



Fading Measurement Method of Backup Path Signal in Wireless Network

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Abstract. In order to solve the above problem, a method of measuring the back-up path signal decline based on wireless network is designed to solve the problem that the existing signal measurement method can not express the specific decline path of the signal. Through the two steps of signal perception module design and measurement signal transmission mode, the wireless network environment of backup path signal measurement is completed. On this basis, three steps are carried out through the determination of the baseband signal fading frequency, the fading measurement channel estimation and the signal modulation measurement term to complete the construction of the new recession measurement method. The experimental results show that the fading path of the terminal signal is clearly expressed when the backup path signal fading measurement method based on wireless network is applied.

Keywords: Wireless network · Path signal · Fading detection · Perception module · Transmission mode · Fading frequency · Measurement channel · Modulation measurement item

1 Introduction

Channel decline is an inherent noun in the field of wireless communication networks. Recession refers to the phenomenon of random changes in the amplitude of received signals due to changes in the channel, which leads to a fading channel called a fading channel. In the field of wireless communications, recession is a concept of power, or signal strength, which means the reduction of signal power. This “decline” can be divided into large scale recession and small scale recession according to the decline of power. Large scale recession is divided into path loss shadow and effect, and the cause of small scale decline is multipath problem. In wireless communications, the receiver may receive many of the same signals from different paths in a period of time. This time is called delayed diffusion, and the reciprocal of delayed diffusion is called the homology bandwidth. The physical meaning is in this bandwidth interval, the size of the decline can be seen as the same, when the delay diffusion is greater, the homology

bandwidth is greater smaller [1, 2]. And the wireless channel will vary with time. If there is a movement, the channel change will be faster, because the time of homology will be shortened, and the reciprocal of the time of homology is Doppler diffusion. The physical meaning is in this period of time, the decline is almost the same, when the signal time is transmitted. Greater than the same time, there will be a so-called fast recession. In order to better determine the specific decline form of the wireless network signal, the existing technical means set up the signal acquisition platform by IEEE 802.11 wireless technology, and through the method of counting the recessionary cycle of the signal, the signal decline phenomenon is measured in real time. With the progress of science and technology, this method has begun to show the drawbacks of sending signals and displaying specific fading paths. In order to avoid the above situation, a new method of signal fading measurement is designed under the support of the backup path wireless network environment, and the practical value of the method is proved by the design contrast experiment.

2 Wireless Network Environment for Backup Path Signal Measurement

The backup path signal measuring wireless network environment is the application foundation of the new recession measurement method, and its concrete construction method can be carried out according to the following steps.

2.1 Design of Signal Sensing Module

Signal sensing module is the foundation of wireless network measurement environment. The module uses the 802.11 g receiver as the core set up equipment and connects several signal path backup devices with independent running functions around the device. When the measured signal enters the wireless network operating environment, the 802.11 g receiver enters the infinite running state with the promotion of the constant power supply device, and multiple signal path backup devices begin to analyze the location information of the received signals, and store the path backup results in the form of the module transmission medium in the form of running scripts [3, 4]. Under the condition that the external operating conditions remain unchanged, the transmission medium of the signal sensing module always maintains a stable running state, and the backup path information of the signal can be well preserved until the next command appears. The design principle of specific signal sensing module is shown in Fig. 1.

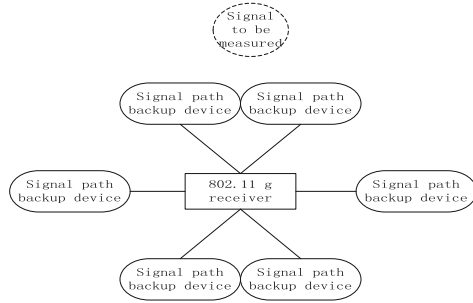


Fig. 1. Schematic diagram of signal sensing module design

2.2 Unification of Measurement Signal Transmission Mode

The existing technical means are the unified measurement of the signal transmission mode, using the path backup script generated by the signal sensing module, and strictly restrict the transmission destination of each signal. On this basis, when the total amount of the decay signal is increased, the number of insertable nodes in a part of the script will also increase, which also promotes the rapid progress of signal decline detection. On the basis of guaranteeing the speed of measurement, the new measurement method explicitly sends out the display definition of the end signal fading path, and adds a data compression packet with. Sqlpt as a suffix after each path backup script [5]. When the fading signal is transmitted to the wireless network monitoring link, the data compression packet is automatically decompressed, in which the message of the emit signal fading path is clearly displayed, and the original design aim is achieved. A unified method for measuring the transmission mode of the signal is shown in Fig. 2.

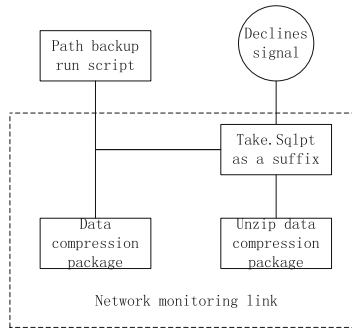


Fig. 2. Unified schematic diagram of measurement signal transmission

3 Realization of Signal Degradation Measurement Method Based on Wireless Network Environment

On the basis of the wireless network environment of the backup path signal measurement, three links are made through the determination of the baseband signal fading frequency, the fading measurement channel estimation, and the signal modulation measurement item to achieve the smooth application of the new decaying measurement method.

3.1 Frequency Determination of Baseband Signal Fading

The determination of the fading frequency of baseband signal can be regarded as the inverse process of baseband signal transmission. When the wireless network environment receives the backup path signal, the frequency offset is estimated and corrected first. After that, the reception sequence is string and converted, then the protection interval of each OFDM symbol is removed, and then the sequence of these sampling points is transformed to the frequency domain subcarrier for processing by FFT transform [6]. After FFT, the channel estimation, phase tracking and correction of the OFDM symbols are processed with the corresponding information of the lead and pilot, and then the data is mapped and interlaced. Finally, descrambling is used to get the original signal and complete the determination process of the decay frequency. The specific determination method is shown in Formula (1).

$$f = \frac{(\alpha + \beta)t}{l \cdot \sqrt{ds}} \quad (1)$$

Among them, f the decline frequency of the baseband signal, α it represents the parameter of frequency offset estimation, β On behalf of frequency offset correction parameters, t represents the guard interval between OFDM symbols of the original signal, d representing the constant of the solution mappings, s representative interleaver constant, l the frequency domain carrier cycle of the FFT transform is represented.

3.2 Fading Measurement Channel Estimation

In the actual measurement of signal decline, frequency selective fading and multipath effect will exist in many measurement environments, which will reduce the quality of the signal. Therefore, it is necessary to minimize or eliminate the effects of these interference on the quality of the signal. It is necessary to make channel estimation for the wireless channel between the transmitter and the receiver, also known as the frequency response estimation [7, 8]. The process of channel estimation is to estimate the parameters of the wireless channel model between the transmitter and the receiver from the received signal. This process plays a vital role in the wireless communication system, and may even be one of the important indicators to measure the performance of a wireless communication system. Only when the detailed channel information is obtained, the estimated channel coefficients can be used to correct the data, and then the transmitting signal is demodulated accurately at the receiving end. Therefore, the

channel estimation algorithm will directly affect the system error rate. The channel estimation results for specific recession measurements are shown in Formula (2).

$$\lambda = \frac{f \cdot q}{2\zeta G} \quad (2)$$

Among them, λ on behalf of the fading measurement channel estimation results, q representing channel coefficients, ζ the constant coefficient representing the quality of the signal, G the demodulation original of the receiver.

3.3 Correction of Signal Modulation Measurement Term

The modulation signal of the fading signal is always proportional to the bit information carried by each subcarrier. The frequency response characteristic of the signal transmitter is also stable in the condition that the wireless network environment of the backup path signal measurement is stable, but it is impossible to keep the power that is completely equal to the basic measurement operation. At this time, the decline frequency of the baseband signal is in the same state as the base frequency of the signal transmitter, and the decline frequency of the signal to be measured in its channel will not produce a clear floating state [9, 10]. In simple terms, the modulation measurement term of a fading signal is a stable constant with a corrected property, and its specific correction method is shown in Formula (3).

$$H = \frac{1}{\lambda}(W + Y)a^4 \quad (3)$$

Among them, H represents the correction result of modulation signal measured by fading signal, W the bit information constant carried by the subcarrier, Y the frequency response parameters of the signal transmitter, a the basic floating cycle that represents the frequency of recession. Finishing the above setup steps, the design of backup path signal degradation measurement method based on wireless network is completed.

4 Experimental Results and Analysis

In order to verify the practical value of the signal fading measurement method based on the wireless network backup path, the following comparative experiments are designed. Two computers with the same configuration are taken as the experimental object, in which the existing signal measurement method is used as the control group. The new signal measurement method is carried out as the experimental group, and 40 min is used as the experimental time. The changes in the clarity of the show.

4.1 Setting of Experimental Parameters

In order to ensure the authenticity of the experimental results, the relevant experimental parameters can be set down according to the following Table 1.

Table 1. Experimental parameter setting table

Parameter name	Experience group	Control group
ETT/(min)	40	40
WSL/(T)	8.94×1011	8.94×1011
SRC/(s)	0.42	0.42
PDL/(%)	85.96	85.96
PDP	1.35	1.35

In order to ensure the authenticity of the experimental results, the parameters of the upper table represent the experimental time, the upper limit of the radio network signal capacity, the cycle of the signal decline, the upper limit of the definition of the path display, and the definition parameters of the path display. The experimental parameters of the experimental and control groups are always consistent.

4.2 Definition Contrast of Emit Signal Fading Path

On the premise that the definition parameters of the path display are 1.35, the changes of the clarity of the emit signal decline path are recorded after the application of the experimental group and the control group respectively. The specific experimental results are shown in Fig. 3.

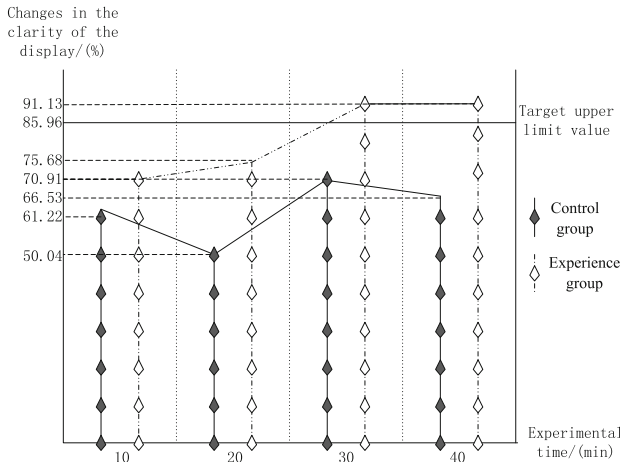


Fig. 3. Shows the contrast map of terminal signal fading path display clarity

The analysis of Fig. 3 shows that with the increase of experiment time, after the experiment group method, the end signal decline path shows the first increase and the trend of the stability. After the experiment time reaches 30 min, the definition of the emit signal decline path shows the maximum value of 91.13%, exceeding the target upper limit of 85.96%. After the use of the control group, the signal decline path of the

emit signal showed a decline in clarity and an alternation trend. When the experiment time was 30 min, the definition of the emit signal decline path showed the maximum definition of 70.91%, far lower than the experimental group.

5 Conclusion

Analysis and comparison results show that after the existing signal measurement method is applied, the terminal signal fading path can not reach the target upper limit of 85.96%, after the application of the wireless network backup path signal fading measurement method, the definition of the emit signal decline path shows an increasing state with the increase of the application time, and the maximum value is far above the target upper limit of 85.96%. Considering the feasibility of application, the signal fading measurement method based on wireless network backup path is indeed worth promoting.

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