

CHARACTERISTICS OF RADIO WAVE PROPAGATION IN URBAN CONDITIONS.

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Abstract. In urban conditions, the propagation of radio waves has a more complex nature than on the flat surface of the Earth. The construction of the city creates a non-homogeneous environment filled with irregularly located semiconductor barriers. Therefore, not one, but several waves reflected from the surrounding buildings and obstacles and diffracted on the roof of the buildings arrive at the reception point.

Keywords: Signal, wave, electromagnetic field, plane waves, homogeneous medium, Plane electromagnetic wave, amplitude, Vacuum.

ХАРАКТЕРИСТИКИ РАСПРОСТРАНЕНИЯ РАДИОВОЛН В ГОРОДСКИХ УСЛОВИЯХ.

Аннотация. В городских условиях распространение радиоволн имеет более сложную природу, чем на плоской поверхности Земли. Строительство города создает неоднородную среду, наполненную неравномерно расположенными полупроводниковыми барьерами. Поэтому в точку приема приходит не одна, а несколько волн, отраженных от окружающих зданий и препятствий и дифрагировавших на крыше зданий.

Ключевые слова: Сигнал, волна, электромагнитное поле, плоские волны, однородная среда, Плоская электромагнитная волна, амплитуда, Вакуум.

Characteristics of radio wave propagation in urban conditions.

In urban conditions, the propagation of radio waves has a more complex nature than on the flat surface of the Earth. The construction of the city creates a non-homogeneous environment filled with irregularly located semiconductor barriers. Therefore, not one, but several waves reflected from the surrounding buildings and obstacles and diffracted on the roof of the buildings arrive at the reception point.

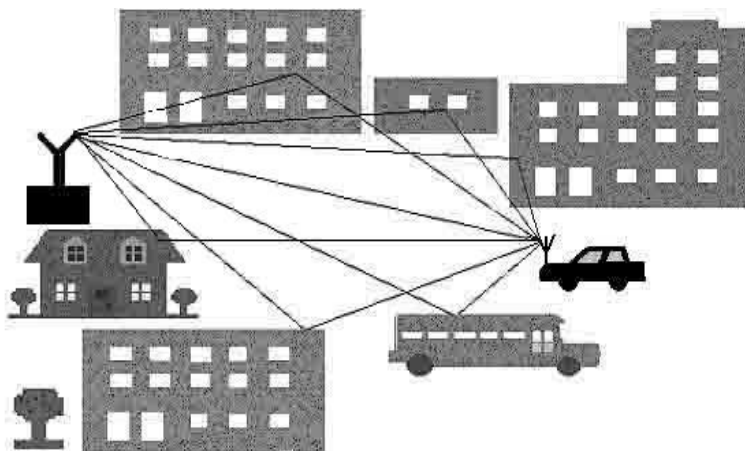


Figure 5.3. Multibeam propagation of radio waves in urban conditions

Since it is extremely difficult to determine the phases and amplitudes of these waves, the experimental data are of special interest. Because the architecture of the city has a significant effect on the nature of the propagation of radio waves.

In mobile communication systems, the propagation properties of the transmitted signals are strongly dependent on the optical scattering and radio wave scattering phenomena caused by the inhomogeneous environment. This causes a change in the field strength at the receiving point. The change of the radio signal level has the appearance of a fast level change and a slow level change based on its statistical characteristics. Gradual level changes are usually due to small changes in the topography of the propagation medium. A rapid level change occurs in the reflection of a signal from stationary and moving objects and is called multi-beam fading.

Signal propagation between base stations and mobile communication devices mainly depends on this multipath fading. In addition to the shift and superimposition of pulses during reflection, polychromaticity, level changes, it leads to "delay expansion" ("impulse expansion").

When radio waves are reflected and fall on top of each other, they create the phenomenon of multibeam scattering and depolarization, that is, the plane of polarization of the signal changes and an orthogonally polarized signal is formed.

In urban conditions, the quality of radio reception is significantly affected by industrial interference. When considering these factors, it is generally assumed that the receiving antenna of the mobile receiving facility is below roof height.

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