

The Transmission of the Information of the System of Telecommunicational DECT in the Trans-Shipping Terminal

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ABSTRACT: Introduce the concrete project of the distribution of base stations in the article and propose the architecture of the system DECT of the trans-shipping terminal. The simulation of the system of DECT which was limited only to the broadcasting track from the transmitter to receiver set was realized he walks about examining the quality of the radio broadcast between the base station, and the station movable. It was accepted as the criterion of the quality the bit error ratio (BER) during the of sending given broadcasts.

1 INTRODUCTION

Serious difficulties exist solving many questions of the theory of the telecommunicational movement analytic methods. The way of behaviour can be the signal one of examples of such problem in the broadcasting track. Presented questions can real system, his physical or simulating paternal be solved by the observation. He complies first method only in the limited range because of high costs. He often also wants to become acquainted the motive proprieties of the system being just in the bevel of projecting. You should understand the techniques of solving the problems consisting in the observation during changes drawing ahead in the dynamic paternal of the system by the simulation.

The creation of paternal brings in many advantages for the explorer of the system (Filipowicz 1996):

- checking the theoretical courts about system, accomplishment on the model of empirical observations and extraction from these actions of logical conclusions makes possible,
- the understanding of the system facilitates,
- he makes possible the opinion of the meaning of the details of the system and the relationships of boundary strip them,
- the realization of the analysis accelerates,
- he makes up the basis of the opinion of the advisability of the modification of the system,
- it is more easily before to manipulate than the system,
- the model is, in the general case, expensive the than system less.

2 SYSTEM DECT FOR SETS PARAMETERS

In the aim of designing the system of DECT for trans-shipping terminal, you should execute the suitable measurements of the field and the conditions of the propagation of waves on him and work out on their basis the project of the distribution of the station base RFP so that where the ranges of these stations cover the whole terrain the system DETC has to function (Jackowski 2005). The result of this working was introduced on Figure 2.2. Red dots mark points, where you should place base stations so that they their range cover the whole terrain. For considered earlier parameters and it was affirmed for the given configuration of objects that you should use 16 base stations. The number of the station probably underwent the change after executing specialist measurements. The ideological pattern of the proposed system was introduced on Figure 2.1.

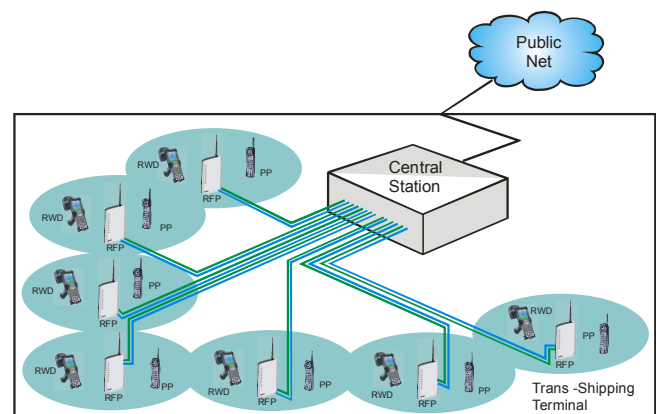


Figure 2.1. The scheme of the system of DECT (own study)

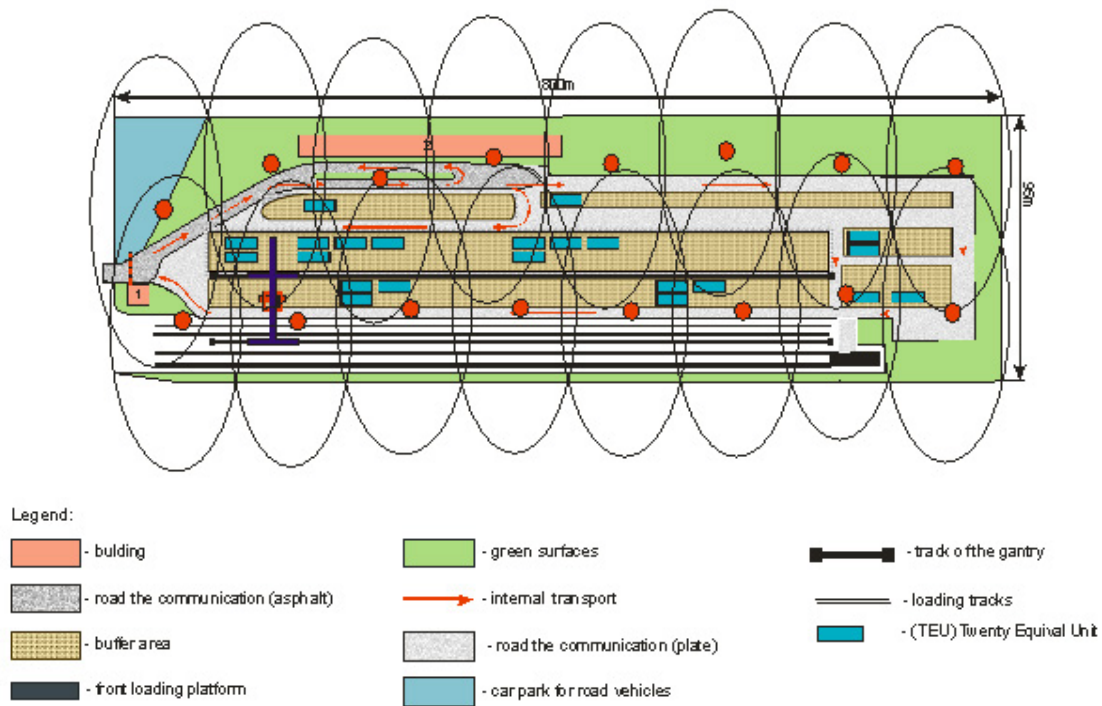


Figure. 2.2 . The plan of the distribution of base stations and their radio ranges in the trans-shipping terminal (Kuśmińska- Fijałkowska 2008)

It is the most suitable system to put earlier parameters the multicellular system of the contact radio Hicom cordless E. The system integrated of wireless contact co-operating with central stations ISDN Hicom 300 E and Hicom 300. The architecture of the system and digital broadcast leaning on the standard of DECT guarantee the free contact in buildings and their surroundings. Stations base RFP are added for the help of digital interfaces to integrated with central station modules. He possible is thanks to this projects and carries out the installation of the system of the radio, optimum contact under in relation to costs, area of range and users (PP) number (Figure 2.4). He assures apparatus Gigaset 3000 (PP) roaming between various systems and lets use the function of central station Hicom 300 / 300 E. System will make possible constructs connections and receiving developments on the whole terrain the covered radio range.



Figure. 2.4. The wireless receiver (PP)

Base stations create radio mobile phones for the needs of the wireless contact on the area trans-shipping terminal. They convert the radio signal on the signals of the interfaces of DECT and WLAN integrated with central station base ISDN 300/300 E. They can be reinforced from her or from the external source of the voltage. The location of base stations is defined after executing the measurements of the field and radio conditions and worked out on their basis of project (Figure 2.2). (Łukasik 2007)



Figure. 2.3. Base stations P-2302HWUDL-P1

Proposed device (base station) this P-2302 HWUDL-P1 (Figure 2.3), which WLAN is equipped in the interface Ethernet 10/100 Mbps, working in the standard 802.11b / g and two the port USB the enabling facility in the net of the printer or memory of the mass VIP possesses the integrated gate with the base station for the receivers of DECT (PP).

3 THE SIMULATING MODEL OF THE SYSTEM BROADCAST SIGNALS OF DIGITAL

The simulation will be conducted in the programme Matlab Symulink, he will be realized only for chosen his part. She oneself will base on examining the quality of the radio broadcast between the base station, and the movable station (PP).

The bit error ratio was accepted as the criterion of the quality during the of sending given broadcasts (Wesołowski 2003) The simulation will be conducted for three variants:

- 1 The movable station is inside the building.
- 2 The movable station is beyond the building and moves with the maximum speed even 5 km / h.
- 3 The movable station is the building outside and moves with the average speed even 20 km / h.

The pattern of the measuring arrangement of the bit error ratio (BER) for the chosen part of the system was introduced on Figure 3. 1. He will look for the various variants of the simulation, only parameters of the radio track will change. The effect Doppler will not be taken into account in first case, and only hums introduced through channel and phenomenon multiways of the signal. The phenomenon Doppler was considered in the next case for the set speed. These alone phenomena will be considered in the last case, what in second case with this, that the phenomenon Doppler will play the significant part.

He is on the entry of the arrangement passed the random binary draught from the generator Bernoulli. Probability of the pronouncement 0 and 1 carries out 0,5.

The draught crosses from the generator to the encoder the channel, which complies to improve or, what the least affirm of the existence of mistakes in the binary sequence. Informative bits are replenished about certain quantity of suitably well-chosen additional bits 2 chosen informative bits beaten these are the sum the modulo. Algebraical dependences come into being among bits in the sequence in such way so that the error of some lets on reproducing the original sequence been useful from them in this way. The signal is steered to the modulator GMSK then. The modulator is the arrangement generates the signal modulate, whose parameters such as the frequency, amplitude and bevel are the function passed on his entry of the binary draught. Thanks to what the signal carrying information binary is placed in the proper strand of the frequency and has the shaped spectrum suitably. The radio signal after passing through the channel grinds in to the receiver set which consists of these alone blocks what the transmitter, but every block realizes the opposite function than in the transmitter. The block „Rician Fading Channel” was applied for first case of the simulation in the radio channel. White gaussian noise adds block this the hum to the entrance signal and the multiways of the signal takes into account. One can skip the phenomenon Doppler in the building.

The small frequency Doppler was considered in second piece of the simulation in the radio channel. Simulating arrangement for third case differs from second these that the maximum shift Doppler carries out 35 Hz (for the of the station of the movable-cart jacks even speed 20 km/h), it carried out approx. 7 Hz in the previous case where.

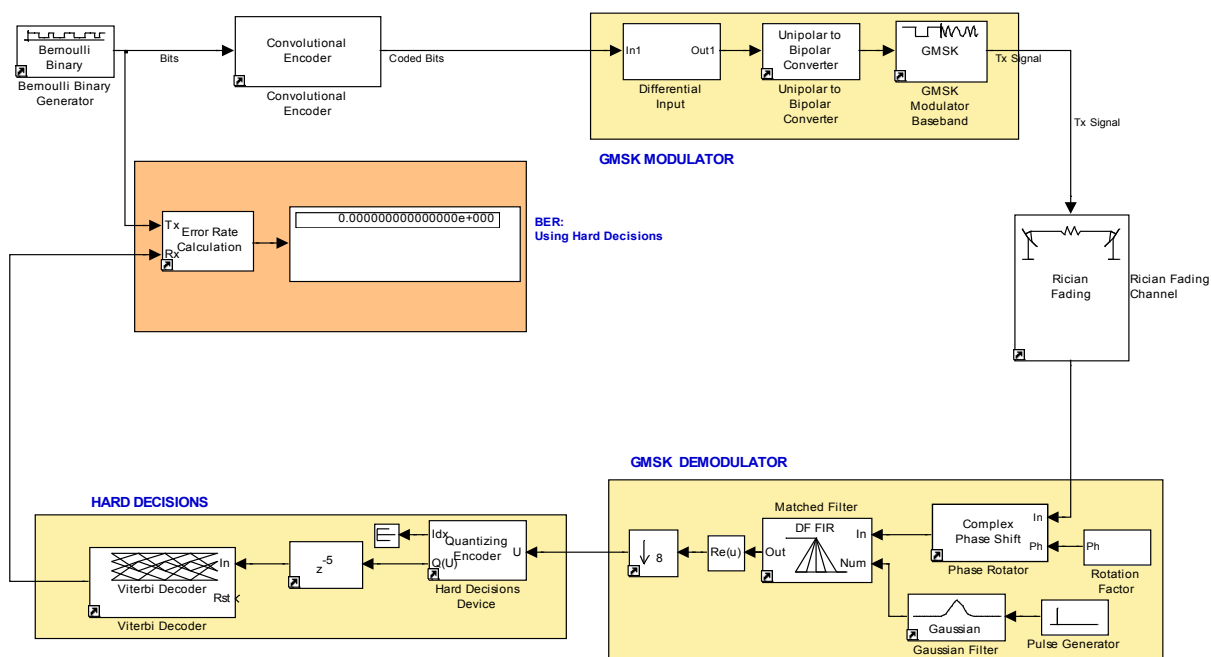


Figure. 3.1. The pattern of arrangement to the measurement of the bit error ratio (own study)

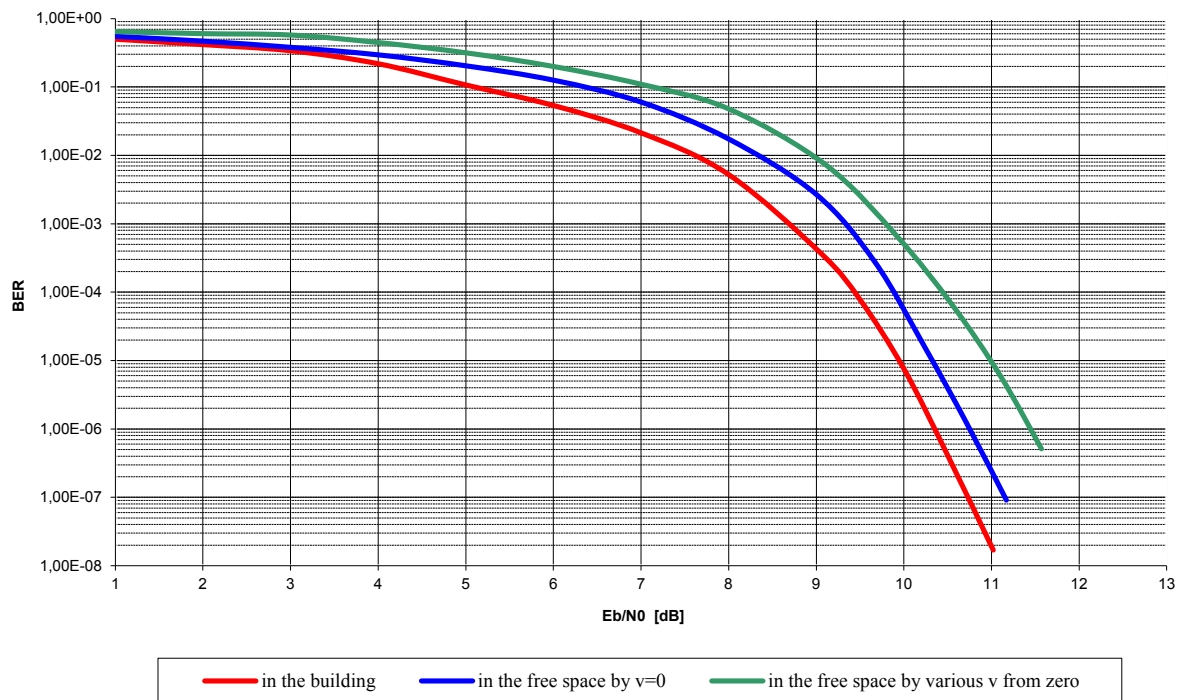


Figure 3.2. Dependence BER in the function E_b / N_0

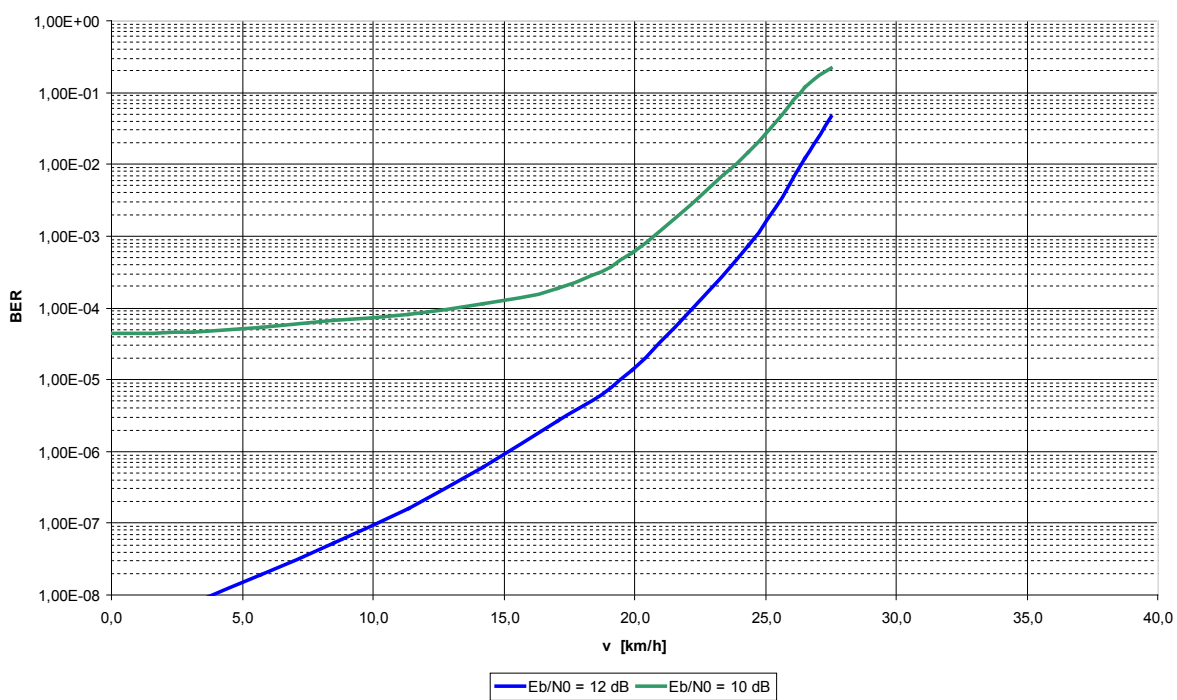


Figure 3.3. Dependence BER in the function of the speed of the movable station

3.1 Got results

Changing the values E_b / N_0 was noted down the value of the bit error ratio. She was different for various E_b / N_0 . Dependences what were got it was introduced on Figure 3. 2.

The next stage of the simulation is the measurement of the bit error ratio in dependence from the speed of the mobile station. This was realized changing the frequency Doppler which answers the value of the speed near the solid value E_b / N_0 . Enumerated speeds were introduced in Table 3. 1. for the chosen frequencies Doppler which was used during the simulation.

Table 3.1. The counted values of the speed for chosen frequencies Doppler

Frequencies Doppler [Hz]	Speed [km/h]
0	0,0
5	3,1
10	5,7
15	8,5
20	11,4
25	14,2
30	17,1
35	19,9
43	24,4
47	26,5
48	27,5
60	34,1

4 CONCLUSIONS

Could was the system of the wireless contact leaning on this standard design, the hypothetic plan of the distribution of objects was created on the terrain trans-shipping terminal. It was considered in the structure terminal that the system of the exchange of information (DECT) should function inside objects, in the free space (the article pt. „Propagation FEM on areas about the folded architectural structure the trans-shipping terminal,,) and during subscribers movement mechanical vehicles (Gate Gantry, Sisu). Wanting approach to the distribution of base stations on the introduced plan trans-shipping terminal analyze propagation FEM and qualify the ranges of base stations inside objects how and on the free space. Introduce the concrete project of the distribution of base stations after qualifying maximum ranges and propose the architecture of the system of DECT in the trans-shipping terminal. The aim of the verification of the correctness of functioning of the proposed system of DECT, the realized simulation was introduced in the programme Matlab Simulink.

In first variant of the simulation changing the values E_b / N_0 was noted down the value of the bit error ratio. She was different for various E_b / N_0 . De-

pendences what were got they are introduced on Figure 3.2. According to the recommendations of the standard of DECT the bit error ratio, for $E_b / N_0 = 10$ dB, he should carry out 10^{-5} , and the sill timber of the receipt finds oneself in $BER = 10^{-3}$ (Kuśmińska-Fijałkowska 2008). As one can read value this from Figure 3.3. for conditions in the building he carries out approx. 10^{-5} and together with the growth E_b / N_0 diminishes quickly. However for second case, i.e. on the open space, the value of the bit error ratio grew up considerably and carries out for 10 dB 10^{-4} . This caused these is, that the distance of between the transmitter, and he is the receiver set considerably larger than in buildings and the worsened quality of the receipt of the data becomes. Third value of the bit error ratio was in the variant approx. 10^{-3} . Value this in the comparison from previous he is considerably worse, but he still is comprises in the foundations of the standard. The result which was got was caused these, that she was considered the maximum frequency Doppler, which as you can see, the quality of the broadcast worsened considerably. It is also with the phenomenon Doppler connected the maximum speed of movable stations in the system of DECT.

One can find in the foundations of the standard of DECT, that the maximum speed of movable stations should not cross 20 km/h (Jackowski 2005). This caused these is, that for such fluxation he which offers DECT, shift larger Doppler than 35 Hz cause that the bit error ratio is not to the party by the standard and is comprises not in the sill timber of detection. max the speed of movable stations carries out 10 km / h in the case terminal. On Figure 3. 3. was introduced. the dependence of the bit error ratio in the of the speed of the station movable function. The simulation was conducted for two values $E_b / N_0 = \text{const}$. In first case the value E_b / N_0 accept even 12 dB. As one can notice the bit error ratio even 10^{-3} on Figure 3. 3. it was got for the speed carrying out almost 25 km/h. He is caused this, that the relation of energy falling on the single bit to the spectral thickness of the power of the white hum additive he is enough large and can thanks to this get the larger speed $E_b / N_0 = 10$ dB was accepted in case second. As one can notice the bit error ratio is considerably worse in comparing with the previous profile for every speed. For BER carrying out 10^{-3} , the speed of the station of movable carries out approx. 20 km/h. it would be the One from the ways of the enlargement of the maximum speed e.g. decrease of the fluxation of the system, like e.g. the enlargement of E_b / N_0 . However one can not do this, because standard this was created for the assurance of the contact inside buildings, and not for movable stations moving with large speeds.

Results what were received, they could insignificant changes undergo near the investigation of the

real system. This would be caused these that only several phenomena what had taken into account during the simulation they draw ahead in real radio tracks. The received results of measurements fulfil the standards of the standard of DECT, he infers from here that the designed earlier system of the contact will work according to foundations:

- he will assure the continuous understanding contact on the area of the dislocation terminal;
- he will make possible the realization of the digital summary contact of the short packets of information from the any object being on the terrain terminal;
- the sharp the tuning two-way socket will assure with external users both understanding as and in the figure of short telegrams, from the any external system;
- the information will be exchanged in the system of the contact protected before the access to her persons unentitled.

System DETC in the trans-shipping terminal will bring workers full mobility through shortening the time of the reaction, raise efficiency simultaneously, reduce costs and enlarging receipts trans-shipping terminal.

LITERATURE

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