SYNTHESIS OF DISADVANTAGES IN THE DISTRIBUTION OF DIGITAL TELEVISION SIGNALS

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Introduction. At present, analog television has been completely discontinued in the Republic of Uzbekistan, and the transition to digital television has been gradually completed. However, the key issue remains the quality of TV signals and the need to study the processes of full coverage. Thus, this leads to the synthesis of indicators of the quality of the propagation of a digital television signal, and also analyzes the problems and solutions to increase the coverage of digital television signals in the Kashkadarya region.

Keywords. Digital television, terrain, radius of coverage, interference, noise immunity, loss of signals.

In practice, the issue of ensuring high-quality reception of TV broadcasts in the mountains is topical. After all, the level of field voltage and, accordingly, the quality of reception of television signals strongly depend on the characteristics of the relief. This should be taken into account when choosing the location of the antenna and the height of its support. [1]

The use of digital TV methods and means gives a number of advantages over analog TV data transmission methods:

- Improving the noise immunity of transmission and recording channels of a television signal;
- decrease in the power of television transmitters;
- a significant increase in the number of TV programs broadcast in one frequency band;
- Improving the quality of the image and sound on television receivers;
- Expansion of the functionality of studio equipment used in the preparation and broadcast of television programs;
- transmission of various additional data in a television signal, transformation of a television receiver into a multifunctional information system;
- creation of interactive television systems that allow the viewer to interact with the broadcast program. [2]

Taking into account the fact that the territory of the Republic of Uzbekistan has a different geographic relief, the task is to analyze the location of reliefs when transmitting terrestrial television signals. The creation of a terrestrial digital television system is a very difficult task, because the complex landscape of the city, various types of buildings, the refraction of radio waves in buildings lead to the formation of waves that reflect light, that is, to interference. In addition, on the terrain, obstacles in the form of hills, dams, railroad barriers are often encountered, behind which shadow zones are formed [2], which leads to a sharp decrease in the field strength. For example, the line-of-sight response of the field strength behind a hill or railroad barrier is shown in Figure 1.

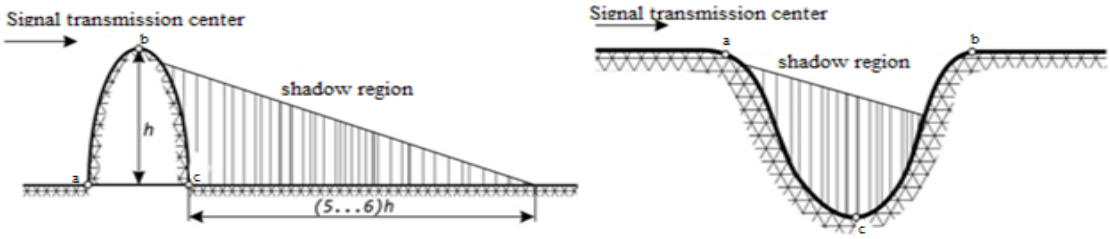

fig. 1. The formation of shadow zones (zones without a signal) from obstacles.

As the slope increases towards the center of transmission (from point a to point b), the field strength remains approximately constant or increases slightly and reaches a maximum at the top of the slope (point b). On the rear slope, the field strength is initially weak, then sharply decreases, reaching a minimum at the foot of the hill (point c). With distance from the hill, the field voltage begins to increase smoothly and reaches the same level as the lateral slope, when it reaches a distance of approximately (5 ... 6) h, where h is the height of the hill. This creates a shadow area (shadow region) behind the hill.

Thus, the electromagnetic voltage in the receiving area can constantly change even when the receiving point is directly visible, i. E. the appearance of dead zones can lead to the fact that the signal will not be received. Therefore, terrestrial digital television must meet the following requirements:

• ensuring a high level of noise immunity;

• high-quality transmission of service information, teletext and data protection from unauthorized access;

• Development of a universal standard compatible with digital satellite and cable television devices in order to reduce the cost of television receivers;

• provide signal reception using portable receivers and indoor antennas;

• ensuring the operation of a single-frequency network, etc.

In digital television channels, they cannot function normally if noise immunity is not provided properly [1]. Therefore, the reasons for the following errors can be considered:

• various natural types of interference and interference (thermal interference, generation-recombination interference of charge carriers, partial interference, etc.) They are mainly manifested in the input stages of receivers;

• industrial and atmospheric disturbances (myopia, arc discharges - in welding equipment, electric vehicles, during a thunderstorm);

• Interference is interference from radio transmitters operating at the same frequencies in adjacent areas;

• Interference from multipath radio waves can occur on the ground, in buildings, on metal surfaces, etc. returning radio waves [3].

Signal reception conditions are especially difficult in rugged and mountainous areas. Large shadow zones are usually formed behind mountains and ridges that cannot be accepted. Repetitive reflections of radio waves from mountain slopes result in repetitive signals that distort television footage.

In the practice of receiving television in mountainous conditions, an event called signal amplification due to obstacles is sometimes observed. This phenomenon is due to the fact that the field strength behind a mountain or ridge can sometimes be greater than the field transmitted by the signal through a smooth spherical surface. The reason for this phenomenon is that if the

mountain is in the shape of a dagger, then its upper part illuminates the TV signal in different directions, and at some points behind the mountain, two or more waves in phase may be added, i.e. direct wave, reappears from above and is reflected from the ground. At the point where the wave phases meet, a significant increase in the field strength occurs.

This is necessary to protect against typical errors associated with the practical use of this phenomenon. Due to the spherical nature of the Earth, the effect of signal amplification behind a mountain or ridge, as a rule, can manifest itself only at large distances, i.e. when the receiving point is in partial shade or shady areas away from the TV center. In other words, signal amplification can only be thought of in relation to a weak diffractive signal that occurs in the absence of a mountain range at the receiving point located in the penumbra or shadow zones. Therefore, one should not rely too much on the signal amplification event due to obstacles in the mountains, especially in practice when there is no signal amplification event from dagger-shaped obstacles (for example, flat and uneven hills, series of mountains at different heights, etc.).

Conclusion. The analysis of the above study shows that the scientific tasks that need to be done in this area are to determine the signal strength in the foothills and beyond the mountains and conduct research based on the results to prevent interference, to study the effects of weather on the propagation of the signal.

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