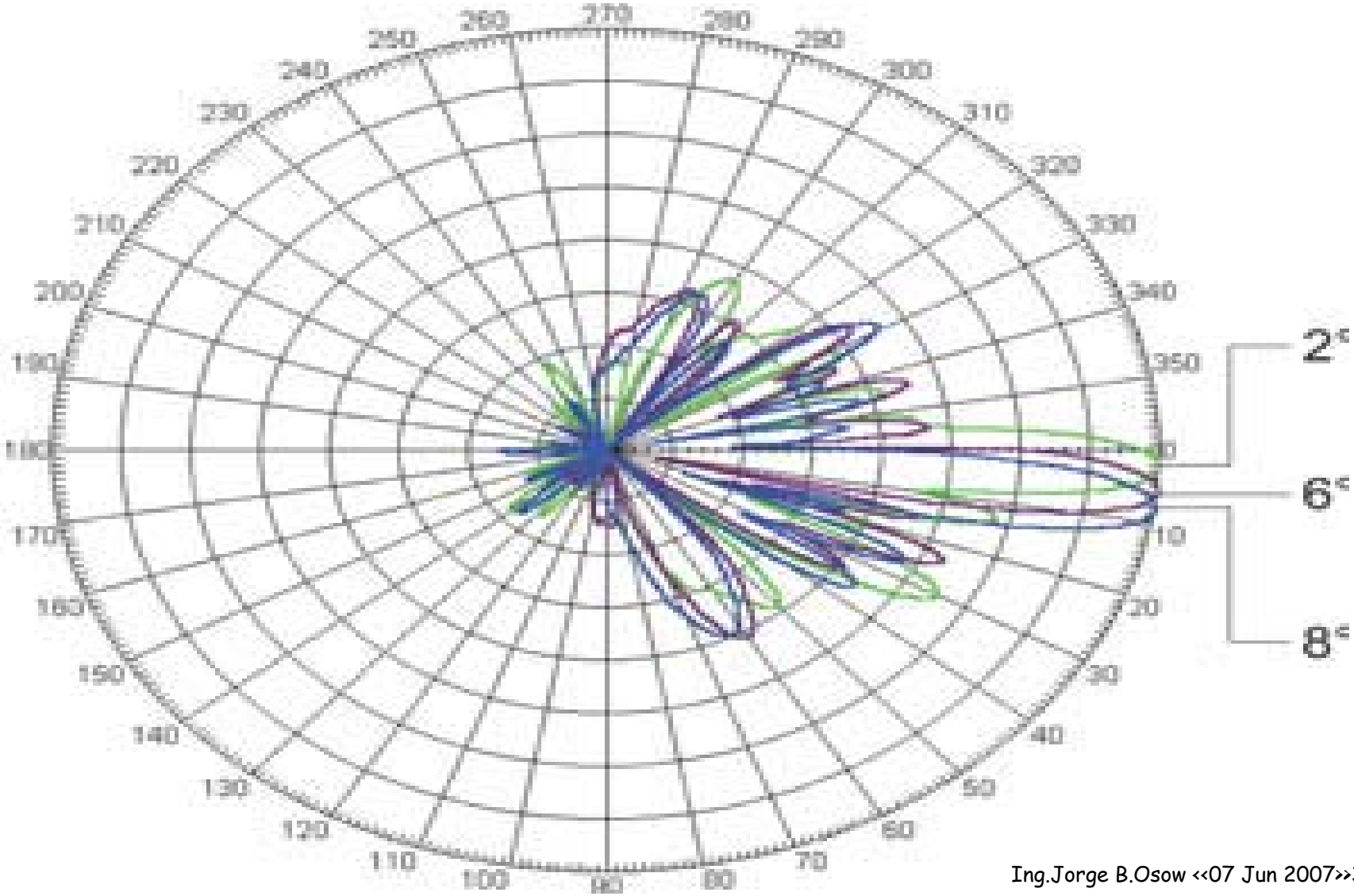
VSWR (max.):	1.35:1
USLS:	> 18 dB
Isolation	
Port to Port:	> 30 dB
Front-to-Back Ratio:	30 dB, typical
Max. Input Power:	500 Watts
Impedance:	50 Ohms
Lightning Protection:	All metal parts are grounded.

Mounting Options

Standard:	DB380-3 pipe mount kit (max. 3.5" OD), included.
Downtilt:	DB5083D downtilt bracket, optional.

Mechanical

Weight:	34 lbs (15.5 kg)
Wind Area:	5.33 ft² (0.5 m²)
Wind Load:	213 lbf (948N) 95.8 kp (at 100 mph)
Max. Wind Speed:	125 mph (200 km/h)
Reflector:	Pass. Aluminum
Radiators:	Aluminum
Radome:	ABS, UV Inhibited
Mounting Hardware:	Galvanized Steel
Color:	Light Gray


270
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290
300
310
320
330
340
350
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10
20
30
40
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60
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80
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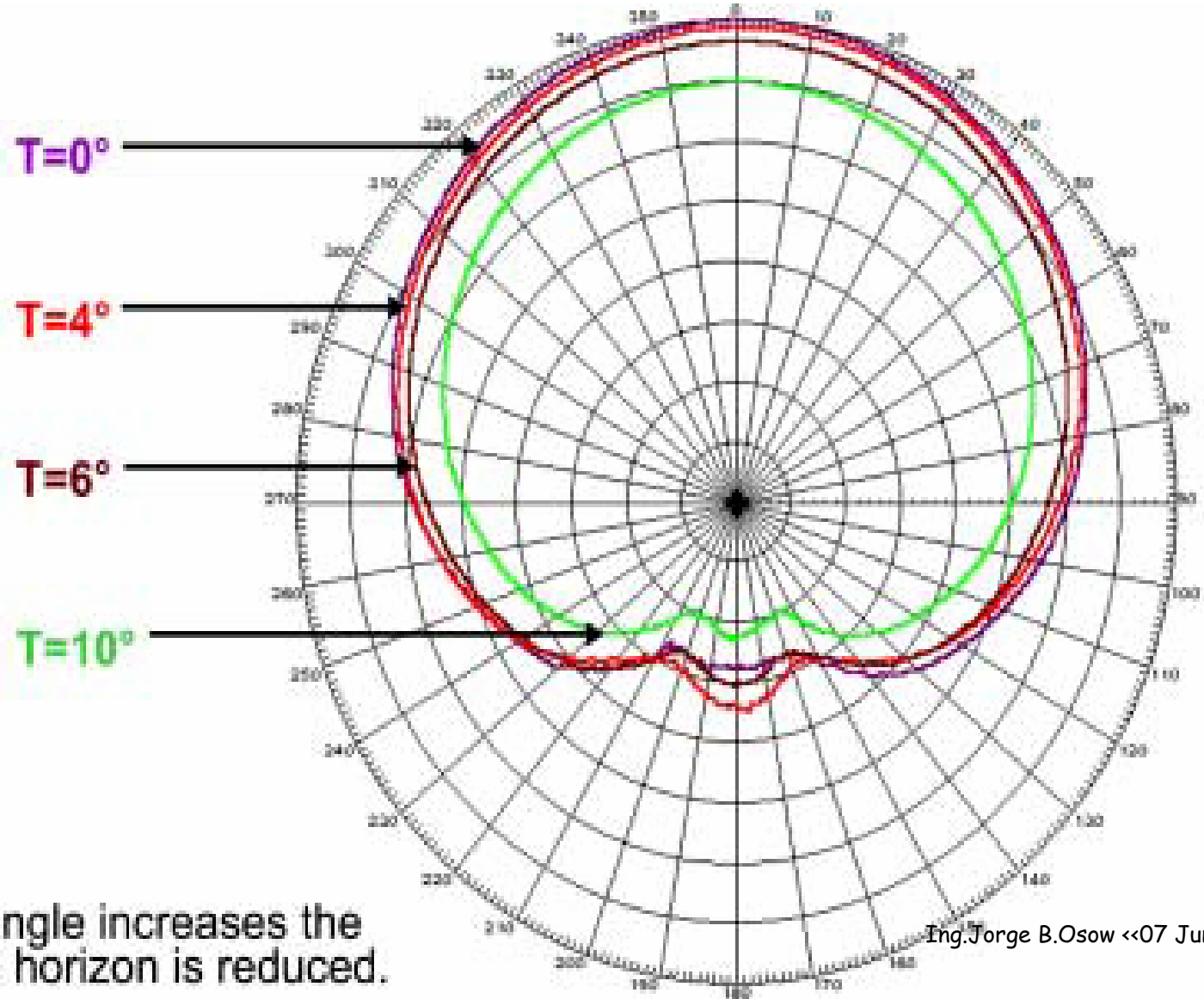
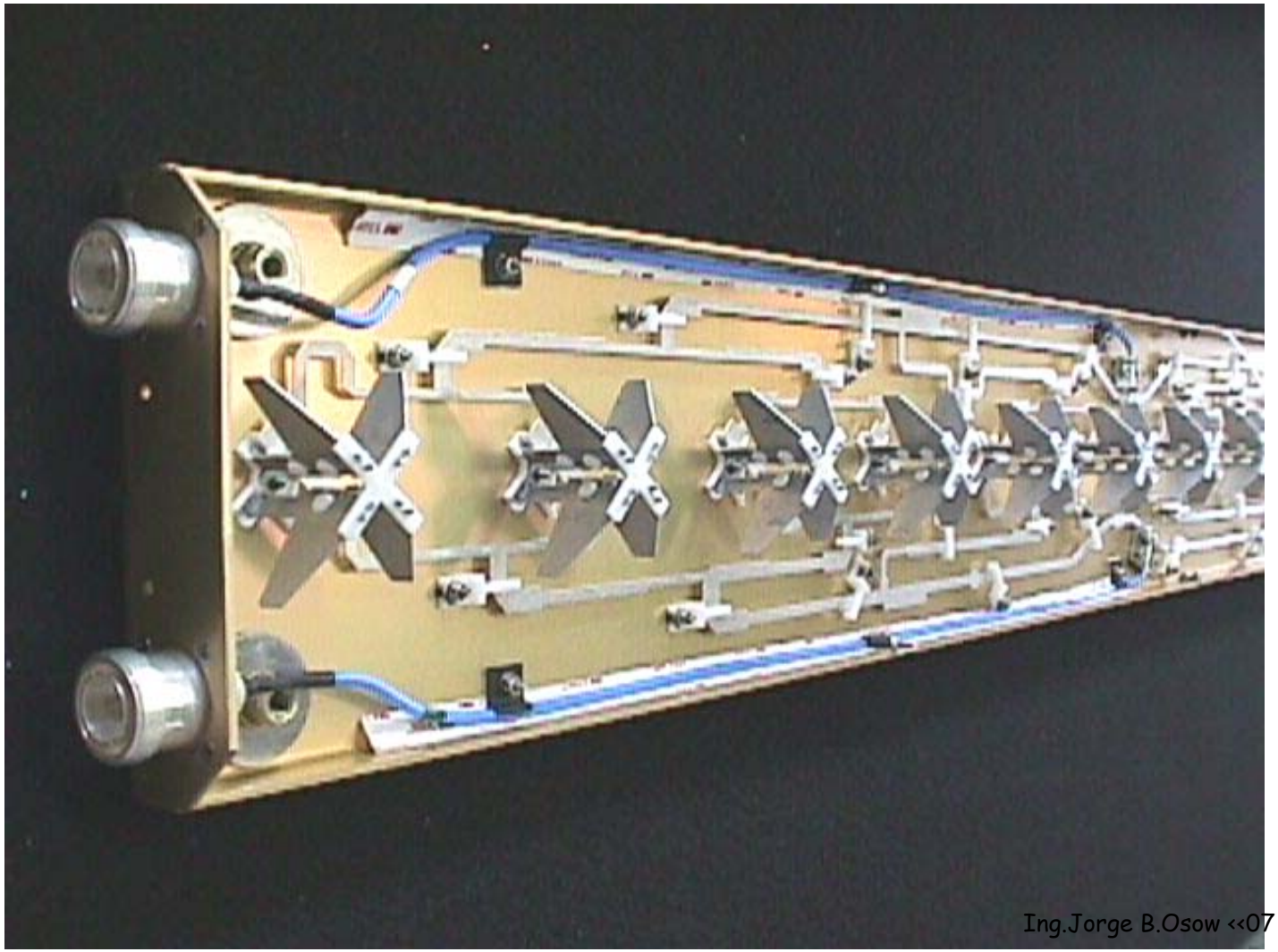
250
260
2
6
8

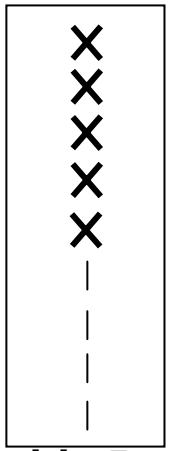


As the tilt angle increases the gain on the horizon is reduced.

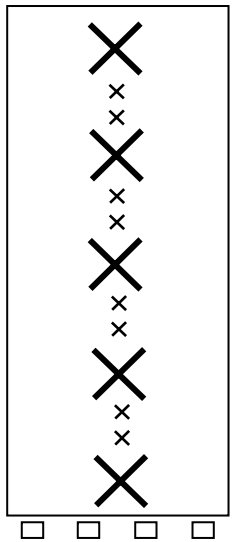
Ejemplo Antena Panel "+45° -45°"

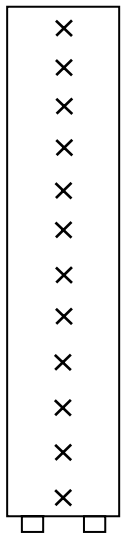


Ejemplos antenas doble banda "+45°-45°"



Doble Banda

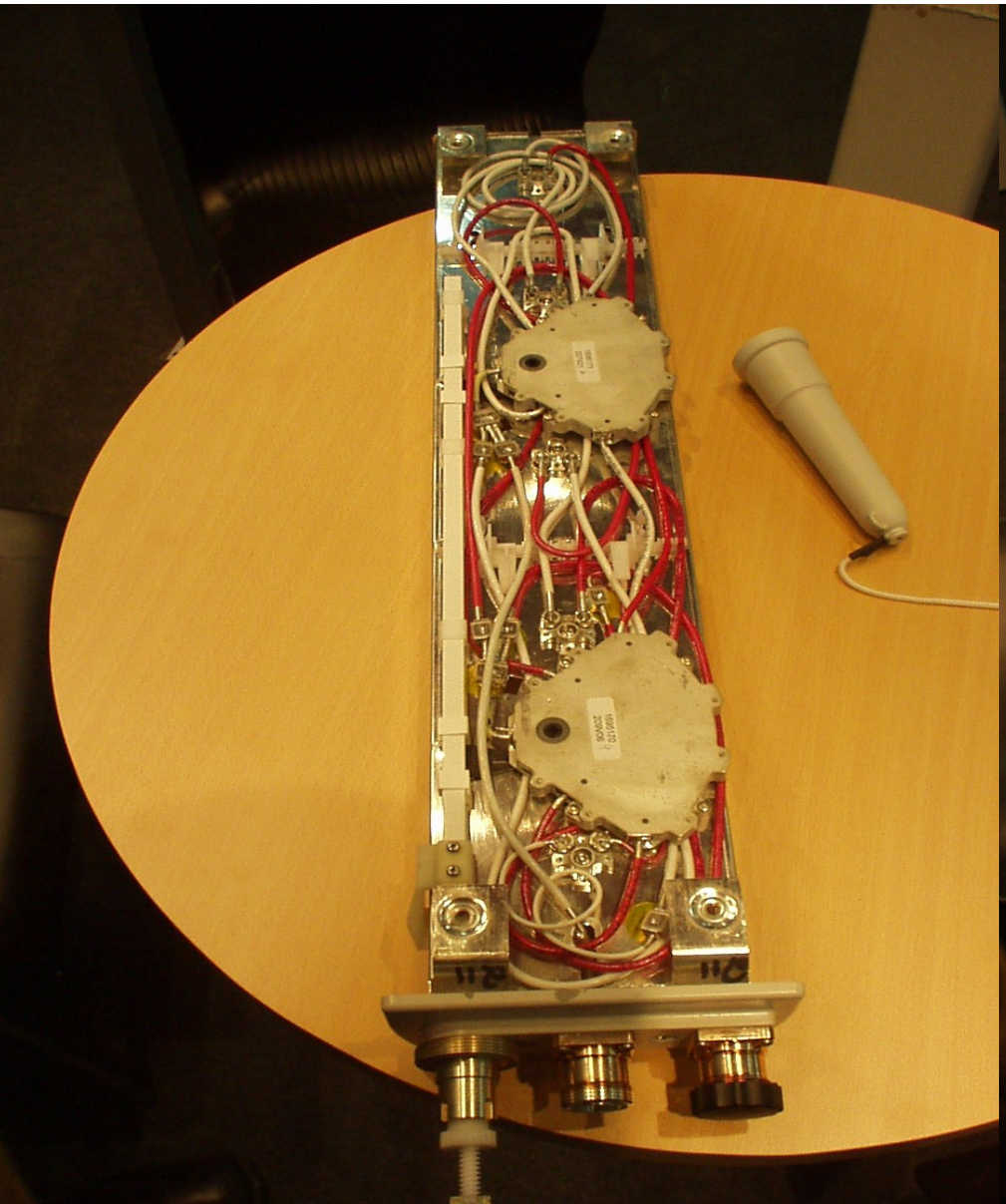


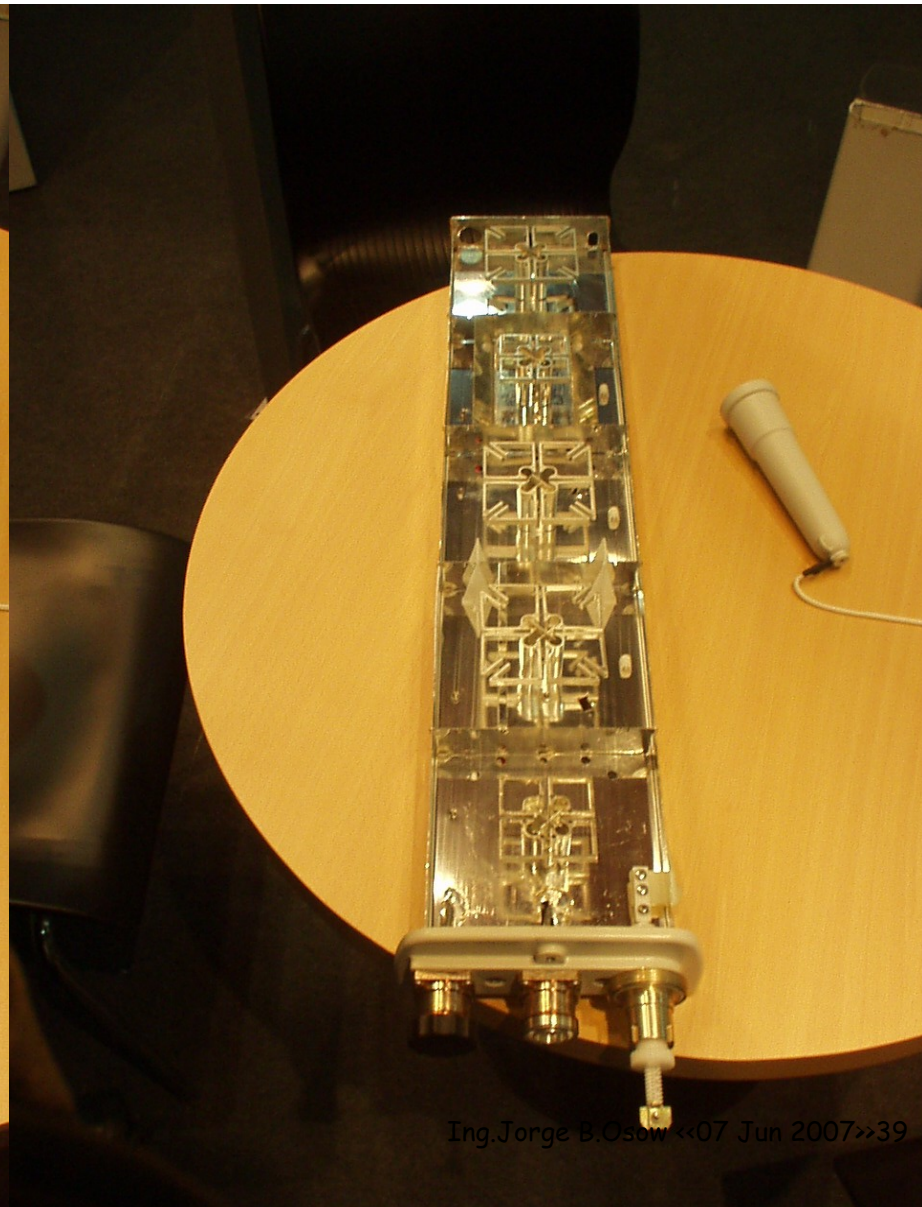


Banda pcs

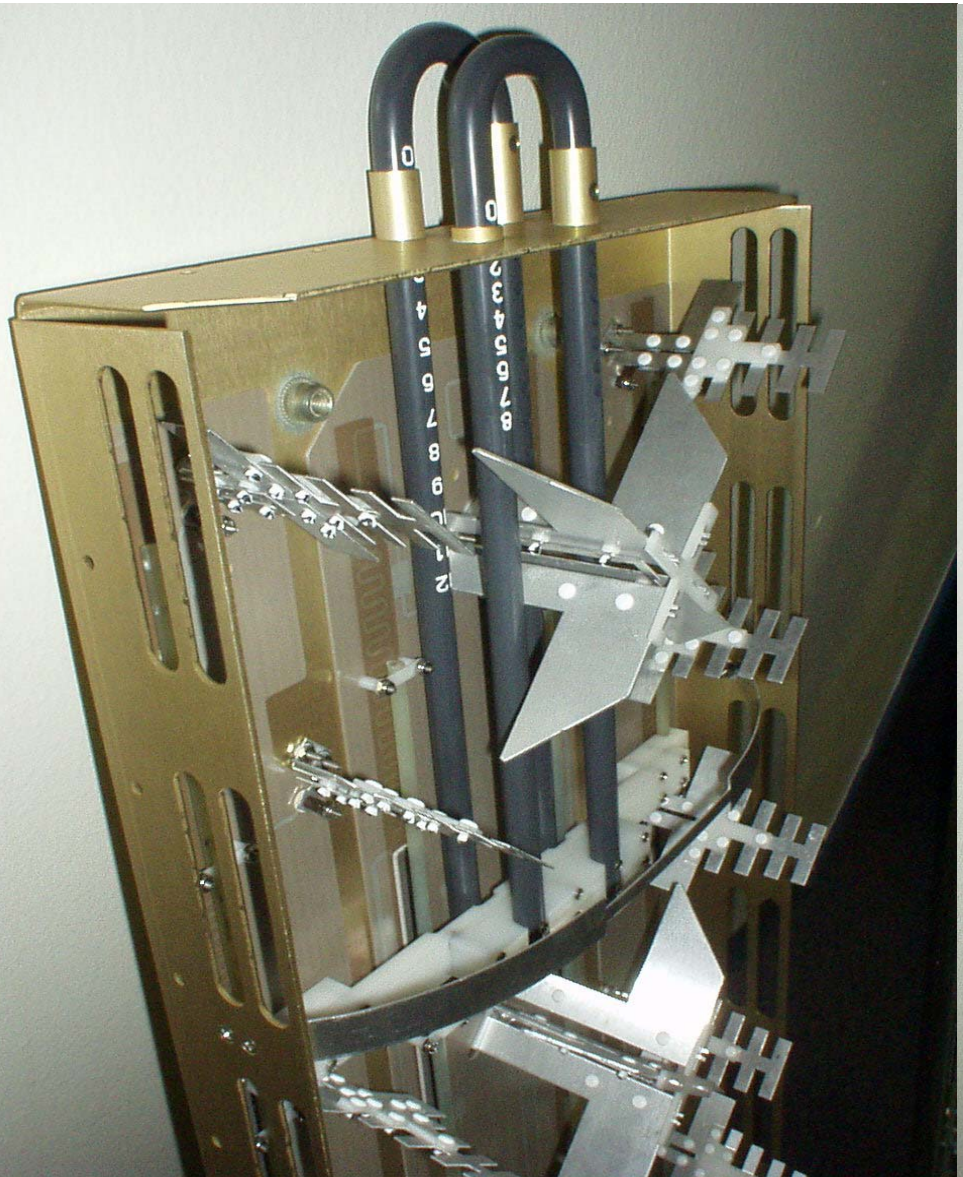
Sistemas irradiantes modernos

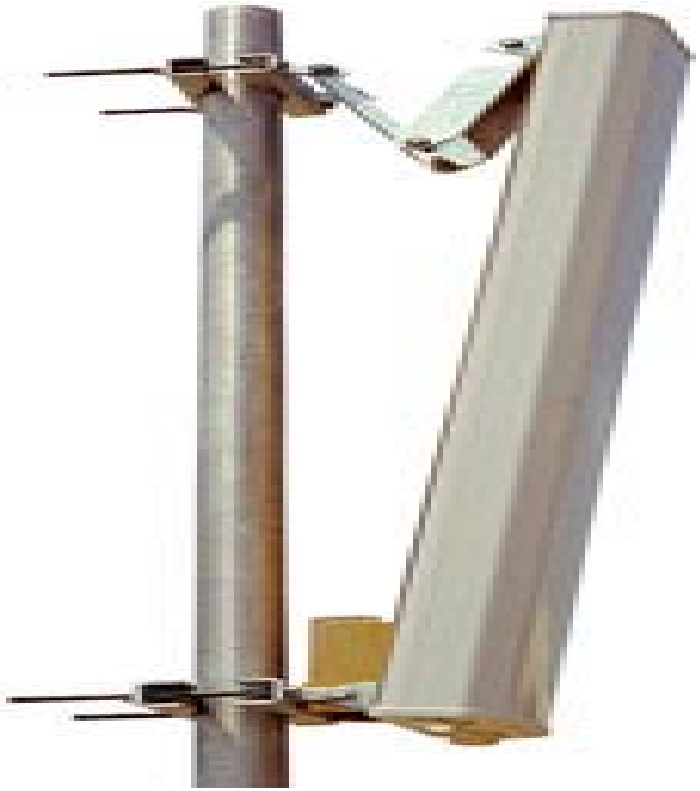
Otro Ejemplo de antena +45° -45°

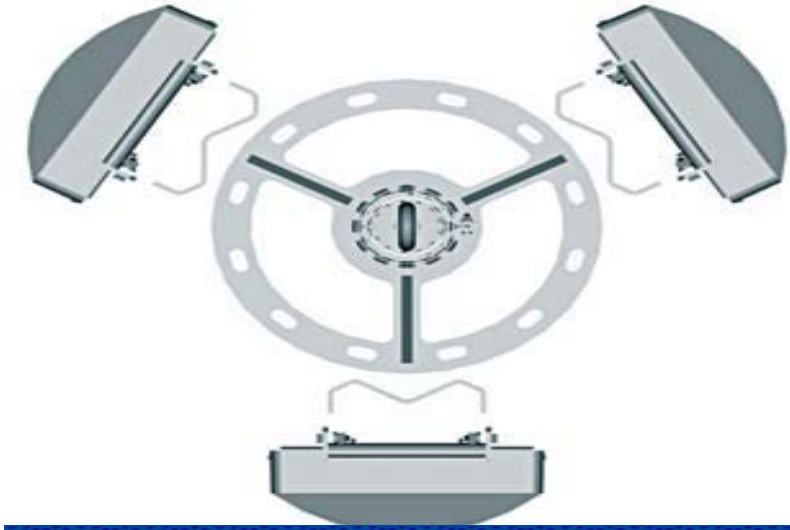


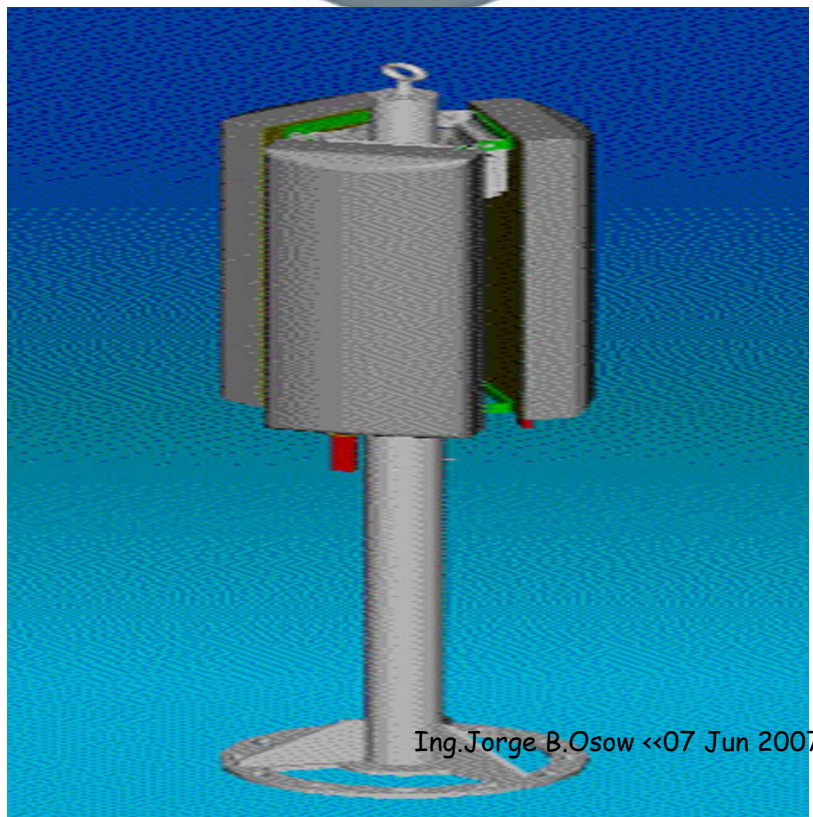


Ejemplos de antenas +45° -45° con inclinación eléctrica variable

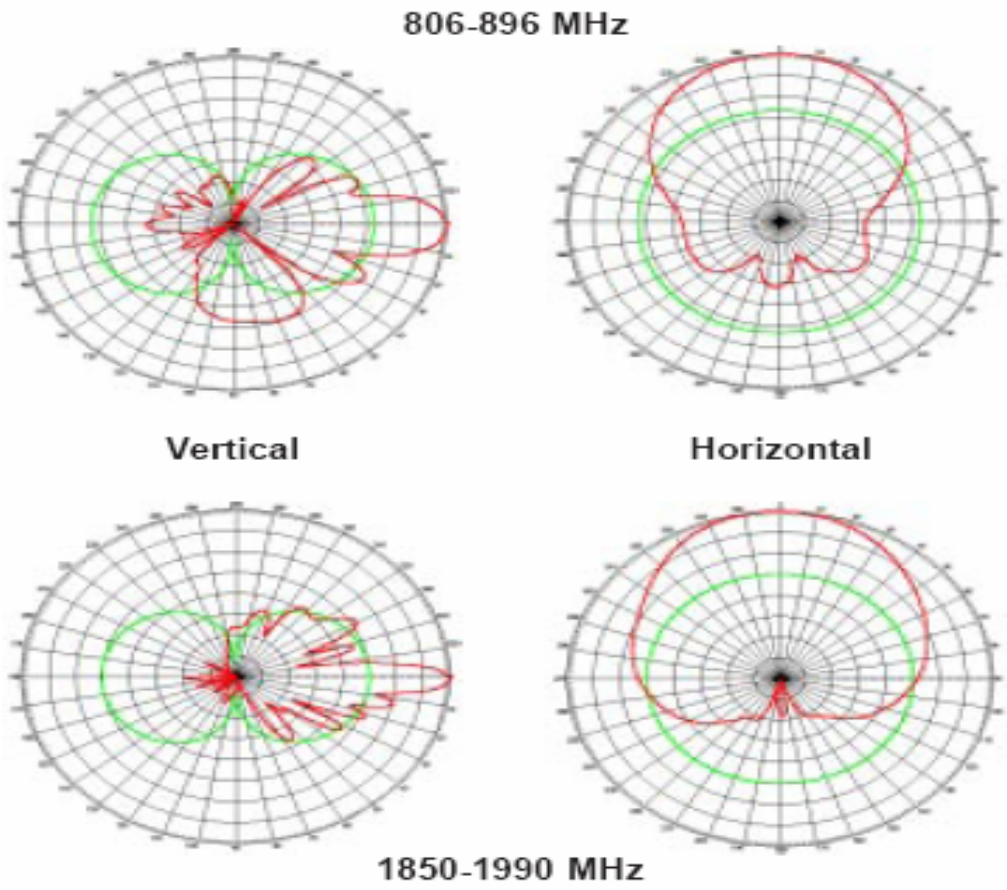


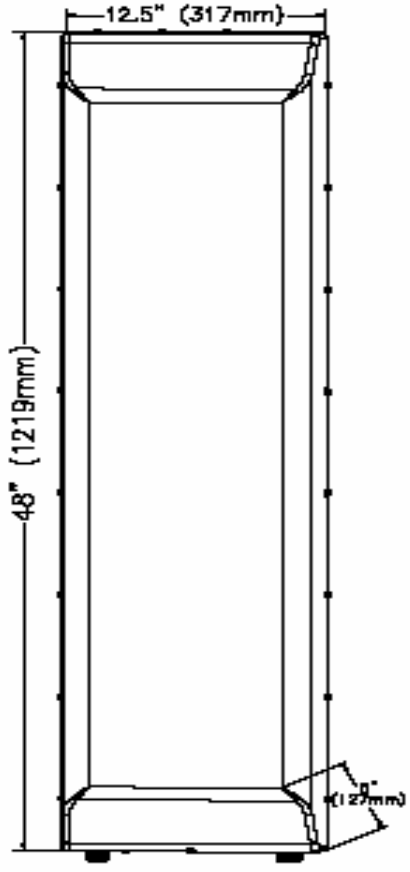






Antena Panel – Dual Band – celular & pcs



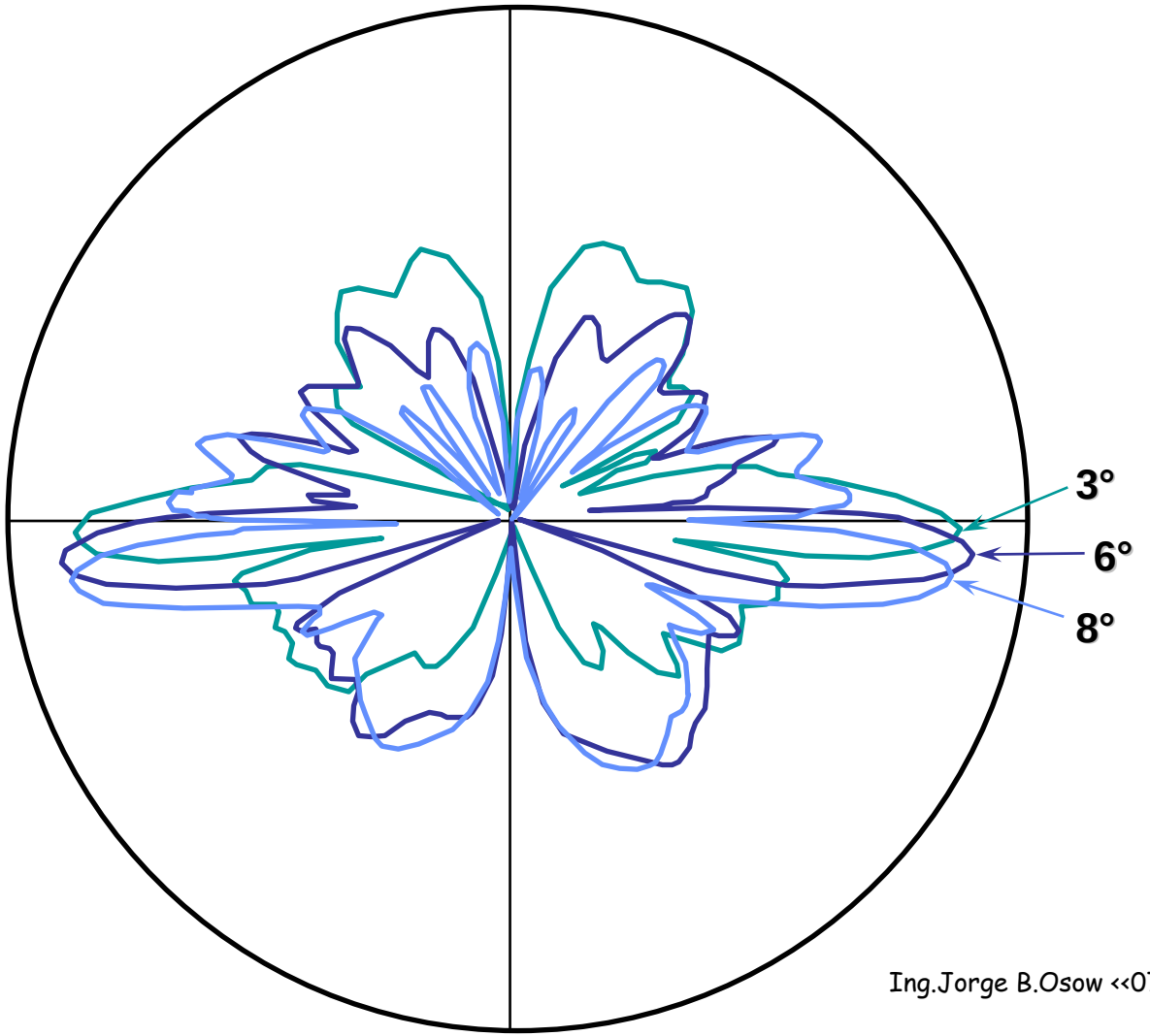


Electrical		
Frequency:	**806-896 MHz**	**1850-1990 MHz**
Gain:	13.5 dBd (15.6 dBi)	15 dBd (17.1 dBi)
Azimuth Beamwidth:	60°	60°
Elevation Beamwidth:	15°	7°
VSWR:	< 1.33:1	
Front-to-Back Ratio:	> 23 dB	> 30 dB
Max. Input Power:	500 Watts	250 Watts
Polarization:	Vertical	
Lightning Protection:	DC Ground	
Termination:	2-7/16 DIN (Bottom)	

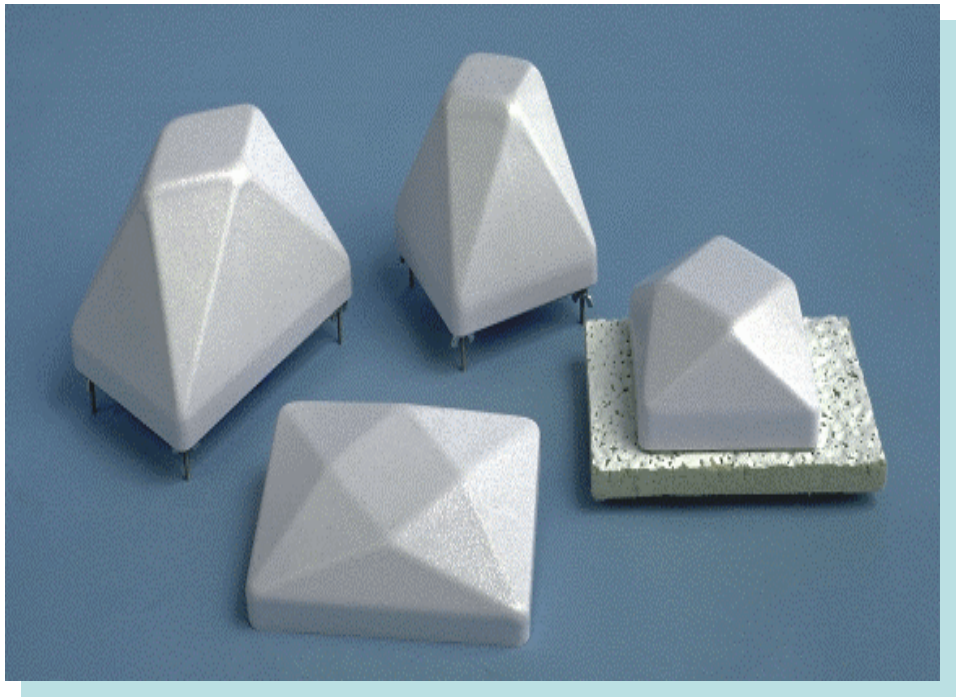
Mechanical	
Weight:	18 lbs (8.2 kg)
Wind Area:	4.1 ft² (0.38 m²)
Frontal Thrust:	167 lbf (742N) (at 100 mph)
Max. Wind Speed:	125 mph (200 km/h)
Reflector:	Pass. Aluminum
Radiators:	Aluminum
Radome:	ABS, UV Resistant
Mounting Hardware:	Galvanized Steel
Color:	Gray

Inclinación ajustable del haz antena omni

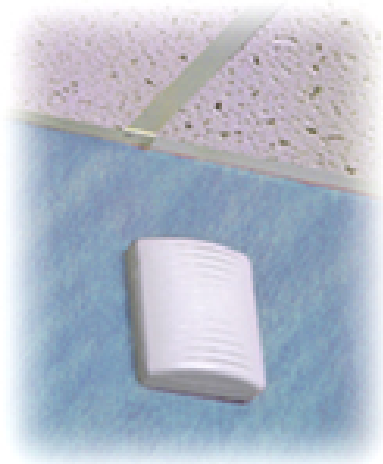
Diagrama Vertical

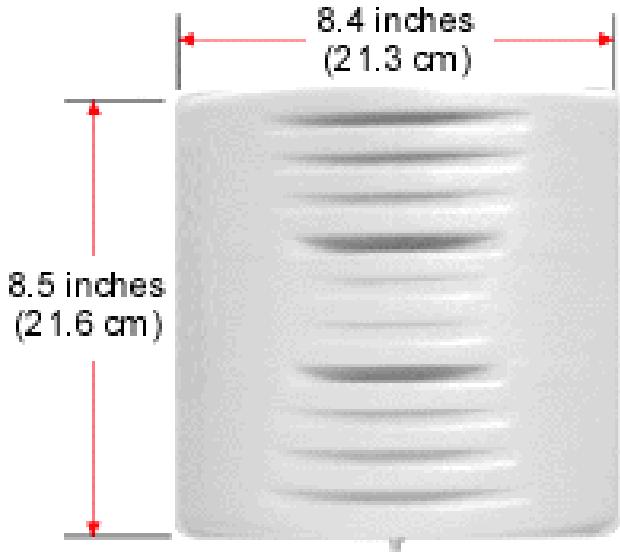


Algunos tipos de antenas de aplicaciones especiales

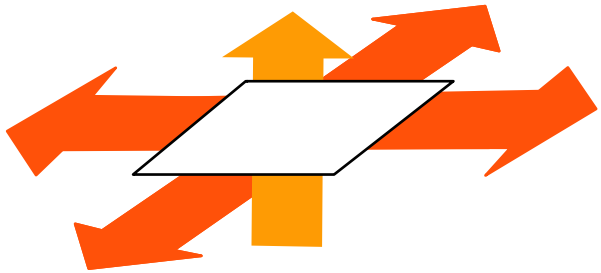


Antenas de irradiación tipo interior

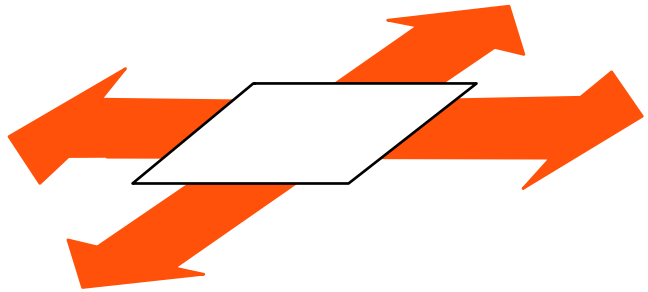


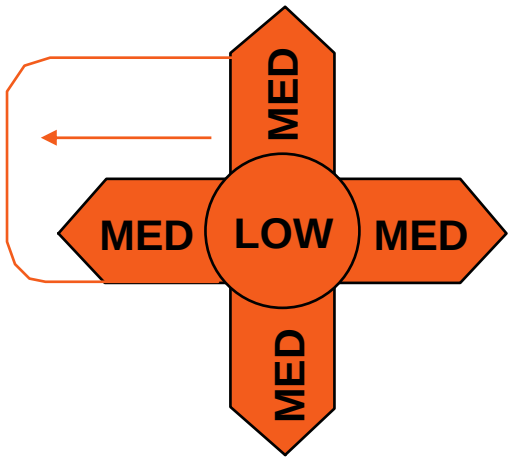


Antena panel individual

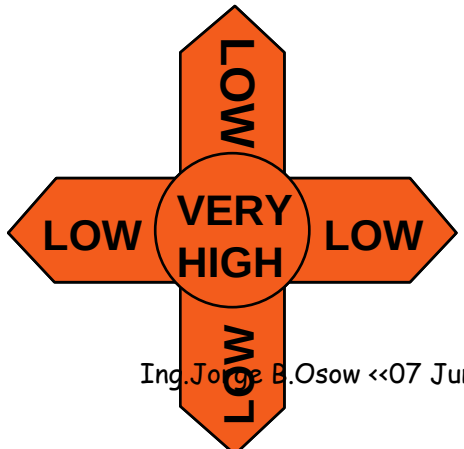


Low

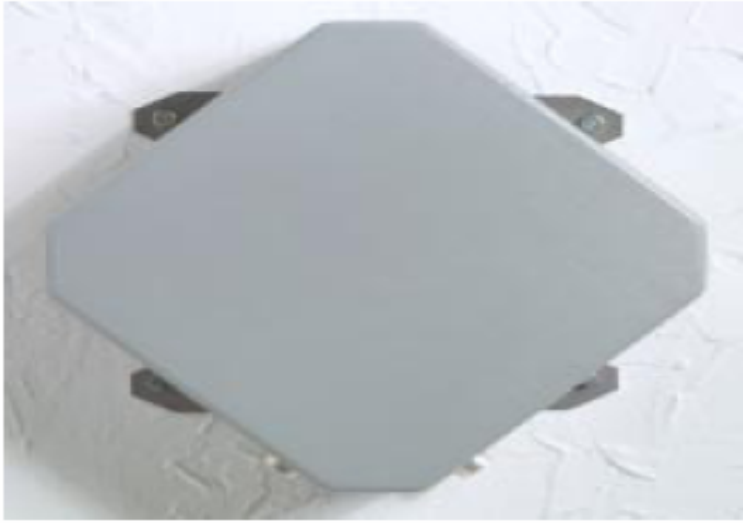


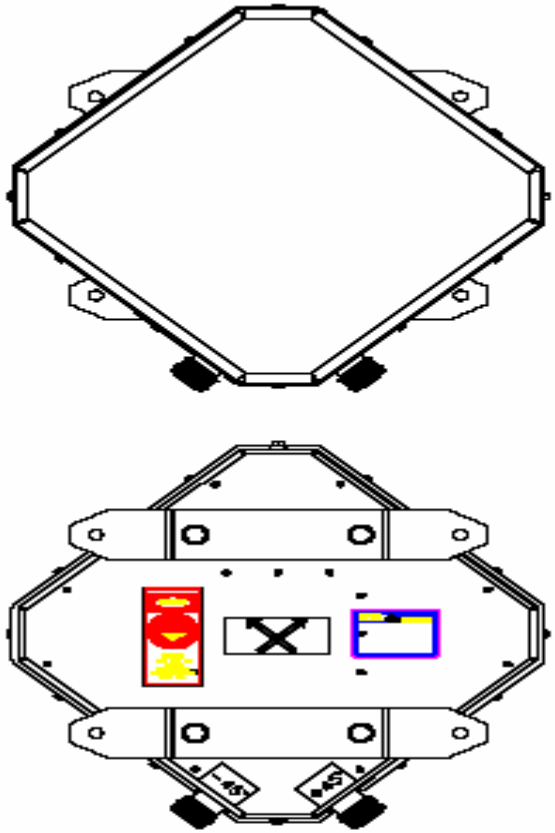


Max



Antena dual band para microceldas – celular/trunking & pcs

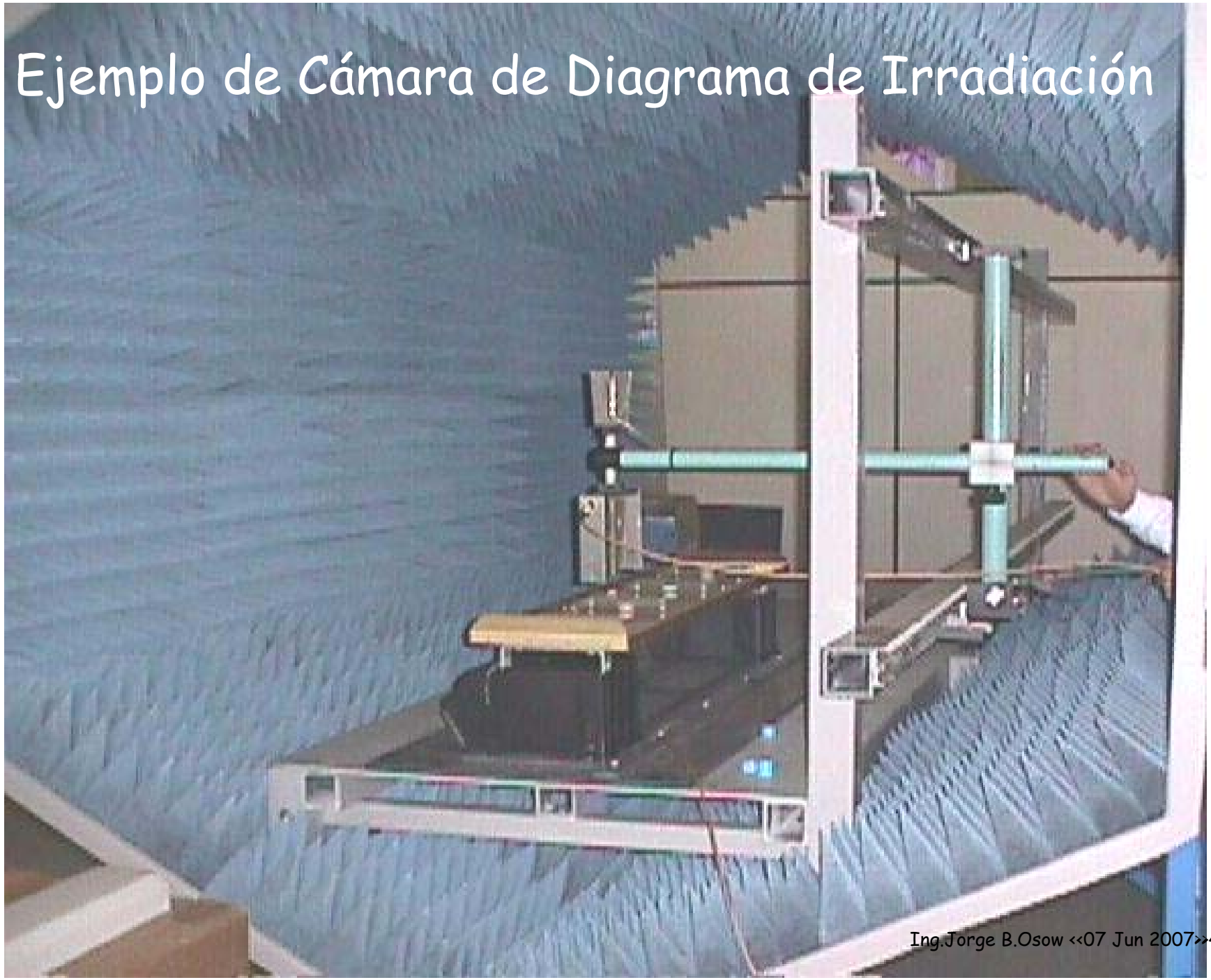




Electrical		
	Cellular / Trunking	PCS
Frequency:	806-896 MHz	1850-1990 MHz
Gain:	7 dBd (9.1 dBi)	7 dBd (9.1 dBi)
Polarization:	+45° / -45°, Independently	
HBW:	60°	65°
VBW:	60°	65°
Isolation:	> 25 dB	> 30 dB
VSWR:	< 1.6:1	< 1.5:1
Front-to-Back Ratio:	> 25 dB, typical	> 25 dB, typical
Max Input Power:	100 Watts	100 Watts
Impedance:	50 Ohms	50 Ohms
Lightning Protection:	All metal parts are grounded.	

Mechanical	
Connectors:	2 - 7/16 DIN Female
Dimensions:	4.2" x 12.4" x 12.4"
(H x W x D):	(107mm x 315mm x 315mm)
Weight:	6.5 lbs (3 kg)
Wind Area:	1.0 ft² (0.09 m²)
Wind Load:	40 lbf (178N) 18.0 kp (at 100 mph)
Max. Wind Speed:	125 mph (200 km/h)
Radiators:	PCB
Back Panel:	Pass. Aluminum
Radome:	ABS, UV Inhibited
Color:	Light Gray
Mounting Hardware:	Galvanized Steel, wall mount, provided

Ejemplo de Cámara de Diagrama de Irradiación

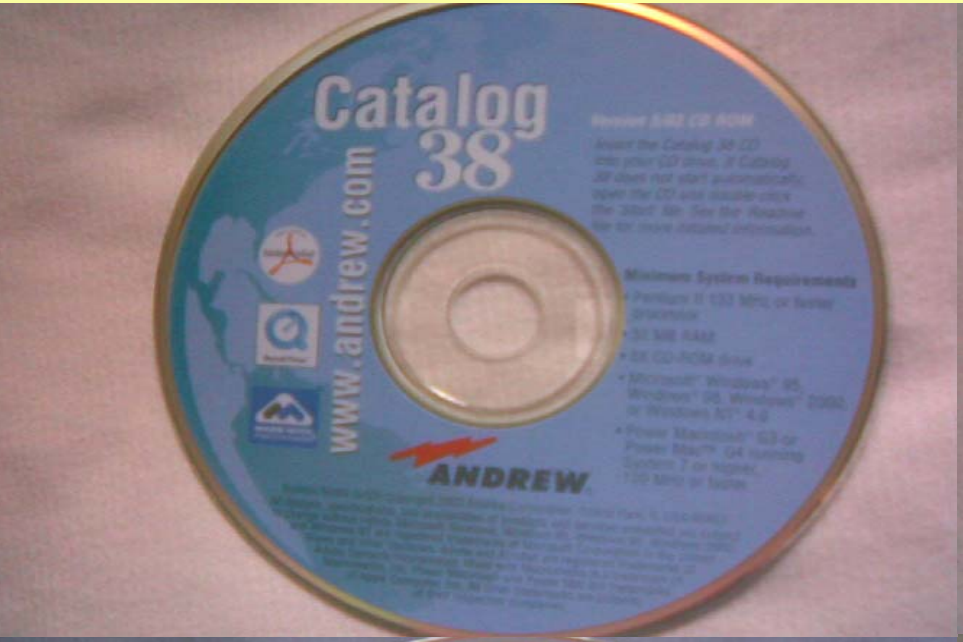


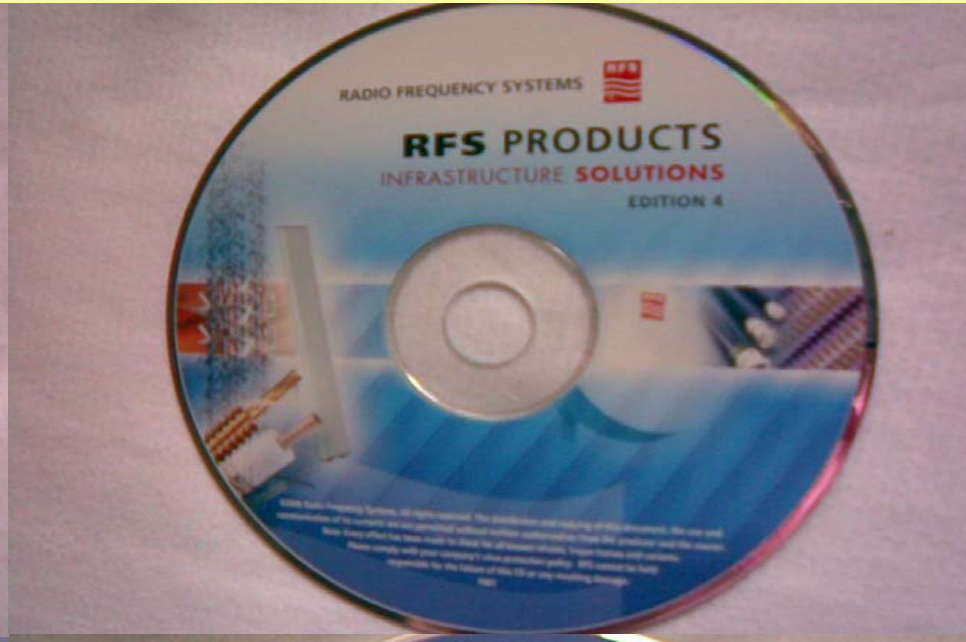
Ejemplos de Pruebas de Medición de Relación de onda estacionaria (VSWR) 50 Ohms

Algunos Fabricantes importantes de antenas Fijas para Móviles

- Andrew Corp EEUU (Allen Decibel, Antennas Specialists, EMS y otros)
- RFS Technology EEUU
- Amphenol-Antel EEUU
- Kathrein Alemania
- Eiffel, Anten, Radiatel, NRD, Argentina

Catálogos de Antenas conocidos





¡¡Muchas Gracias!!

¿ + ?

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josow@fibertel.com.ar