

# **MODERN TECHNOLOGIES USED FOR SECURE DATA COMMUNICATIONS**

## **SUMMARY**

Teză destinată obținerii  
titlului științific de doctor inginer  
la  
Universitatea „Politehnica” din Timișoara  
în domeniul INGINERIE ELECTRONICĂ ȘI  
TELECOMUNICAȚII  
de către

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## **SUMMARY**

The PhD thesis was developed during teaching and research activities of the Department of Communications Faculty of Electronics and Telecommunications, University "Politehnica" of Timisoara.

The PhD Thesis is dedicated to a field of great interest and significant development in recent years: modern technology used for secure data communications. It pays special attention to security technologies and methods that directly or indirectly improve the security of data communications.

The PhD thesis presents a series of critical studies on the current state of security. Data and applications security is a topic of great interest today.

The PhD Thesis combines theoretical and methodological research with the practice, providing a mechanism capable of being used in the data security using alternative technologies and modern methods for data protection based on bioinformatics.

The thesis consists of an important theoretical signification development of the new encryption methods and algorithms using bioinformatics with a higher degree of security and reliability in the encryption systems.

Technologies addressed, appropriate applications and interpretation of results are presented throughout the thesis.

## **Keywords**

Security of data transmission, JCE, Cryptography, cryptographic key public / private, PKI, DNA, human genome, evolutionary models, bioinformatics

## **Content**

The thesis is organized into nine main chapters last of which is dedicated to conclusions and personal contributions, followed by a bibliography, and related scientific work containing some of the practical results obtained, two articles and a book chapter representative to the PhD thesis, published in March in 2012.

The PhD thesis expands on page 180, in which the theoretical considerations, experimental results, conclusions and contributions of the PhD thesis are presented, including 55 figures, tables, a list of notations and acronyms, significantly related to present concepts and results. 113 references are cited, including relevant specialized articles and books in the field.

Chapter 1, make an overview of recent research presenting the motivation and challenges of the author, placed in the context of the main research directions of theoretical and applied research conducted to date in this field. General considerations are presented on the theme, the main contributions and sentence structure.

Chapter 2, addresses the issues of data security and cryptography. Presents key points of information security, communications and networks.

Chapter 3, presents the concepts related to encryption and DNA steganography. Describes the most important aspect of data communications-security which is a basic building block for data security.

Chapter 4, describes the Data Security using a Java Security Model, The chapter presents the Key Management: the way in which keys are stored, transmitted, and shared

Chapter 5, is devoted to cell biology and structure of DNA, also dealing with DNA engineering and bioinformatics in the context of data encryption.

Chapter 6, is devoted to alternative security models. DNA memories are presented in terms of hardware allowing the definition of structures that allow massive data storage and processing, including encryption in DNA. The model presents DNA encryption DNA and biological principles.

Chapter 7, a description of the basic contributions, evidenced by the development of a security provider using human DNA.

Chapter 8, presents the practical results obtained in alternative security mechanism based on DNA.

Chapter 9, is devoted to conclusions, personal contributions and perspectives. Besides the main results is an outlook on future research directions, given the new technologies based on the human genome.

Bibliography is then introduced and used at the end of the PhD thesis.

There are also referenced in the field, published pappers in national, international journals and conferences.