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DIGITAL RADIO SIGNALS TRANSMISSION OF DVB-T AND DVB-T2 STANDARDS BY USING TERAHERTZ FREQUENCY - BAND RADIO CHANNEL.

Drobina O.S., Avdeyenko G.L., Naritnik T.M., Naboka B.Y.
Institute of Telecommunication Systems NTUU "KPI"
E-mail: oleg.drobina.kpi@gmail.com

Передача сигналів ЦТБ стандартів DVB-T та DVB-T2 по радіорелейній лінії терагерцового діапазону

Робота відображає результати експерименту з передачі радіосигналів цифрового телебачення стандартів DVB-T та DVB-T2 через макет одноінтервальної симплексної радіорелейної лінією терагерцового діапазону хвиль. Отримані дані дозволяють зробити висновки з можливості використання наявного макету радіорелейної лінії терагерцового діапазону для якісної передачі та прийому сигналів з COFDM модуляцією.

Introduction.

Terahertz waves («T-rays») are electromagnetic waves in a frequency band of 100 – 3000 GHz. Compared to the relatively well studied and technically secured microwave, optical and X-ray, advances in research and application of terahertz radiation so far are limited and are likely to demonstration level, despite the extremely high possibility of their technical and biomedical use, for example in infrared astronomy and oncology [1].

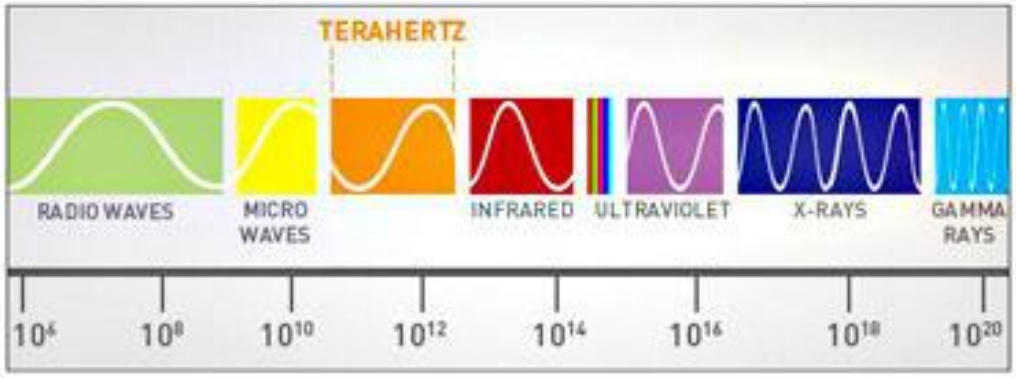

Fig.1 Place of terahertz frequency ratio in electromagnetic spectrum.

Main part.

There is a research on the demonstrative level of the possibility of transmission of signals of DVB-T and DVB-T2 standards by using radio-relay line (RRL) of terahertz frequency band (THz) in this work. Let us take a look at the principal scheme (Fig.2). It is a RRL of THz where the transmission of signal happens on the frequency of 130 GHz. At the input of transmission and the output of receiving parts, analyzers are placed for measuring of parameters of the signal that is being transmitted and the signal that is being received. Also, receiver and TV are placed on

the output for checking of the possibility of demodulation of the transmitted signal and getting of TV image and sound. The task of the experiments is in alternately transmission of DVB-T and DVB-T2 signals through the RRL and measuring of their parameters for getting practical results and rating of the usefulness of using of «T-rays» in practice.

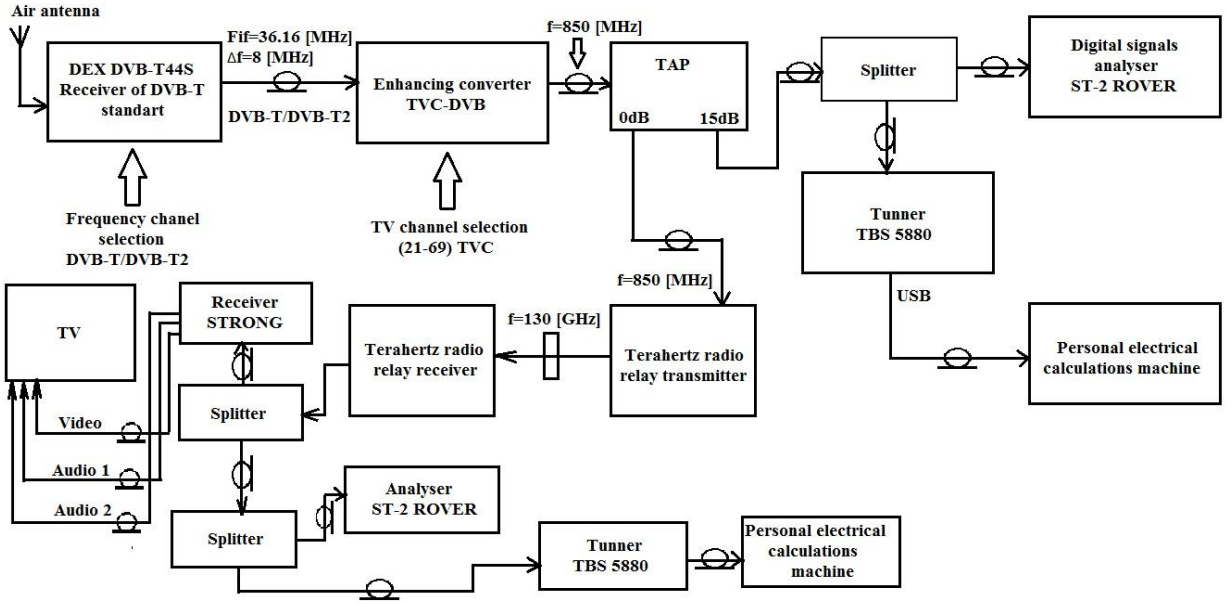

Fig.2 Principal scheme for transmission of signals of DVB-T and DVB-T2 standards through RRL of THz research

Experiment №1. Transmission of digital TV signal of DVB-T standard through RRL of THz.

The source of DVB-T signal is a digital multiplex with a frequency of 650 MHz. Signal passed the terahertz path after pretreatment and there was a high quality image on the TV receiver. The results of parameters measurements of the signal with the help of ST-2 ROVER analyzer are shown in Table 1.

Table 1. DVB-T signal research results

Digital TV transmission of signals by RRL THz research		
DVB-T		
Parameters	Input value	Output value
N.MAR [dB]	5	5
aBER	$5 * 10^{-7} - 7 * 10^{-7}$	$< 10^{-8}$
bBER	$2 * 10^{-3}$	$3 * 10^{-3}$
SNR [dB]	29	29
MER [dB]	24,6	24
PWR [dBm]	-35,8	-45,3
CARR.	8KDTB-T	8KDVB-T
QLTY	MARG	MARG

Table 2. DVB-T2 signal research results

Digital TV transmission of signals by RRL THz research		
DVB-T2		
Parameters	Input value	Output value
N.MAR [dB]	6	7
QLTY	PASS	PASS
C/N [dB]	30	31
FLAT [dB]	6	7
BER	$1 * 10^{-7}$	$1 * 10^{-7}$
MODE	QAM256	QAM256
PWR	-31,6	-41,2

Experiment №2. Transmission of digital TV signal of DVB-T2 standard through RRL of THz.

The source of DVB-T2 signal is a digital multiplex with a frequency of 514 MHz. Signal was being passed through the THz path, like in the previous experiment, and at the output of RRL of THz with the help of receiver we have got a high quality

image and sound on the TV. The data, which obtained at the input and output of RRL of THz using ST-2 ROVER emulation mode, are presented in Table 2.

Also, the received signal constellations by using TBS 5880 receiver of CrazyScan program, are presented on fig.3 – fig.6.

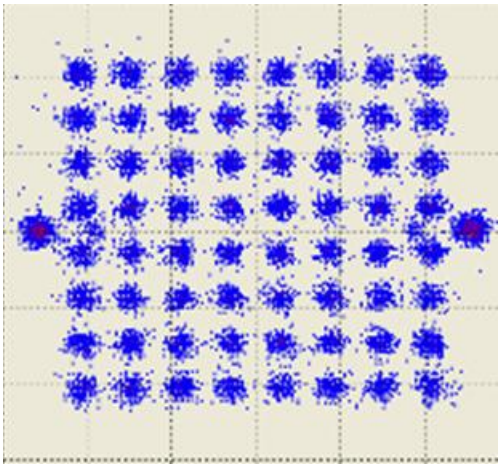

Fig.3 DVB-T signal at the input of RRL.

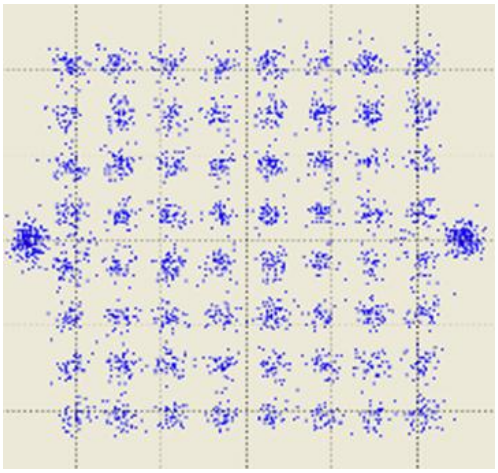

Fig.4 DVB-T signal at the output of RRL.

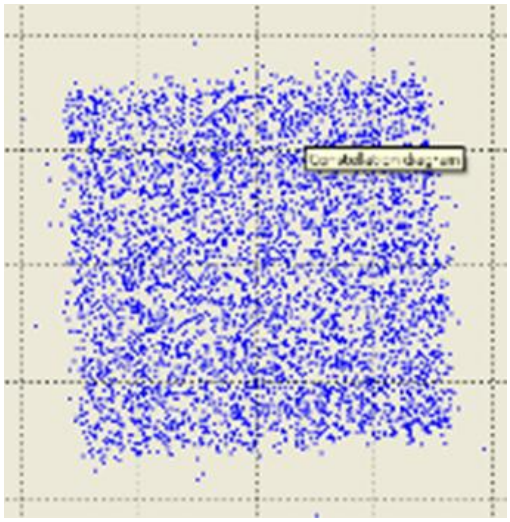

Fig.5 DVB-T2 signal at the input of RRL.

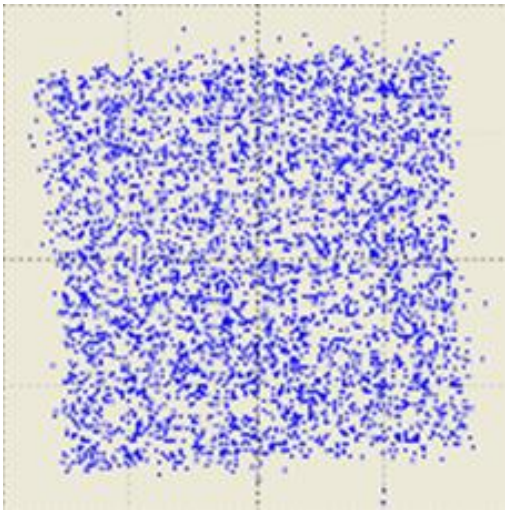

Fig.6 DVB-T2 signal at the output of RRL.

Conclusions.

So, as the results of the experiment show, high quality signals DVB-T/DVB-T2 were received with minimal distortion and low probability of error. It proves the possibility to use RRL of THz for transmission of radio-signals with COFDM modulation, which are DVB-T and DVB-T2 signals.

References

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