RESOLUTION AND INFLUENCE OFDXX-824-960/1710-2170-65/65-17I/17.5I-M/M-C IN MOBILE PHONE BASE STATIONS IN RANYIA CITY

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ABSTRACT

The aim of this paper is to evaluate the solution and influence of antenna type Dxx-824-960/1710-2170-65/65-17i/17.5i-M/M-C In Mobile Phone Base Stations in Ranyia City. Huawei Agisson undertakes to enhance customer success by rapidly responding to customer demands and providing customers with profitable and sustainable base station antenna products and solutions through innovative technologies and outstanding operation by compared with Kathrin type of antenna. the reason for choosing this type is because it have very good properties from the other types . In Raniy a city there are 24 site three sectors and just two sites in 2 sectors. One site have the type Telos for HSN 47 Hz. Almost of the sites include the type K742225 near to 15 sites have this type of antenna. And two other sites have the antenna type [DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C]. In this paper a Simulation results indicate that Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C depends on the network environment and different environments may lead to different optimization results in terms of capacity and coverage performance.

Keywords: DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C Antenna, Huawei Agisson Kathrin antenna, K742225, capacity, Coverage.

1. INTRODUCTION

Cellular Networks achieve large capacity capabilities by reusing given frequencies repeatedly in a given system. This concept means that the communication paths are interference limited as opposed to traditional radio systems that were noise limited. To minimize interference, the use of sectorized antennas have been employed, each of which provides coverage to a portion of the cell. In a three-sector arrangement, each sector antenna covers a 120-degree pie shape that extends some distance away from the antenna site. Ideally, each sector antenna should only provide coverage in its 120-degree pie shaped sector so that interference with adjacent sectors is minimized [1].

By holding the consistent concept of customer orientation in mind, Huawei Agisson undertakes to enhance customer success by rapidly responding to customer demands and providing customers with profitable and sustainable base station antenna products and solutions through innovative technologies and outstanding operation [2].

In 2004 based on a deep understanding of wireless communication systems as well as the application experience in antenna, Huawei Agisson start the base station antenna self-development. Through years of efforts, Huawei Agisson has developed single-band, dual-band, and multi-band antenna series to meet the GSM / UMTS / CDMA / and TDSCDMA/ LTE /WiMAX and other system needs. Through strict testing and authentication, Huawei Agisson products have been gradually deployed by famous carriers in China and abroad, including Vodafone, STC, Telefonica, MTN, BSNL, ET, Zain, China Unicom, China Telecom, etc. At present, Huawei Agisson antennas have been deployed across the world and serve over 200 carriers in more than 90 countries Fig. (2) Show the Addition of new carriers of Huawei Agisson antenna / year [2].

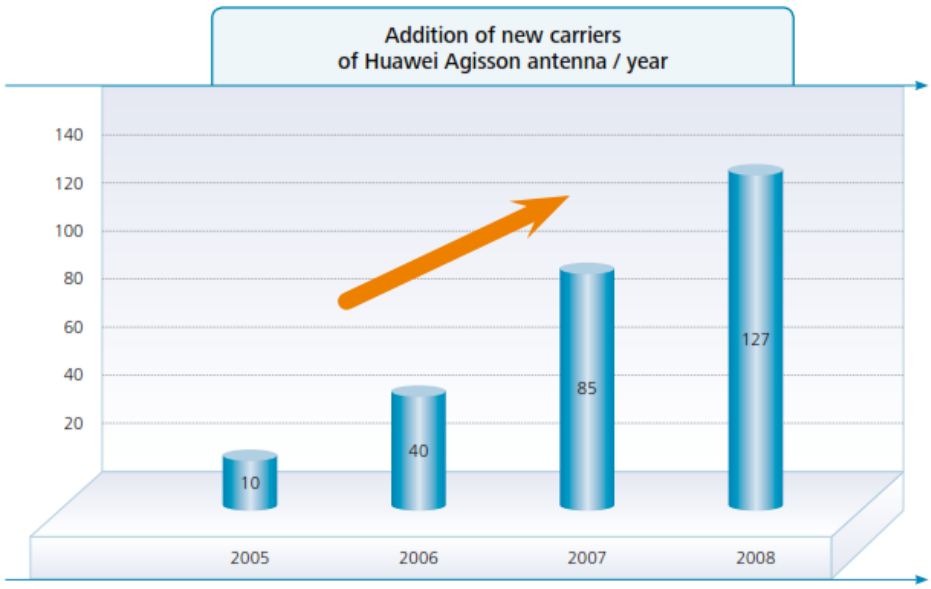

FIGURE 2 .The Addition of New Carriers of Huawei Agisson Antenna / Year

Multiple antennas at the base stations may be used to form multiple beams to cover the whole cell site.Three beams each with a 120^0 beam width (or six beams each with 60^0 beam width) can be used for this purpose. The coverage of each beam is then treated as a separate cell. Traditional base station installations of mobile communication make use of space diversify techniques, which require at least two antennas pointing in the same direction and separated by a distance of 10 to 20 wavelengths [10].

2. THEORY

2.1 ELECTRICAL PROPERTIES

The electrical properties for the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C is shown in fig. (3) [2].

Electrical Properties															
Frequency range (MHz)		824 -894			880 -960			1710-1880			1850-1990			1920-2170	
Polarization		±45°													
VSWR		≤1.5													
Gain (dBi)	(°)	0	4	8	0	4	8	0	4	8	0	4	8	0	4	8
	(dB)	16.7	16.8	16.5	17.1	17.2	16.9	16.7	16.9	16.6	17.0	17.2	16.9	17.3	17.5	17.2
Side lobe suppression for first side lobe above horizon (dB)	(°)	0	4	8	0	4	8	0	4	8	0	4	8	0	4	8
	(dB)	18	17	16	18	17	16	18	17	16	18	17	16	18	17	16
3dB beamwidth (horizontal)		67°			65°			67°			65°			63°		
3dB beamwidth (vertical)		8.3°			7.2°			8.0°			7.5°			7.0°		
Isolation between portsw (dB)		≥30													
Front to back ratio (dB)		≥28						≥25							
Cross polar ratio(dB)	0°	≥18													
	±60°	≥10													
Electrical downtilt		0° - 8°						0° - 8°							
Intermodulation IM3 (dBc)		≤-150 (2 × 43 dBm carrier)													
Max. CW input power (W)		300						200							
Max. power per combined input (W)		500													
Impedance (Ω)		50													
Grounding		DC ground													

FIGURE 3. The Electrical Properties

From fig (4) the frequency range for the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C is 824-960 for polarization ±45°where the gain (dBi) between 16.7- 17.2 and electrical down tilt is 0° - 8°with VSWR ≤1.5and Max. power per combined input (W) is 500 and for frequency range 1710-2170 for same polarization while the gain (dBi) between 16.7- 17.5 and same electrical down tilt with same VSWR and Max .Polarization is defined as ' the orientation of electric field of an electromagnetic wave '. In other words, it is the direction of the electric field. Polarization is in general described by an ellipse. The ratio of the maximum to minimum linearly polarized responses on the ellipse is the axial ratio [5].
Gain is a measure of the ability of the antenna to direct the input power into radiation in a particular direction and is measured at the peak radiation intensity, or is measure of directivity properties and the efficiency of the antenna.
The relationship between gain and directivity is given as [5], [9]:

Gain = efficiency X directivity (1)

For Kathrein there is no difference only the beam that point to the sky that become bigger. Also in horizontal plane the back lobe of Huawei antenna is bigger [3] .power per combined input (W), as Shown in fig (3). [2].

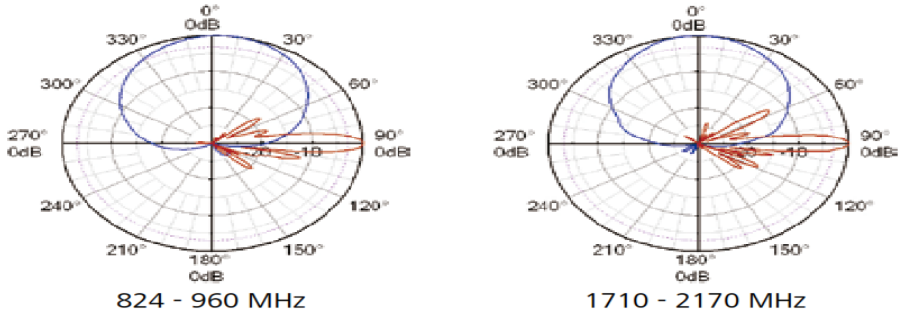

FIGURE 4 .The frequency range for the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C

Huawei have bigger vertical beam width than Kathrein however the gain of1800 band of Huawei is smaller. But back lobe of Huawei antenna is quite big for this pattern [3, 7].

2.2 MECHANICAL PROPERTIES

Until recently, the accepted method for Mechanical properties for the Huawei. Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C was to mechanically alter its position on the tower. As shown in Fig (5). Where the Dimensions (H × W × D) (mm) is 2449 × 368 × 99 and Net weight (kg) is 26.7 and the Mechanical downtilt are between 0° - 15° at Operating temperature (°C) range between - 55 - + 65 at last Max. Wind velocity (km/h) is 200. The antenna represents a fixed unit capable of tilting along one plane only. As the front tilts down to lower the gain on the horizon, the back tilts up, changing the frontto-back ratio and increasing inter-sector interference [9].Utilization of antenna mechanical down tilt has been a tool for radio network planners to optimize networks .It has been observed to be an efficient method to reduce other-cell interference in the main-lobe direction [6], [9].

Mechanical Properties	
Dimensions (H × W × D) (mm)	2449 × 368 × 99
Packing dimensions (H × W × D) (mm)	2756 × 498 × 220
Net weight (kg)	26.7
Bracket weight (kg)	7.8
Packing weight (kg)	41.6
Mechanical downtilt	0° - 15°
Mast diameter (mm)	50 - 115
Radome material	Fiberglass
Operating temperature (°C)	- 55 - + 65
Windload frontal (N) Windload lateral (N) Windload rearside (N)	1152 (v=150km/h) 270 (v=150km/h) 1152 (v=150km/h)
Max. wind velocity (km/h)	200
Connector	2×7/16 DIN Female

FIGRUE 5. Mechanical Properities

When mechanically and electrically down tilted antenna patterns are compared side by side, the ability of the electrically down tilted antenna to reduce anomalies such as pattern blooming becomes apparent[9]. The use of electrically down tilted antennas has increased significantly since the technology was first introduced. RF engineers, however, continue to apply the same basic guidelines initially developed to help compensate for the limitations of mechanical down tilt antennas. Additionally, many operators have begun to use mechanical down tilt in tandem with electrical down tilt. While combining the two methods can be effective in very limited applications, data suggests that overall this practice leads to horizontal pattern deformations that can all together offset the benefits of electrical down tilt fig.3 shows the Electrical vs. mechanical down tilt angle comparison [8]. As shown from fig (6) a simple explanation for the name of the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C [2].

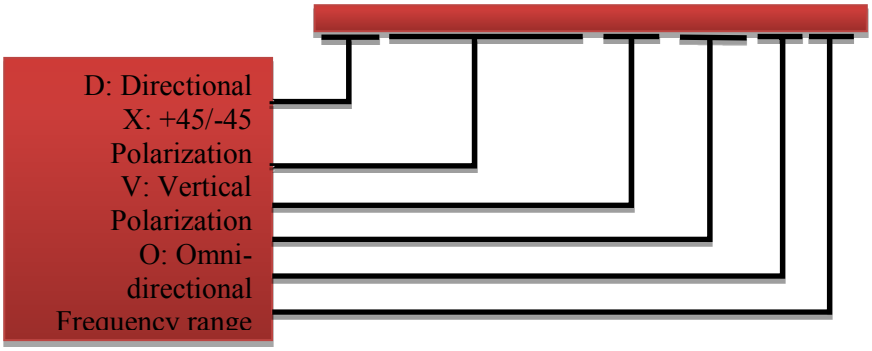

FIGURE 6. Simple explanation for the name of the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C

The best type for Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C. The Easy RET antenna solution can effectively resolve these problems. This solution facilitates installation, maintenance, and usage of the RET antenna; therefore, the O&M efficiency is improved. The solution has the following features [4].

Free of configuration, Free of calibration, Free of RCU installation, Free of manual recording of bar codes, High reliability, Excellent performance.

3. SIMULATION RESULTS

From table (1) show the antenna type that used in Raniya city in Kurdistan Iraq. There are most type used in this city is almost kathrin type of antenna and the other is for the Huawei Agisson antenna type DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C. The reason by choosing this type is because it have very good properties from the other types Kathrin antenna types. Statistic shows no problem after change antennas to Huawei for the existing sites and some sites have better performance after change the antenna. However we suspect the antenna problem or other factors because only one site has this effect.

As shown in raniya city there are 24 site three sectors and just two site in 2 sectors. One site have the type Telos for HSN 47 Hz. Almost of the sites include the type K742225 near to 15 sites have this type Antenna. And two other sites have the antenna type [DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C]. Just to know there is one site in raniya holding antenna type Telos this site is skarta_0619. And the other sites have different antenna type like K739684, K739686, K730378 and K739623. That clear from the chosen sites are the antenna type K742225 are favorite for Asia cell because it is has very good capacity also for the gain and the beam width. So it have good performance.

TABLE 1.
The Antenna Type That Used In Raniya City in Kurdistan Iraq

Antenna type	SITE	Antenna type	SITE
K742225	Bitwen_0738	K742225	Raniyah_0620
K742225	Bitwen_0738	K742225	Raniyah_0620
K742225	Bitwen_0738	K742225	Raniyah_0620
K742225	Chwarqrna2_0737	K742225	Raniyah1_0670
K742225	Chwarqrna2_0737	K742225	Raniyah1_0670
K742225	Chwarqrna2_0737	K742225	Raniyah1_0670
DXX-824-960/1710-2170-65/65-17i/17.5iM/MC	Chwarqurna_0621	K742225	Raniyah2_0644
DXX-824-960/1710-2170-65/65-17i/17.5iM/MC	Chwarqurna_0621	K742225	Raniyah2_0644
DXX-824-960/1710-2170-65/65-17i/17.5iM/MC	Chwarqurna_0621	K742225	Raniyah2_0644
K742225	Raniyah_0620	K742225	Raniyah3_0643
K742225	Raniyah_0620	K742225	Raniyah3_0643
K742225	Raniyah_0620	K742225	Raniyah3_0643
K742225	Raniyah1_0670	K739686	Raniyah4_0732
K742225	Raniyah1_0670	K739686	Raniyah4_0732
K742225	Raniyah1_0670	K739686	Raniyah4_0732
K742225	Raniyah2_0644	K739686	Raniyah5_0677
K742225	Raniyah2_0644	K739686	Raniyah5_0677
K742225	Raniyah2_0644	K739686	Raniyah5_0677
K742225	Raniyah3_0643	K742225	Raniyah6_0686
K742225	Raniyah3_0643	K742225	Raniyah6_0686
K742225	Raniyah3_0643	K742225	Raniyah6_0686
K742225	Raniyah6_0686	K739684	Sangasar_0747
K742225	Raniyah6_0686	K739684	Sangasar_0747
K742225	Raniyah6_0686	K739684	Sangasar_0747
K742225	Skarta_0619	Telos	Skarta_0619
K742225	Skarta_0619	Telos	Skarta_0619
K742225	Skarta_0619	Telos	Skarta_0619
K739684	Tawela_0679	K730378	Halsho_0678
K739684	Tawela_0679	K730378	Halsho_0678
K742225	Bitwen_0738	K739623	Khandaka_0685
K742225	Bitwen_0738	K739623	Khandaka_0685
K742225	Bitwen_0738	K739623	Khandaka_0685
K742225	Chwarqrna2_0737	K730378	Makok_0714
K742225	Chwarqrna2_0737	K730378	Makok_0714
K742225	Chwarqrna2_0737	K730378	Makok_0714
DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C	Chwarqurna_0621	K739684	Chwarqurna3_0710

DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C	Chwarqurna_0621	K739684	Chwarqurna3_0710
DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C	Chwarqurna_0621	K739684	Chwarqurna3_0710

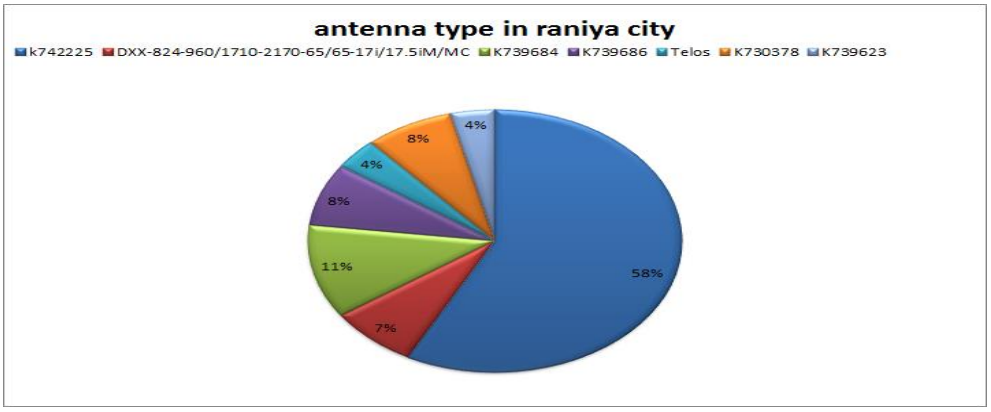

FIGURE 7. The antenna type percent for Rania city

Fig. (7) Show the antenna type percent in Rania region. 58% from Rania area have the k742225. And for K739684 11% and 8% for K739686, K730378 respectively. While 7% for DXX-824-960/1710-2170-65/65-17i/17.5i-M/M-C it's a new type of antenna designed from Huawei Agisson Company. At last 4% for K739623 and Telos. As shown from fig. (8) The antenna type K742225 are favorite for Asia cell due to its good Performance. Also Performance of Huawei antennas is acceptable too. By comparing to Kathrin antenna, the two antennas types have better performance in coverage enhancement and interference control.

The results indicate that both antenna types depend on the network environment and different environments may lead to different optimization results in terms of capacity and coverage performance.

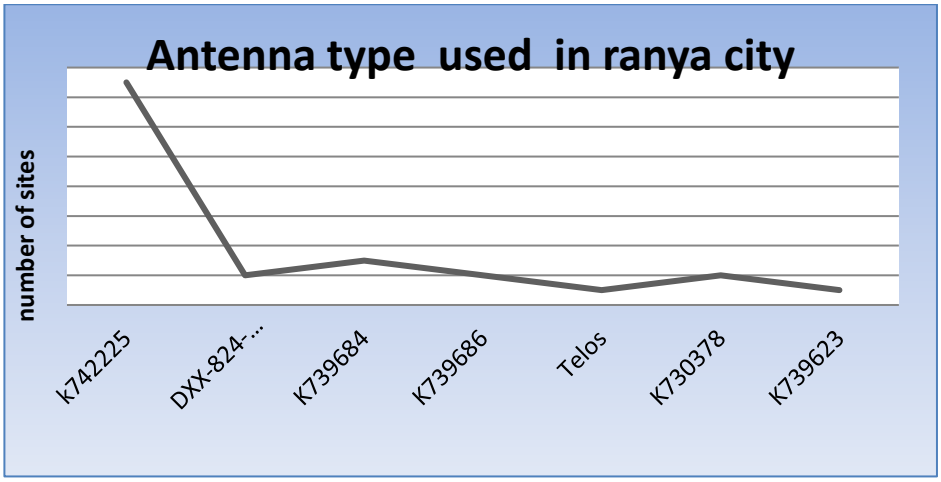

FIGURE 8. The antenna type curve at Rania city

4. CONCLUSION

In this paper the resolution and influence of antenna type Dxx-824-960/1710-2170-65/65-17i/17.5i-M/M-C in Mobile Phone Base Stations in Ranyia City was discussed. System performance results in presence of both Dxx-824-960/1710-2170-65/65-17i/17.5i-M/M-C and Kathrin antenna type were simulated for different sites in raniya city in Kurdistan north of Sulaymaniya. According to the results, Dxx-824-960/1710-2170-65/65-17i/17.5i-M/M-C provides better performance in case of interference limited system, while performance difference is insignificant for noise limited cases. Although Kathrin antenna types scheme is not considered as the best possible for the down tilt scheme, the results emphasize the fact that antenna type *DXX-824-960/1710-2170-65/65-17I/17.5I-M/M-C* should be used, not only to maximize the network capacity, but also to reduce the amount of, e.g., pilot pollution.

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