ROTEX
TELECOMMUNICATIONS SUPPLY

Introduction of the

All-Scenario Coverage Solution

2026

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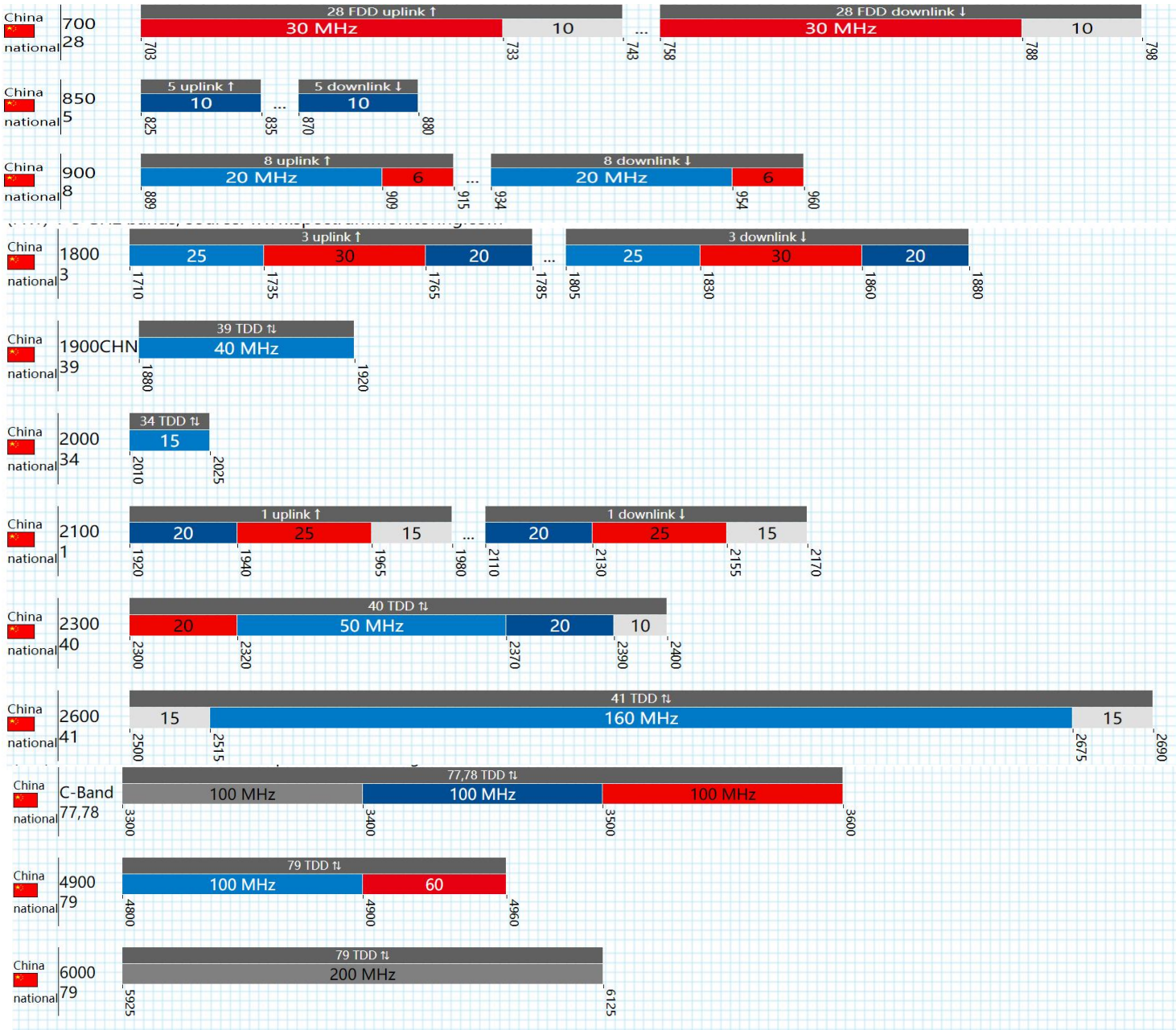
01 Spectrum Strategy of Operators

Introduction

Main Characteristics

- Policy driven network construction, Clear spectrum allocation
- High level network construction, open for bidding
- Centralized requirement for mass production and lower cost
- Suppliers management: Performance, commercial and service support



Mobile Spectrum Strategy

Mobile Research Institute has strong R&D and self-development capability

By end of 2023, 1.9M 5G sites are achieving county level continuous coverage on dual 700MHz+2.6GHz network

Network Characteristics

- 5G Network：700M+2.6G+4.9G multiband network , Coverage Focus、Perceive the advantage（700+2.6 dual level）
- 4G Network：900M+1.8G/1.9G Network， Maintianing 900M, 1.8G/1.9G will refarm to 5G on requirement
- 700MHz： Focus on rural continuous coverage, keep improving rural coverage
- 2.6GHz： Town level onwards continuous coverage, rural hotspot coverage

Future Priority

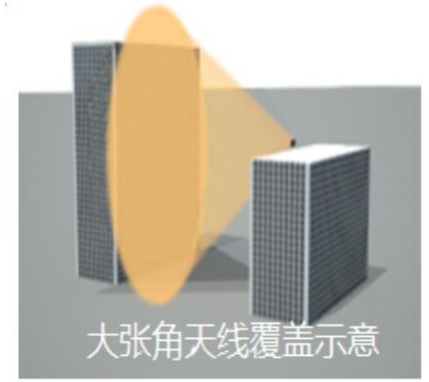
- Improving on Rural: Low cost solution，700M 4T8R or 700M 4TR Narrow Band, or 32 Channel 2.6G
- Promote Green Energy：Converting into High Efficient Antenna
- HSR Coverage： “2+2+8” 1800/FA/D Tri Band Antenna, Pizza Mounting Bracket

Mobile 5G Network Characteristic

Special Scenario Antenna - Open Bidding with focus on “Spotlight” type antenna

Y2023 HSR and Special Scenario Antenna Group Purchase

Scenario	Antenna Types	Short Term	Product Characteristics
HSR	HSR All Spectrum “2+2+2+8”Antenna	HSR Full Band“2+2+2+8”Antenna	HSR All Spectrum“2+2+2+8”Antenna
Outdoor Distributed	Outdoor Distrbuted 1800-D Wide Band Antenna	Ultra Low Gain 1800-D Wideband Antenna	Ultra Low Gain 1800-D Wideband Antenna
	Outdoor Distrbuted 900-D Wide Band Antenna	Ultra Low Gain 900-D Wideband Antenna	Ultra Low Gain 900-D Wideband Antenna
	Outdoor Distrbuted 900/1800-D Dual Band 4 Ports Antenna	Outdoor Distributed 900/1800-D Dual Band 4 Port Antenna	Outdoor Distributed 900/1800-D Dual Band 4 Port Antenna
High Rise	Highrise 900/1800-D Dual Band 4Port Vertical Wide Angle Antenna	Hghrise Dual band 4Port Vertical Wide Angle Antenna	Incl. 900MHz full spectrum Vertical Wide Angle Antenna (Spotlight)
	Highrise1800-D Wideband Vertical Wide Angle Antenna	Highrise Wideband Vertical Wide Angle Antenna	Only hignband Vertical Wide Angle Antenna (Spotlight)
	Highrise 900-D Full Band 2 Port Vertical Wide Angle Antenna	Highrise Full band Vertical Wide Angle Antenna	Full band Vertical Wide Angle Antenna (Spotlight)
	Highrise 900/1800-D Dual band 4 Port Horizontal Wide Angle Antenna	Highrise Dualband 4 Port Horizontal Wide Angle Antenna	Incl. 900MHz full spectrum Horizontal Wide Angle Antenna (Spotlight)
	Highrise1800-D Wideband Horizontal Wide Angle Antenna	Highrise Wideband Horizontal Wide Angle Antenna	Only hignband Horizontal Wide Angle Antenna (Spotlight)
	Highrise 900-D Full Band 2 Port Horizontal Wide Angle Antenna	Highrise Fullband Horizontal Wide Angle Antenna	Full band Vertical Wide Angle Antenna (Spotlight)
Confined Space	Elevator 900-D Dual band 2 Port Antenna	Narrow space Elevator Dual Band 2 Port Antenna	Incl 900MHz for Elevator coverage High Gain Area Array Antenna
	Tunnel 900-D Dual band 2 Port Antenna	Narrow space Tunnel Dual Band 2 Port Antenna	Incl 900MHz for Tunnel coverage High Gain Area Array Antenna



4/5G Network Spectrum Strategy

Spectrum：800/1800/2100/3.5G

Till end of 2023，its has >1.2M 5G base stations, achieving village level continuous coverage, include administrative coverage

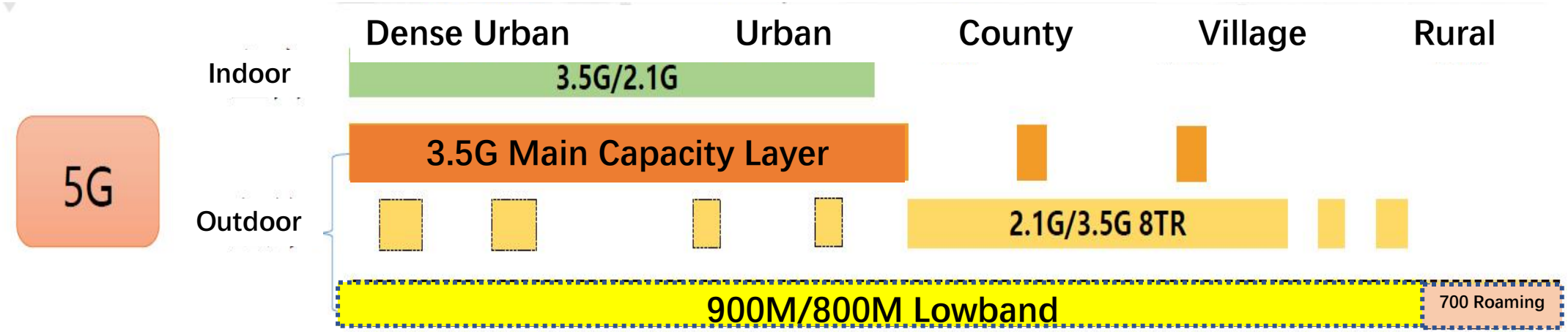
5G

- City and Key County： 3.5G as main network， 2.1G as supplement network
- County：2.1/3.5G 8TR as main coverage
- Village：Low cost solution, replacing 800M equipment, low band for coverage

4G

- Mid 1800 MHZ for all areas，2.1G gradual upgrade to 5G

- Antenna-800M-17dBi Wide Band -65degree-4Port-e-Tilt
- Antenna-800M-15dBiWide Band-65degree-4Port-e-Tilt
- Antenna-800MHz/2GHz-15dBi/18dBiWide Band-65degree-4+4Port-e-Tilt
- Antenna-800MHz/2GHz-17dBi/18dBiWide Band-65degree-4+4Port-e-Tilt



Special Scenario Antenna

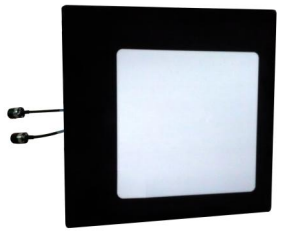
Special scenario antenna: Mainly Spotlight and Ventilation Pipe

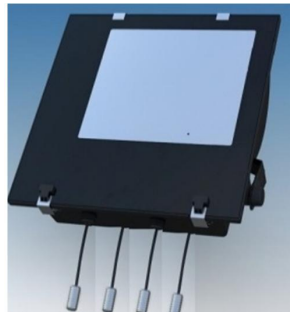
3 main High Rise Scenario Antennas:

- Vertical Wide Angle Antenna - its vertical beamwidth achieving 60 degree making it suitable for tall high rise coverage scenario;
- Horizontal Wide Angle Antenna - its horizontal beamwidth achieving ~60 degree making it suitable for wide building coverage scenario;
- The other type is small size high high frequency dual polarization

Group Purchase Spotlight Types

Indicator	Spectrum（MHz）	Dimension
800MHz-single band-4Port-10~12dBi-Vertical Wide Angle	820~960×2	550×550×210
800MHz-single band-4Port-13~15dBi-Horizontal Wide Angle	820~960×2	550×550×210
800MHz/2GHz-Wide Band-2+2Port-10~12dBi/13~15dBi-Hirozontal Wide Angle	820~960/1710~2170	430×425×145
800MHz/2GHz-Wide Band-2+2Port-10~12dBi/13~15dBi-Vertical Wide Angle	820~960/1710~2170	430×425×145
800MHz/2GHz-Wide Band-2+2Port-13~15dBi/13~15dBi-Rectangular Beam	820~960/1710~2170	550×550×210
800MHz/2GHz-Wide Band-4+4Port-10~12dBi/10~12dBi-Vertical Wide Angle	820~960/1710~2170	550×550×210
800MHz/2GHz-Wide Band-4+4Port-10~12dBi/13~15dBi-Vertical Wide Angle	820~960/1710~2170	550×550×210





Network Strategy

Spectrum Resource：900/1800/2100/3.5G

5G

- Focus on Pooling Midband Spectrum, improving city Coverage
- Completing 5G Rural NR900

4G

- 4G Single Midland (1800M)

HSR

- Prefering 2.1NR, 3.5NR

Antenna category	model	frequency (MHz)	gain(dBi)
Low-band wide-beam non-RET antenna 2 ports	65°14.5dBi	820 ~ 960	14.5
4 ports of low-frequency wide-beam RET antenna	65°16dBi	820 ~ 960	16
Low-frequency wide-beam, high-gain RET antenna 4 ports	65°17.5dBi	820 ~ 960	17.5
4 ports of the mid-band broadband broadband beam RET antenna	65°17.5dBi	1710 ~ 2170	17.5
4 ports of medium band wide beam high gain RET antenna	65°19dBi	1710 ~ 2170	19
6 ports of the medium-band broadband beam RET antenna	65°17.5dBi	1710 ~ 2170	17.5
6 ports of medium-band wide-beam high-gain RET antenna	65°19dBi	1710 ~ 2170	19
8 ports of medium band wide beam high gain RET antenna	65°19dBi	1710 ~ 2170	19
8 ports of high-frequency and wide-beam RET antennas	65°16.5 dBi	3400 ~ 3600	16.5
Low and medium band broadband beam RET antenna 4+4 ports	65°14.5dBi 65°17.5dBi	820 ~ 960 1710 ~ 2170	14.5 17.5
Low and medium band broadband beam RET antenna 4+4 ports	65°16dBi 65°17.5dBi	820 ~ 960 1710 ~ 2170	16 17.5
4+6 ports of low- and medium-band wide-beam RET antennas	65°14.5dBi 65°17.5dBi	820 ~ 960 1710 ~ 2170	14.5 17.5
4+6 ports of low- and medium-band wide-beam RET antennas	65°16dBi 65°17.5dBi	820 ~ 960 1710 ~ 2170	16 17.5
Low-high-frequency, wide-beam RET antenna 4+8 ports	65°14.5dBi 65°16.5dBi	820 ~ 960 3400 ~ 3600	14.5 16.5
Low-high-frequency, wide-beam RET antenna 4+8 ports	65°16dBi 65°16.5dBi	820 ~ 960 3400 ~ 3600	16 16.5
4+8 ports of medium, high and wide beam RET antennas	65°17.5dBi 65°16.5dBi	1710 ~ 2170 3400 ~ 3600	17.5 16.5
Medium and high frequency wide beam high gain RET antenna 4+8 ports	65°19dBi 65°16.5dBi	1710 ~ 2170 3400 ~ 3600	19 16.5
Medium and high frequency wide beam RET antenna 6+8 ports	65°17.5dBi 65°16.5dBi	1710 ~ 2170 3400 ~ 3600	17.5 16.5
8+8 ports of medium, high and wide beam RET C antennas	65°17.5dBi 65°16.5dBi	1710 ~ 2170 3400 ~ 3600	17.5 16.5
Low, medium, high frequency, and wide-beam RET antenna 4+4+8 ports	65°14.5dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710 ~ 2170 3400 ~ 3600	14.5 17.5 16.5
Low, medium, high frequency, and wide-beam RET antenna 4+4+8 ports	65°16dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710 ~ 2170 3400 ~ 3600	16 17.5 16.5
Low, medium, high frequency, and wide-beam RET antennas have 4+6+8 ports	65°14.5dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710~2170 3400 ~ 3600	14.5 17.5 16.5
Low, medium, high frequency, and wide-beam RET antennas have 4+6+8 ports	65°16dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710 ~ 2170 3400 ~ 3600	16 17.5 16.5
Low, medium, high frequency, and wide-beam RET antenna 4+8+8 ports	65°14.5dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710 ~ 2170 3400 ~ 3600	14.5 17.5 16.5
Low, medium, high frequency, and wide-beam RET antenna 4+8+8 ports	65°16dBi 65°17.5dBi 65°16.5dBi	820 ~ 960 1710 ~ 2170 3400 ~ 3600	16 17.5 16.5

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02 HSR Antenna Introduction

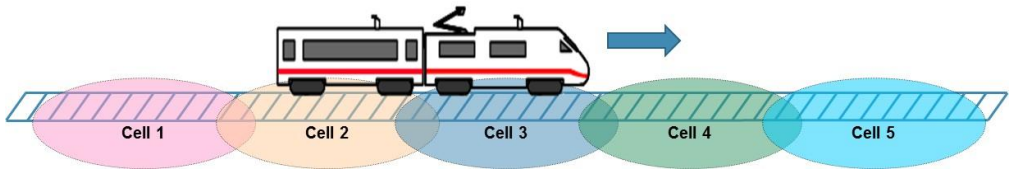
Challenge of HSR Coverage: High Gain Antenna as Key Requirement

➢ Train Body Penetration Loss

New concealed type HSR train body caused Penetration Loss ~**10dB** loss compare to conventional train body

Train Type	Material	Overal Penetration Loss（dB）	Route
T Type Train	Steel	18	Normal line
K Type Train	Steel	18	Normal line
CRH1 Train	Stainless Steel	28	Guangzhou-Shenzhen, Shanghai-Hangzhou high-speed railway, etc
CRH2 Train	Hollow aluminum alloy	24	Beijing-Guangzhou, Beijing-Shanghai high-speed railway, etc
CRH3 Train	Aluminum alloy	28	Beijing-Tianjin intercity high-speed railway, etc
CRH5 Train	Hollow aluminum alloy	28	Beijing-Harbin high-speed railway, Beijing-Guangzhou high-speed railway, etc
CRH380 Train	Hollow aluminum alloy	26	Beijing-Guangzhou, Hainan East Ring High-speed Railway, etc

➢ Frequent H/O



Frequent Cell H/O increase complexity on coverage, requires larger coverage distance to reduce Cell H/O

Train Type	Speed（Km/h）	Duration per KM（s）
Normal（K Prefix）	100-120	30-36
Express（T Prefix）	140-160	23-26
Speed（D Prefix）	200-250	14-18
High Speed（G Prefix）	300-350	10-12

New HSR Coverage Antenna - Broadband Shaping

Product Chracteristic

- Support Broadband Shaping, 1710~2170MHz
- High Gain Beam，23dbi
- Small cross-sectional area, wind load meets tower pole requirements
- Mature Products , mass market deployment

机械参数	
天线规格(H×W×D)(mm)	1360×355×165
包装尺寸(mm)	1690×460×260
天线净重(kg)	16.5
安装件重量(kg)	5.5
包装后重量(kg)	25.8
机械下倾角(°)	0~10
抱杆直径(mm)	φ50~φ115
外罩材质	玻璃钢
外罩颜色	灰色
工作温度(℃)	-50~65
最大工作中的风速(km/h)	216
接头类型	9×4.3-10-Female
接头位置	底部
每端口最大输入功率 (W) @50°C	80

XXXXPol 1710~1880/1920~2170MHz 100°/80°±15° 16.5/17.5dBi 2°~12° 内置的 内置可插拔 RCU (远程控制单元) 波束赋形 天线.

电气参数				
常规参数	频率范围(MHz)		1710~1880	1920~2170
	极化方式		±45°	
	电下倾角(°)		2~12	
	电下倾角精度(°)		±1	
校准和电气参数	校准口至各辐射端口的耦合度(dB)		-28±2	
	每个端口与校准口之间的最大幅度偏差(dB)		≤0.9	
	每个端口与校准口之间的最大相位偏差(°)		≤7	
	端口驻波比		≤1.5	
	同极化辐射端口间的隔离度(dB)		≥25	
	异极化辐射端口间的隔离度(dB)		≥25	
	三阶交调(2x43dbm)		≤-110dBm(2*43dBm)	
	电调类型		内置可插拔	
	RET协议		AISG 2.0 远程控制和升级	
辐射参数	单元波束	水平面3dB波瓣宽度(°)	100±15	80±15
		增益(dBi)	16.5	17.5
		垂直面3dB波瓣宽度(°)	≥5	≥5
		交叉极化比(0°)(dB)	≥15	≥15
		交叉极化比(±60°)(dB)	≥8	≥8
		前后比(dB)	≥23	≥23
		上旁瓣抑制(dB)	≤-14	≤-14
	65°广播波束	水平面3dB波瓣宽度(°)	65	65
		增益(dBi)	17.5	18.5
		±32.5°扇区功率占比(%)	72±7	72±7
		±60°扇区功率占比(%)	≥90	≥90
		波束±60°边沿功率下降(dB)	12±5	12±5
		垂直面3dB波瓣宽度(°)	≥5	≥5
		前后比(dB)	≥25	≥25
		上旁瓣抑制(dB)	≤-14	≤-14
	业务波束	0°业务波束增益(dBi)	≥22	≥23
		0°业务波束水平面3dB波瓣宽度(°)	≤35	≤30
		0°业务波束副瓣(dB)	≤-12	≤-12
		±60°业务波束增益(dBi)	≥17.5	≥18.5
		±60°业务波束水平面3dB波瓣宽度(°)	≤37	≤32
		±60°业务波束水平副瓣(dB)	≤-3	≤-3
		0°业务波束交叉极化比(轴向)(dB)	≥18	≥18
		0°业务波束前后比(dB)	≥28	≥28

HSR/Highway Coverage Scenario

HotSpot Coverage: 4 Channel High Gain Narrowbeam Antenna

Product Advantage: High Gain, Narrow Beam, High Capacity, , Long Coverage Distance, Concentrated Coverage, High Efficient

Scenario: Railway, Highway, Narrow Street

Spectrum: 1710-2690MHz

4 Channels 1710-2690MHSR Antenna:

Freq：1710-26900MHz

Gain：20.5dBi

VBW：32°

Electrical downtilt range：0-10°

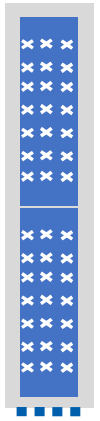
Antenna Length：1360 x 446mm

New HSR Broadband Shaping Antenna - TELANAR Design

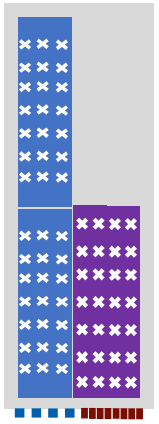
Product Characteristics

- 4 Port Midband + 8TR /3.5G
- High Gain，1710~2170MHz / 18-19dBi，3400~3600MHz /16.5dBi(Broadcast) 22.5(Service)
- 3 Arrays shaped into special lobes, accurately covering the far end and near end of the high-speed rail
- Midband support 4x4 MIMO，3.5G support beamforming
- Windward area 0.99 m², meeting tower pole requirements

4 Port Midband

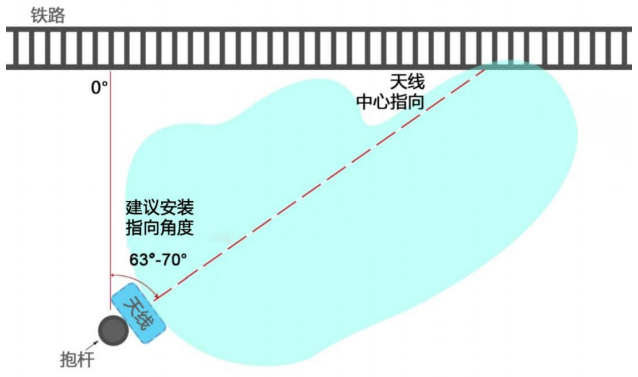


4 Port Midband
+ 8TR /3.5G

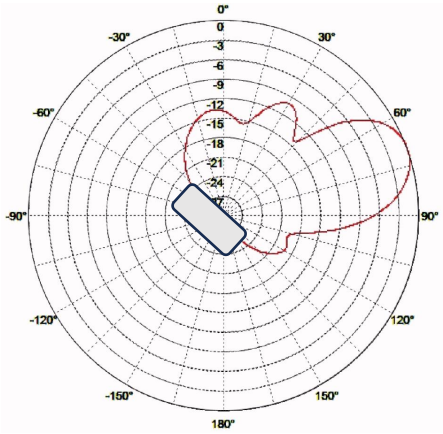


Cover Illlustration

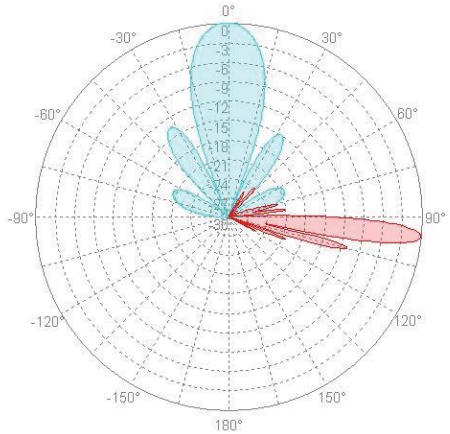
Installation effect Illutration



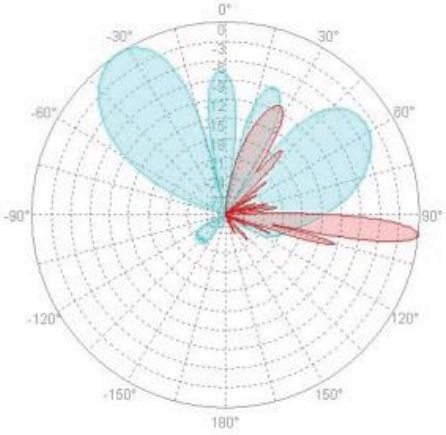
Horizontal direction illustration
(1.7-2.1MHz)



Directional Illustration（0°/3.5GHz）



Directional Illustraion（30°/3.5GHz）



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03 Stadium Type Antenna Introduction

Low Density Coverage Solution

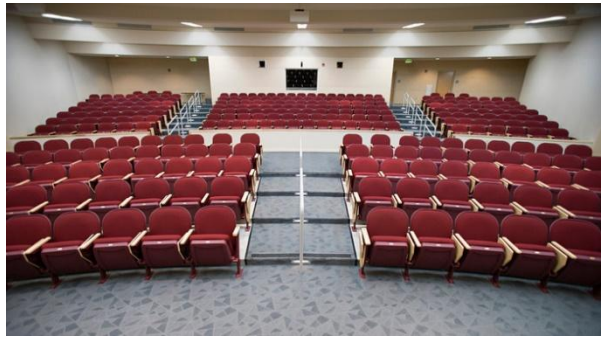
Suitable for small stadium

Scenario Characteristics: Smaller Area, low traffic Low density, Low service requirement;

Antenna Selection: Base on actual site requirement, choose low-gain wide-beam antennas;

Advantage:

- Supporrt 1800，2100MHz，3.5G
- Small size, Wide Lobb, Beam, accurate coverage, easy installation;
- Support both 2T2R & 4T4R;



Freq（MHz）	Gain（dBi）	Beanwidth（°）		Port	Dimension（mm）
		Horizontal	Vertical		
1710~2690MHz	10	35°	35°	2	500×220×100
1710~2690MHz	9	65°	65°	2	180×160×80
1710~2690MHz×2	9	65°	65°	4	180×320×80
1710~2700MHz/3400~3600MHz	8/8	65°/65°	65°/60°	4	360×160×81

Mid Density Coverage Solution

Sutiable for medium size stadium

Scenario Characteristics: medium size stadium, medium traffic, relative high density and service requirement;

Antenna Selection: Base on actual site requirement, choose medium gain narrowbeam antenna;

Product Characteristicss

- Support 1800, 2100, 3.5G
- Small size, narrow beam, accurate coverage, easy installation;
- Support 4T4R (Optional)

Freq (MHz)	Gain (dBi)	Beanwidth (°)		Port	Dimension (mm)
		Horizontal	Vertical		
1710~2690MHz×2	11.5	33°	33°	4	280×320×80
1710~2700MHz/3400~3600MHz	11/10	33°/30°	65°/65°	4	420×320×150

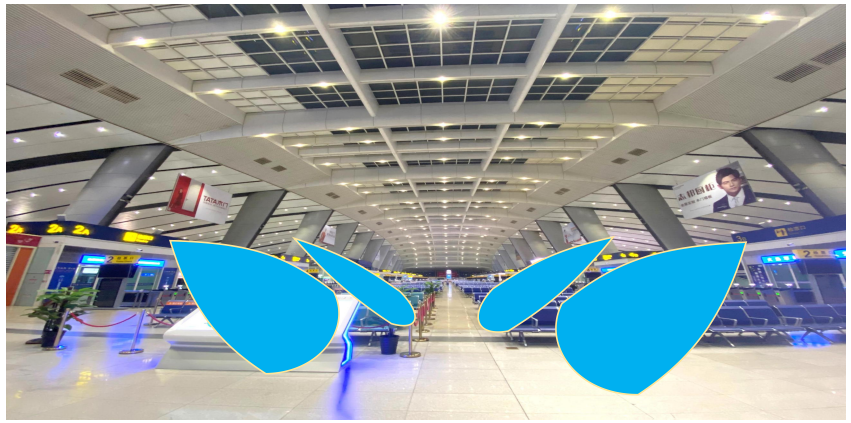
Mid Density Coverage Solution Case

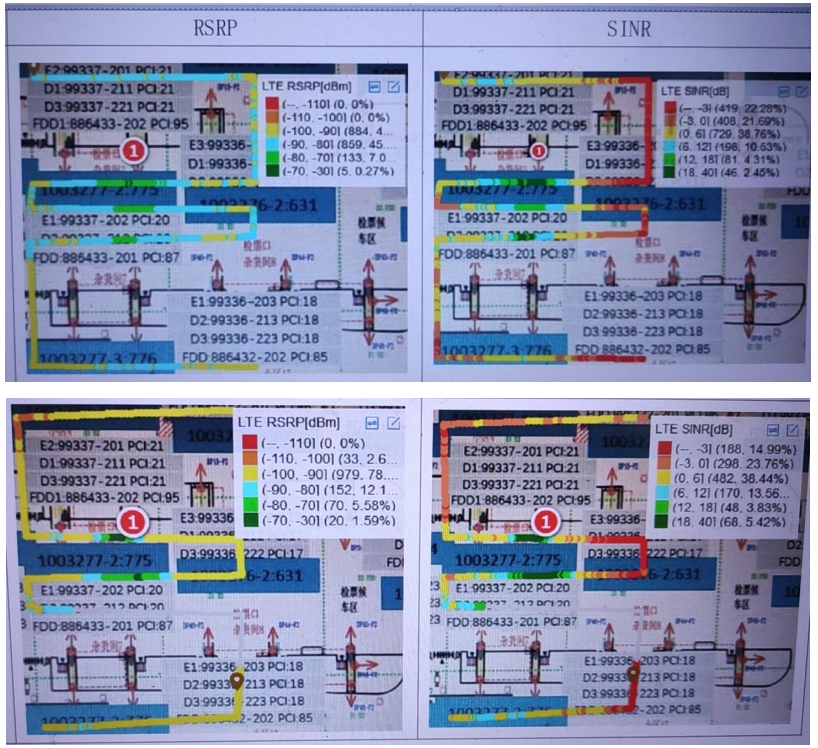
Case Study

Site：Beijing HSR Station

Antenna Type：Medium density coverage stadium shaped antenna

KPIs	Before	After
RSRP > -90 Ratio	53.00%	19.30%
SINR > 0 Ratio	56.03%	63.05%
Cell Main coverage & Cell Edge (30M) RSPS Delta	5~10 dB	10~15 dB





Improvement:
Target Testing Cell: the RSRP at the edge of the cell outside the main coverage area dropped rapidly, and the shaping effect was obvious, which greatly reduced the interference to adjacent cells and improved the overall SINR of the coverage area. There will be a more obvious effect in the NR network of the same frequency network.

Mid Density Coverage Solution Case

Multibeam Antenna - Suitable for Mid to Large Stadium

Site Characteristics: As main venue for large event hall, the site is spacious, high capacity and complex traffic scheduling, thus requirement 2-3 beams antenna to meet coverage requirement

Performance Advantage: with Freg range 1710-2690MHz, Gain19.5/21.5dBi, 2&3 beams antenna realizing fulfill high capacity and coverage requiment

Antenna Type	Freq (MHz)	Gain (dBI)	Beanwidth (°)		Polarization	Port	Dimension (mm)
			Horizontal	Vertical			
Multibeam (2Beam)	1710～2690	19.5±1	28±5	7±2	±45° Polarization	4	1400×400×150
Multibeam (3Beam)	1710～2690	21.5±1	24±5	12±2	±45° Polarization	6	1360×446×165

High Density Coverage Solution

High Gain Narrow beam Antenna

Site Characteristics: Large site area, high human traffic, high density and service requirement;

Antenna Selection: Base on actual site requirement, choose High Gain Narrowbeam Antenna

Product Characteristic

- Support 1800, 2100, 3.5G
- Small Dimension, Narrow lobes, precise coverage, easy installation
- Support 4T4R

Freq (MHz)	Gain (dBi)	Beanwidth (°)		Port	Dimension (mm)
		Horizontal	Vertical		
1710~2675MHz×2	14	35°	35°	4	510×280×85
1710~2700MHz/3400~3600MHz	15/13	35°/30°	35°/30°	4	598×320×150

ROTEX

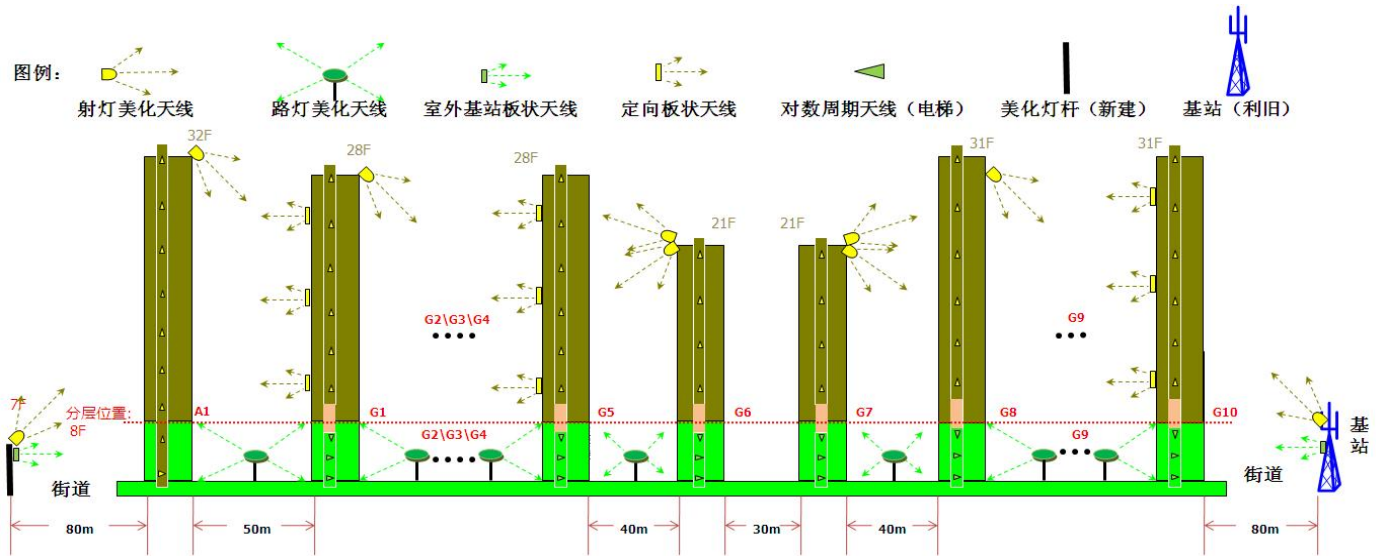
04 High Rise Antenna Introduction

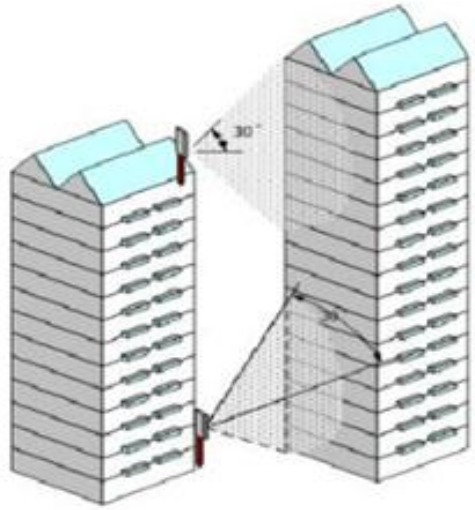
High Rise Coverage Solution

Environmental Characteristics

High-rise cell signals can easily affected by interference such as reflection, diffraction and other effects of outdoor signals and thus resulting in poor network quality!!

Can deply Camourflage **Spotlight Antenna direct upwards**, **Air Conditioning Type Antenna from opposite building** or **small cell antenna** for direct coverage to improve high rise building coverage





Solution 1

Panel Type Wide Angle Antenna

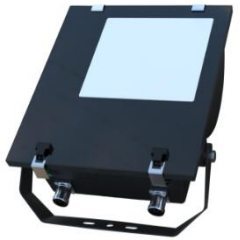
- ✓ Conventional Panel antenna, mature technology and easy installation
- ✓ Vertical Wide Angle, Wide Coverage
- ✓ Suitable for High Rise Floor Coverage
- ✓ Small Size, easy conceal and no specific installation requirement

Freq（MHz）	820～960MHz/1710～2690MHz
No. of Beam	1
Horizontal Beam（°）	≥7°
Vertical Beam（°）	65°
Gain（dBi）	12dBi
Dimension（mm）	650×320×105mm

Solution 2

Spotlight Antenna

Direct Beam to buildings and achieve deep indoor coverage.



- ✓ Camourflag as Spotlight, unnoticeable;
- ✓ Small size, east intallatiosna and maintenance;
- ✓ Flexible in upwards direct and downards coverage, achieving precise coverage

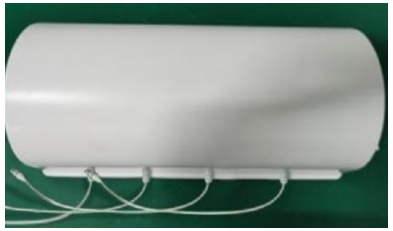
Antenna	Freq（MHz）	Gain（dBI）	Beanwidth（°）		Polarization	Port	Dimension (mm)
			Horizontal	Vertical			
Wide Angle Spotlight	820～960	11	30	≥60	Vertical Polarization	2	430×430×150
	1710～2690	13	20	≥55	±45°Polarization	2	430×430×150
Vertical Wide Angle 8 Channel Intelligence Spotlight	2515～2675MHz	13	≥11	65	±45°Polarization	9	430×430×150
Horizontal 8 Channel Intelligence Spotlight	2515～2675MHz	13	65	≥11	±45°Polarization	9	430×430×150

Solution 3

New Building Antenna

Product Characteristics

- Higher Gain compare to conventional Spotlight type antenna
- Good Directional, Concentrated/Efficient Energy, Improves deep in building coverage
- Antenna beam is two-dimensionally adjustable and supports azimuth and downtilt adjustment;;
- Pleasing apperance/external wall installation easy for optimization;



KPIs

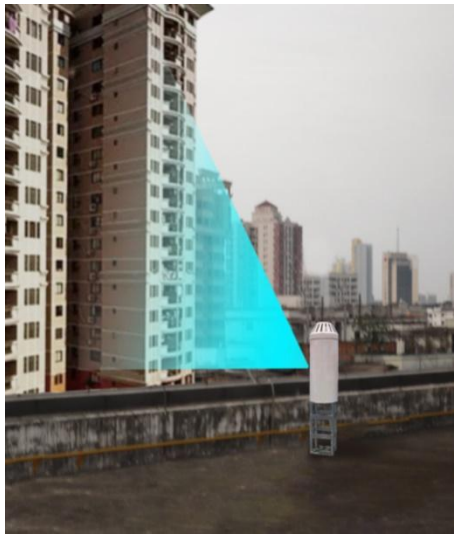
Freq（MHz）	820 ~ 960MHz/1710~2690MHz
No. of Beam	1
Horizontal Beam（°）	15°
Vertical Beam（°）	65°
Gain（dBi）	14dBi
Dimension（mm）	695×305×230mm

Solution 4

Uptilt Camourflage Antenna

Large Angle Uptilt, suitable for lower ground to upper floor coverage

Upper side lobe suppresion to minimize interference



KPIs

Freq（MHz）、	820-960MHz/1710-2690MHz
No of Beam	1
Horizontal Plane Bean（°）	≥60°
Vertical Plane Beam（°）	12 / 7 °
Gain（dBi）	15 / 18dBi
Dimension（mm）	1700×φ280 mm

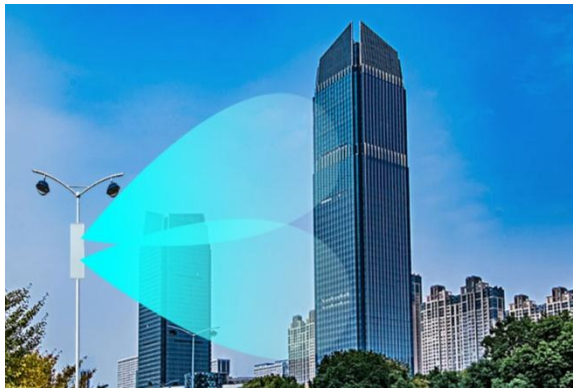
Solution

Double Layer Pole Antenna

Scenario

To overcome height and spacing uncertainty as well as to realize single antenna coverage for highrise building

Thus, we provide an antenna with adjustable up and down tilt angle;



Product Advantage:

Vertical Separation, Adjustable Up/Down tilt， small size, easy installation, easy to intregrate into existing environment i.e.lamp post, roof on annex building, low cost and high efficiency.

Suitablility: High Rise

Support Freq:

1710-2690MHz，3400-3600MHz，Support 2T2R、4T4R.

Freq	1800M/2100M
No of Beam	2（Up/Down Each）
Electrical tilt range 1	-15~0°
Electrical tilt range 2	0~+15°
VBW	20±5°
Gain	13±1dBi
Dimension（mm）	950×150×80mm（2*2T2R） 950×280×80mm（2*4T4R）

ROTEX

05 Other Scenario (Stadium, Small cell)

Small cell Broadband OmniDirectional Antenna

Small cell Broadband OmniDirectional Antenna suitable for deep coverage in street, city square, urban village and hospital

Advantage:

- Support Infrastructure and Antenna Sharing, support 1710~3800MHz, available for wlan dualband coverage;
- Small size, easy to integrate into environment;
- Realiable and easy installation.

Model	Freq（MHz)	Gain（dBi)	Beamwidth（°)		Port	Dimension（mm)
			Horizontal	Vertical		
T0006W0F032	1710~2690×8/ 3400~3800×4	6	Omni	25	12	φ330×420
/	1710~2690×12/ 3400~3800×12/ 5150~5929×6	6	Omni	25	30	φ330×690
/	3400~3800×4	10	Omni	8	4	φ138×690
TYQM-242506/515906	2400~2500×2/ 4900~5850×2	6	Omni	25	4	φ95×140
TQJ-702702	698~960/1710~2690	2	Omni	/	1	φ30×245

Small cell Broadband Directional Antenna

Small cell Broadbanf directional Antenna Suitable for Hotspot coverage such as CBD, Train Station, Shopping Mall.

Advantage:

- Support 698~3800MHz FullSpectrum 4T4R, Support Antenna Sharing for Multi Operators
- Small size, easy for concealment

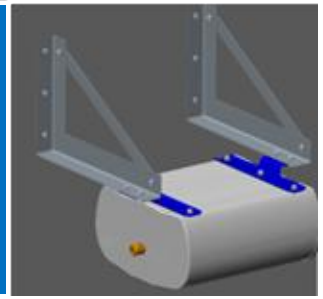
Model	Freq (MHz)	Gain (dBi)	Beamwidth (°)		Port	Dimension (mm)
			Horizonal	Vertical		
T0002W6F033	1710~2690×1/ 3300~3800×1	12	65	30	2	390×160×80
T0004W6F033	1710~2690×4/ 3300~3800×4	13	65	20	4	390×320×105
T2004W6F011	698~960×4/ 1710~2690×4/ 3300~3800×4	12	65	26	12	699×499×178

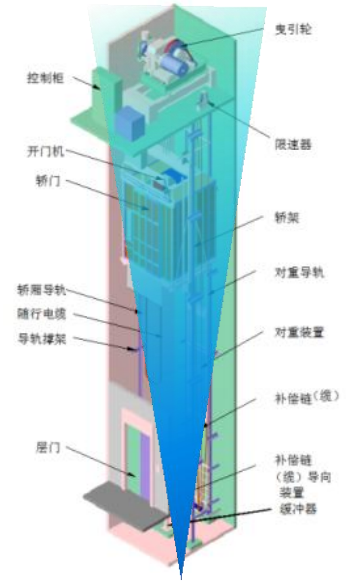
Full Bar Elevator Signal

This antenna suitable for in building narrow space such as elevator to meet coverage requirement. It has advantage of reducing no of antenna requires, capex and opex saving

Small size, easy installation and maintenance

Flexible adjustable angle

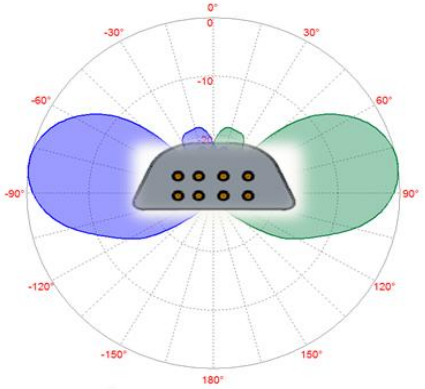




Antenna Model	Freq（MHz）	Gain（dBi）	Beamwidth（°）		Polarization	Port	Dimension（mm）
			Horizontal	Vertical			
Single Polarization All Band Elevator Antenna	820~960MHz/1710~2690MHz	13/16	35°/25°	35°/25°	±45°	1	498×446×165
Dual Polarization All Band Elevator Antenna	820~960MHz/1710~2690MHz	13/16	35°/25°	35°/25°	±45°	2	498×446×165

Tunnel Wall Antenna

Design specifically for tunnel, it is suitable for 5G signal coverage inHSR, Metro and highway. It overcome cable leakage, attenuation, deployment and high cost issue in tunnel deployment

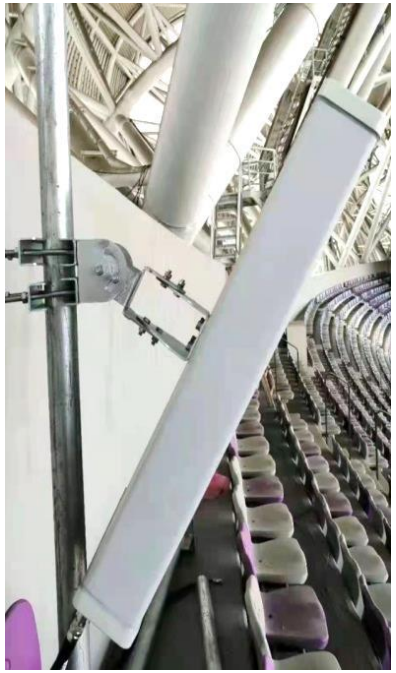


Advantage:

- Support multi operators 1710~3800MHz Full Spectrum 4T4R，max Gain 20dBi;
- Wall Installation, reduce windload and increase reliability;
- Easy installation, support fast disassembly and maintenance

Antenna Model	Freq（MHz)	Gain（dBi)	Beamwidth（°)		Port	Dimension（mm)
			Horizonta	Vertical		
TDQ-253616D-30PT0	2500~2690/3300~3600×4	14.5/16	36/27	25/20	4	264×480×150
TDQ-333820D-18FA90	3300~3800MHz×8	19.5	18	18	8	480×390×250

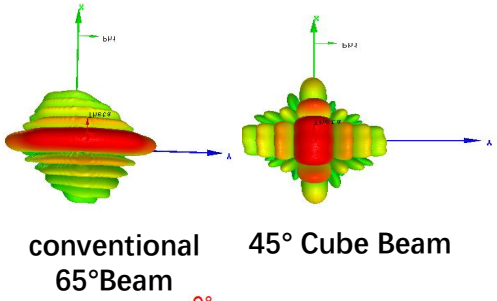
Stadium High Density Coverage Solution

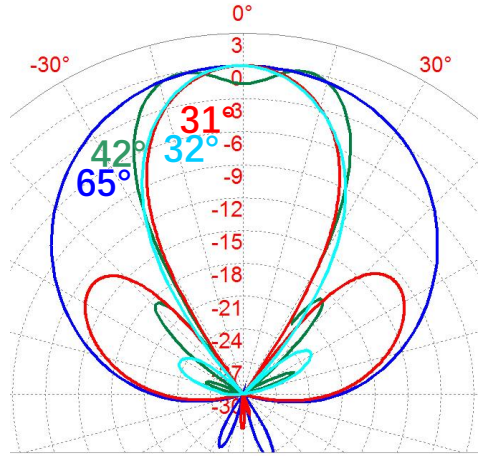


High-density Stadium antennas mitigate serious interference in adjacent areas such as stadiums and conference rooms, by solidify the coverage area, and improve co-channel interference problems.

Advantage:

- Support all Band 4/5G 4T4R of multi operators, with inbuilt combiner;
- Rapid steep drop beam and low side-lobe shaping, allowing precise coverage area. Suitable for densely populated and high traffic areas;;
- The mounting bracket supports a wide range of adjustment in azimuth and pitch over ±20°, flexibly adapting to restricted installation locations;



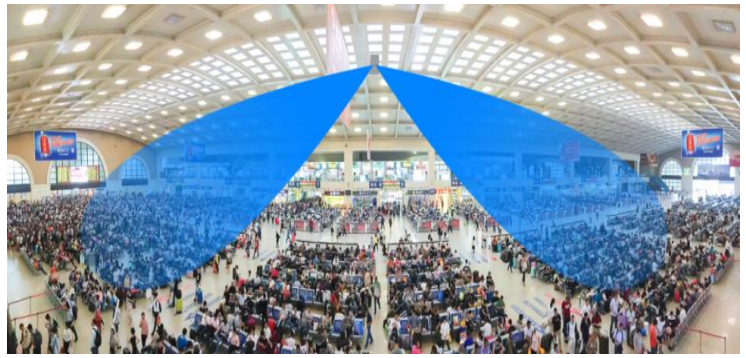


Antenna Type	Freq (MHz)	Gain (dBi)	Beamwidth (°)		Port	Dimension (mm)
			Horizontal	Vertical		
TDJ-172714/484913D-35/30PT0v02	1710~2675×4 / 4800~4900 ×4	13	35	35	4	580×398×105
TDQ-172713/343613D-30PT0-C	1710~2690×4 / 3400~3600 ×4	13	30	30	4	780×320×105
TDQ-172711D-45FT0	1710~2170×4 / 2300~2690 ×4	11	45	45	4	986×500×158

Multibeam Antenna

- As the venue of major events, it is spacious, demand high capacity, complex traffic scheduling, thus require **dual/tri beam Antenna** to meet the coverage requirement;
- **Performance Advantage:** Freq. range 1710-2690MHz,Gain19.5/21.5dBi, realizing high capacity coverage effect, dual/tri beams can fulfilled the traffic demand;
- For 10K+ users and high traffic demand, **Penta-Beam Antenna** can propogate multiple beams at the same time, effectively enhancing network coverage and improving network capacity.
- **Performance Advantage:** Freg range 1710-2690MHz,Gain 23dBi, high-capacity coverage effect, penta beams can meet high traffic demand;

Dual Beam



Tri Beam

Penta Beam

Antenna TypeFreq	Freq (MHz)	Gain (dBi)	Beamwidth (°)		Port	Dimension (mm)
			Horizontal	Vertical		
Multibeam Antenna (2Beams)	1710~2690MHz	19.5±1	28±5	7±2	4	1400×400×150
Multibeam Antenna (3Beams)	1710~2690MHz	21.5±1	24±5	12±2	6	1360×446×165
Multibeam Antenna (5Beams)	1710～2690MHz	23.0±1	12±2	12±2	10	800×900×107

High Gain Wide Beam Antenna

Scenario:

- Rural, Village and Tourist Site which is sparsely targetted, but demand wide area coverage;
- General environment mountainous, slopes, and deep ditches, thus pose challenges on radio;

Antenna Type	Antenna Name	Port	Freq (MHz)	Gain (dBi)	HBW (°)	Downward eTile (°)	Dimension (mm)	Weight (KG)
High Gain Antenna	High Gain Panel Antenna	2	885-960	17.5	65°	0°-8°	2580×270×140	21.8
	High Gain Panel Antenna	4	885-960	17.5	65°	0°-8°	2580×420×140	32
	33°High Gain Panel Antenna	2	790-960	20.4	33°	0°-10°	2520×530×115	35.6
Wide Beam Antenna	90° WideBeam Panel Antenna	2	790-960	15	90°	0°-10°	1980×270×140	18
	90° WideBeam Panel Antenna	4	790-960	15	90°	2°-12°	1980×469×198	26
	120° WideBeam Panel Antenna	1	790-960	14.5	120°	0°-10°	2180×300×146	19.5

06 Green Tech and Product

Key Lifecycles in Green Antenna

Full Lifecycles Low Carbon Technology Antenna

Design
- Efficient feeder network
- High efficiency array
- Integrated antenna components
- Simplified antenna structure
- Reduce antenna weight
- …

Materials
- toxic free and safe
- Recycle and reuse
- Easy access

Manufacturing
- No electroplating
- Lead-free
- No gelling
- Low energy consumption

Transportation
- Environmentally friendly packaging
- Low Carbon Transport

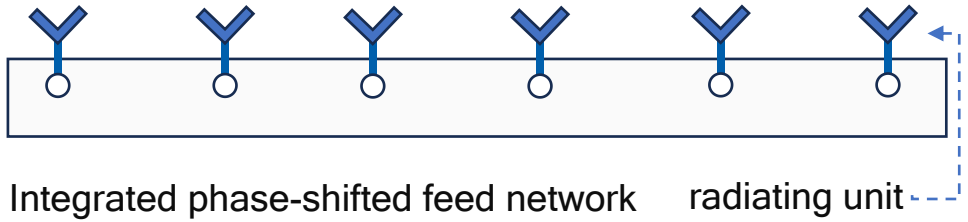
Operating
- Low Energy Comsumption

Recycle
- Recyclable
- Biodegrable

Green Antenna Key Technology

Electroplating-free chamber

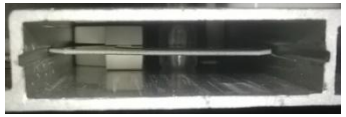
- Aluminum alloy is formed by extrusion equipment and then processed by machining equipment. There is no obvious pollution link in the process.



Pay attention to confidentiality and strictly prohibit dissemination.

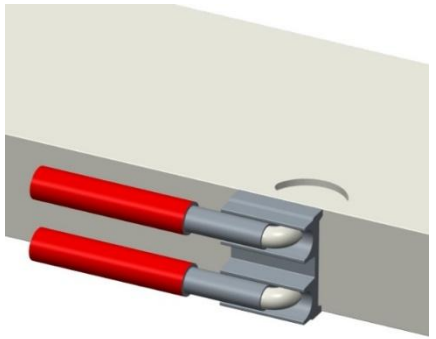
Sheet metal electroplating-free ribbon

- Aluminum alloy sheet metal is formed by precision stamping without electroplating.



Laser Welding

- Reduce plating area by 95%; welding is stable and reliable



New Outer Cover

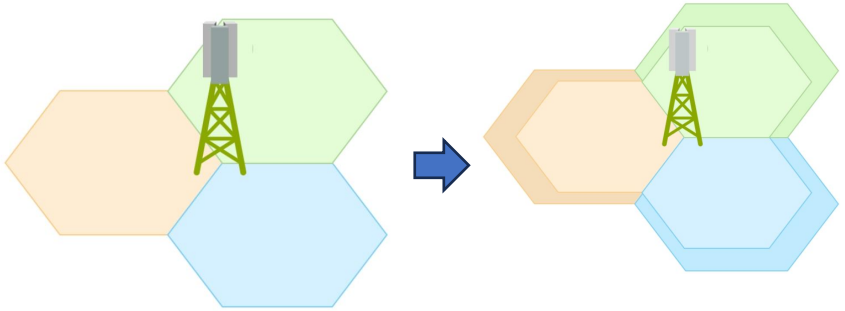
- The new outer cover composite material is based on polypropylene (PP) material and is a reinforced composite material formed by incorporating appropriate amounts of glass fiber and other additives. The production process of these new materials is more environmentally friendly, the materials are also recyclable, and they are maintained Obtain lower loss characteristics under the premise of sufficient strength and specified service life.

Values of Green Technologies Antenna

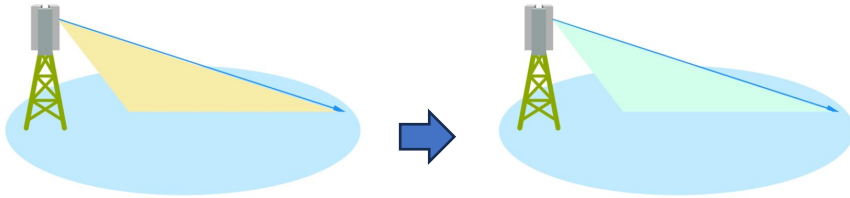
2.6/3.5G High Gain Green Antenna, 1.5-2dB Gain over conventional antenna

Values:

- Under the same transmiting power, the coverage of a single base station is increased by 13%-26%.
- Under the same transmitting power, the total number of base stations to be built in the same coverage area can be reduced by 10%-20%.
- Under the same coverage, every 10,000 stations can save 22-34 million kWh/year of electricity.
- Under the same coverage, every 10,000 stations can reduce carbon emissions by about 17,000 tons per year, which is low cost.



Wider coverage under the same input power, reducing the total number of base stations



Within the same coverage area, the input power of the base station is lower, reducing energy consumption.

Values of Green Technology Antenna

Urban basic coverage scenario : 800&900M+1.8&2.1G co-site

Significant Product KPIs Improvement

4+4 Conventional Antenna
Gain: ≥16.0/17.5dBi
VBW: ≥9/6°
Zero Padding: No

⇒

4+4 Green Antenna
Gain: ≥17.0/19.0dBi
VBW: ≥7.5/5°
Zero Padding: ≥-20dB

4+6 Conventional Antenna
Gain: ≥16.0/17.5dBi
VBW: ≥9/6°
Zero Padding: No

⇒

4+6 Green Antenna
Gain: ≥17.0/19.0dBi
VBW: ≥7.5/5°
Zero Padding: ≥-20dB

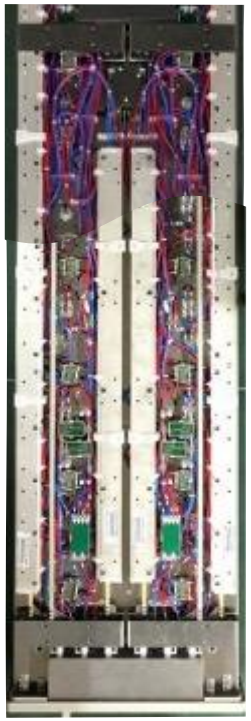
Application Values:

- 800&900M: Under the same coverage, the base station transmission power is reduced by 14%-26%; every 10,000 stations save 14 million kilowatt hours of electricity annually, equivalent to reducing carbon emissions by 8,000 tons (320W equipment); under the same transmission power, the outdoor coverage indoor level Improved by 0.7-1.2dB
- 1.8&2.1G: Under the same coverage, the base station transmission power is reduced by 28%-35%; every 10,000 stations save 27 million kilowatt hours of electricity annually, equivalent to reducing carbon emissions by 16,000 tons (320W equipment); under the same transmission power, the outdoor coverage indoor level Improved by 1.5-2dB

Values of Green Technology Antenna

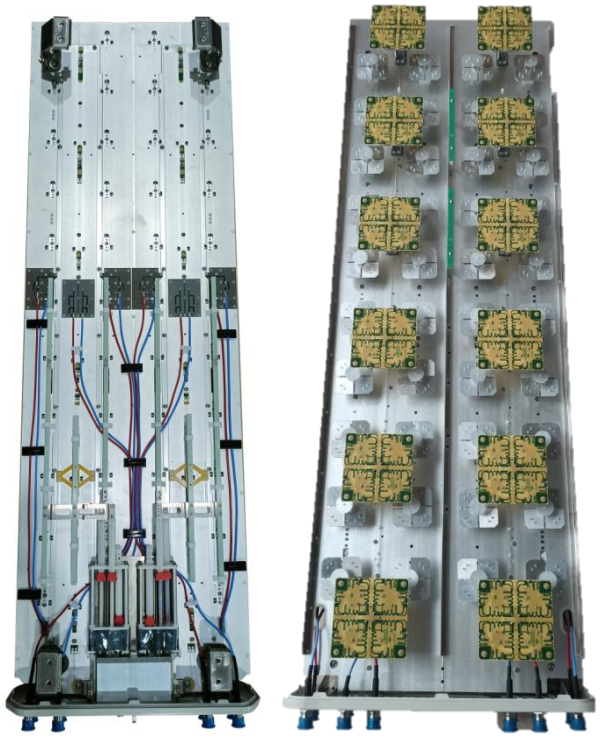
(698-960MHz/1710-2690MHz) 4+8 Port Design Comparison

Traditional Feeder Network



- 90% Cable Reduction
- 48% Fewer Solder Joints
- 30% Improment production efficiency
- 30% Weight Reduction
- 25% Wind Load Reduction
- 10% Width Reduction

Green Feeder Network

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