Yealink WH6X Deployment and Density Whitepaper

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1 Introduction

If a large number of wireless headsets are used simultaneously, such as call centers and centralized office scenarios, users may experience less-than-optimal audio quality due to density issues. Moreover, all wireless technologies have a limit on density capacity due to the limit of available radio channels.

At the same time, there are many factors affecting the deployment density, such as building layout and transmit power. Therefore, a good deployment plan is very important.

This guide is suitable for planning the deployment of Yealink DECT headsets using DECT technology.

2 Reference Value for Deployment Density

Table 1 Yealink WH6X recommended deployment density

Headset model/series	Yealink WH6X Series	Yealink WH6X Series
Frequency	Wideband	Super Wideband
EU	200 number of active users	NA
US	100 number of active users	NA
Japan	85 number of active users	NA

Note: Although Yealink WH6X headsets use narrowband for audio calls, they can actually achieve wideband voice quality.

The above data is measured in a 16m*150m indoor environment with no interference, no obstruction, and short-distance configuration. There are many factors affecting the deployment density, please refer to Considerations for Deployment Planning.

3 Considerations for Deployment Planning

3.1 Deployment Area

The primary factor for a good deployment plan is to decide an area to deploy headsets. The DECT equipment has an indoor signal range of up to 150 meters. If the office area exceeds this range, a special deployment plan is required.

The office layout will have an impact on the deployment density. It is clear that

concrete walls, glass doors, metal doors, etc. have obvious blocking effects on DECT signals. In a single use scenario, more blocks bring smaller movable range when users are wearing headsets. However, as the range of DECT signal becomes smaller, the total number of headsets that can be deployed in the given area increases. Therefore, a heavily furnished office can have a positive impact on a density perspective, while a sparsely furnished office can have the opposite effect.

The data listed in the **Table 1** should be treated as a moderately conservative guidance. In actual use, you need to deploy the headsets according to the actual office conditions.

Table 2 Loss percentage of wireless range

Insertion	Loss (%)
Untreated wood glass	~ 10%
Treated wood	~ 25%
Gypsum board	~ 27% to 41%
Brick wall, 10 to 12 cm	About 44%
Brick wall, 24 cm	About 60%
Gaseous-concrete wall	~ 78%
Wire-reinforced glass wall	~ 84%
Reinforced concrete ceiling	~ 75% to 87%
Metal coated glass	~ 100%

3.2 Number of Headsets and Headset Utilization

If the number of headsets in an area does not exceed the limited data listed in **Table 1**, there should be no deployment issues. Otherwise, you need to design a special deployment plan.

The number of simultaneous calls also affects the deployment density. DECT uses a part of channel even when there is no call. Headset utilization refers to the amount of time in which the headsets will be utilized – e.g. if users are on a call 100% of the time or 50% of the time. A lack of an available channel - which could happen if there are more calls than the average utilization planned for - will result in of loss of communication between a

headset and a base. In DECT, we recommend planning with 100% utilization.

Like DECT phone supporting multi-handsets, Yealink DECT headsets also support multi-headset scenarios, which will occupy the DECT channel. Therefore, if there is a multi-headset or multi-handset call scenario, the deployment density needs to be reduced.

3.3 DECT Channel Frequencies

DECT works in the frequency band from 1880MHz to 1930MHz, using GFSK (Gaussian Frequency Shift Keying) modulation method. This frequency band is dedicated, and consequently has a relatively small possibility of interference, comparing with other wireless technologies using open frequency bands, for example, Bluetooth and Wi-Fi. However, radio frequency signals of adjacent frequencies will still affect DECT transmission.

The DECT channel frequencies in each region are as follows:

Table 3 DECT channel frequency table

	RF Carrier Index (DECT tester Numbering)								
Freq (MHz)	EU	Taiwan	US	LA	Korea	Brazil	Argentina	Japan	Thailand
1881.792	9	9							
1883.520	8	8							
1885.248	7	7							
1886.976	6	6							
1888.704	5	5							
1890.432	4	4							
1892.160	3	3							
1893.888	2	2							
1895.616	1							4 (F1)	
1897.344	0							3 (F2)	
1899.072								2 (F3)	
1900.800								1 (F4)	
1902.528								0 (F5)	2
1904.256									1
1905.984									0
1907.712									
1909.440									
1911.168						4	9		
1912.896				9		3	8		
1914.624				8		2	7		
1916.352				7		1	6		
1918.080				6		0	5		
1919.808				5			4		
1921.536			4	4			3		
1923.264			3	3			2		
1924.992			2	2			1		
1926.720			1	1			0		
1928.448			0	0					
1787.616					8				
1789.344					7				
1791.072					6				

The number of available DECT channels in different regions is different. Different regions work on slightly different but still exclusive DECT frequency ranges. For example, 10 channels in Europe, 5 channels in North America, and 5 channels in Japan with 2 overlapping with Europe. The more available DECT channels are, the more DECT devices can be accommodated in the same deployment environment.

Not only DECT headsets will occupy the DECT channel, but also other DECT devices, for example, DECT phones or repeaters. Therefore, when deploying headsets, you need

to consider whether there are other DECT devices in the office area, and reduce the deployment density as appropriate.

In addition, metal objects can cause radio reflections, negatively impacting headset use. Accordingly, we recommend that you do not deploy headsets near metal walls or on metal shelves. If the table top is metal, we recommend that you place a layer of absorbing material between the base and the table top, for example, foam, plastic, or leather.

3.4 Device Transmit Power

Greater transmit power of the DECT device poses greater interference to surrounding devices. Therefore, reducing the transmit power can significantly increase the deployment density while restrict the movement of the user during a call.

In a general office, the average distance between the headset and the base is typically less than 2 m / 7 ft, which can meet the use scenario even the transmit power is the smallest. The corresponding headset wireless range configuration can be set as “Short” (10 m / 30 ft).

Short and medium wireless range settings can increase the number of units deployed in an office, but reduce the wireless range of the headsets, and thereby restrict the movement of the user during a call. If the user needs to leave the seat frequently, the wireless range configuration cannot be set to “Short”. The data listed in **Table 1** is tested under the short-distance configuration. If it cannot be configured for short distance due to the needs of the customer's usage scenario, the deployment density needs to be reduced.

After reducing the transmit power, the anti-interference ability will also be weakened. Therefore, all DECT devices need to be set to “Short” (10 m / 30 ft) or “Medium” (30 m / 100 ft) in a high-density deployment scenario.

4 Ways to Improve the Density Performance

4.1 Wireless Range Configuration

WH6x products have a configuration option called **Wireless Range** that reduces the range and radio signal strength. For more information, refer to the *WH6X user guide*.

The “Short” (10 m/30 ft) and “Medium” (30 m/100 ft) wireless range settings will improve the density performance. Note that when this option is used, all headset products in the same area must set in the same way. Otherwise, the interference of other devices

may influence the quality of communication.

4.2 ECO Mode

When the wireless range is set to “Long” for WH6X headset, ECO mode feature automatically helps adjust the transmit power of the headset. If you choose to use short-distance, the transmit power of the headset will be automatically turned down. This will reduce the interference to other devices, thereby increasing the deployment density.

4.3 Dock Headset in the Base

When the headset is docked in the base, the transmit power will be automatically reduced, which helps increase the deployment density.

4.4 FEC (Forward Error Correction)

WH6X headset adopts FEC technology, which can achieve automatic error correction in the case of slight interference and occasional radio transmission errors, helping increase the deployment density.