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C O N T E N T S

SSH keys exchange protocol using identity based encryption

Nikolay Krastanov

This paper presents a protocol for exchanging SSH keys based on Identity Based Encryption (IBE). This type of encryption is used as an alternative to traditional cryptosystems. Its first practical solution is discussed in details (mathematical problems, algorithms, etc.). Traditional cryptoscehemes and IBE are compared. A modification of Boneh-Franklin scheme is proposed. Implementation aspects are discussed. Also an analysis of protocols for secure remote access is made. Along with IBE, Domain Name System (DNS) is the other key part which the key exchange protocol relies on. DNS is presented as a replacement of Public Key Infrastructure (PKI). As DNS is widely deployed, it can be used as a much cheaper alternative (with some limitations) to PKI, moreover DNS has such mechanisms. DNS extension DNSSEC is explained and its security mechanisms are discussed.

Протокол SSH за обмяна на ключове чрез използване на криптиране, базирано на идентичност (Николай Кръстанов). *Статията представя протокол за обмяна на SSH ключове чрез използване на криптиране базирано на идентичност (IBE). Този вид критпиране е използван като алтернатива на традиционните крипто системи. Първата негова практическа реализация е дискутирана в детайли (математически проблеми, алгоритми и т.н.). Направено е сравнение между традиционните крипто системи и IBE. Предложена е модификация на схемата на Боне-Франклин. Дискутирани са аспекти на реализацията. Заедно с IBE, Domain Name System (DNS) е друг ключов компонент от предложения протокол. Представена е замяната на PKI (Public Key Infrastructure) с DNS, тъй като DNS разполага с подобни механизми. Разширението на DNS, DNSSEC е обяснено, дискутирани са и неговите механизми за сигурност.*

1. Introduction

Security is a major concern in Internet Protocol (IP) communications. Secure remote access becomes more important with the pervasive deployment of Internet of Things applications. When accessing IP-ready smart objects at home from a remote site, secure remote login is required for either a mobile user or service provider [1], [2], [3].

The research on secure remote access protocols studies different implementation and performance aspects. The Secure Shell (SSH) protocol is one of the most popular cryptographic protocols used for IP communications. SSH uses the standard algorithms, and any user normally can use these algorithms which is being specified by the SSH protocol. In [4], the authors examine design and implementation issues of a mobile SSH protocol. The idea behind [5] is to allow the users to specify their own encryption techniques in the SSH protocol, which is not known to others, and thus to improve their security and also from hackers breaking the code. In [6], the authors introduce a method for using SSH over the Stream Control Transmission Protocol (SCTP), and examine benefits of this adaptation, which can be made available to generic applications with SSH's connection forwarding without further changes. In [7], a two-phased method for classifying SSH tunneled application flows in real time is proposed. The main goal of [8] is to show that packet sniffing in HTTP based wireless communications can be avoided by 'SSH tunneling' which can actually be a good defensive mechanism against the packet sniffing attacks and can also make the communication over wireless networks secured. In [9], the authors

Energy efficiency of IEEE 802.11 WLANs with adaptive modulation schemes

Kiril M. Kassev

Energy efficiency of wireless communication systems has recently drawn rising attention due to their widespread deployment. Wireless local area networks (WLANs) are an attractive choice for a broadband wireless connectivity to the global communication infrastructure. Despite their advantages, a traditional WLAN consumes significant amount of power to contend with the shared wireless medium. This article aims at presenting an analytical model for energy efficiency investigation of IEEE 802.11 with a distributed coordinated function access method. The model adopts adaptive modulation schemes at the physical layer in order to guarantee the packet error rate upper-bound. The wireless channel dynamic is taken into account. Furthermore, the average packet error rate and spectral efficiency for transmissions over Nakagami-m fading channels are evaluated. The effects of the packet size, average signal-to-noise ratio and number of contending nodes on the energy efficiency are presented. Numerical results reveal the benefits of employing adaptive modulation schemes on the system's energy efficiency.

Енергийна ефективност на IEEE 802.11-базирани безжични локални мрежи, използващи схеми за адаптивна модулация (Кирил Късев). *Развитието и широкото внедряване на безжични комуникационни системи поставя въпроса за оценка на енергийна им ефективност. Безжичните локални мрежи са предпочитано решение за широколентов достъп до глобалната комуникационна инфраструктура. Наред със своите преимущества технологията се характеризира с някои слабости по отношение на енергийната им ефективност. Статията има за цел да представи аналитичен модел за оценка на енергийната ефективност на IEEE 802.11-базирани мрежи, използващи разпределена координационна функция (DCF). Моделът отчита въвеждане на схеми за адаптивна модулация на физическо ниво и оценява динамиката на безжичния канал за връзка. Изследвано е влиянието на размера на пакетите, броят конкуриращи се възли и параметрите на канала върху енергийната ефективност на системата. Представените резултати демонстрират ползите от въвеждане на схеми за адаптивна модулация върху енергийната ефективност.*

Introduction

The IEEE 802.11 standard for wireless local area networks is widely deployed due to its capabilities in providing high data rates for users within short-range communication links. Nowadays many different types of both fixed and mobile devices (e.g., smart phones, tablets, laptops, media/game players, set-top boxes, etc.) are equipped with a WLAN interface for broadband wireless access to a rich variety of telecommunication services. The standard defines two access methods, known as Distributed Coordinated Function (DCF) and Point Coordination Function (PCF). The DCF is widely implemented in most commercial devices today. The wireless medium access is contention based using Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) protocol. It can run in both infrastructure and ad-hoc modes. On the other hand, PCF is an optional polling-based access method, which can guarantee some degree of Quality of Service (QoS). Despite of that this access method has a limited application in commercial WLAN interfaces [1], [2].

The technologies behind the IEEE 802.11 set of standards have been developed over the years following the huge bandwidth demands. Thus, a significant amount of research has been carried out mainly on the MAC protocols performance analysis of IEEE 802.11-based WLANs. Various analytical and simulation models have been proposed for the throughput [3], [4] and delay analysis [5] as well as for investigations on certain security issues [6]. The most common feature of the above mentioned models is the absence of transmission (frame) errors introduced by the wireless channel.

Power supply circuits for mobile wireless applications

Tihomir S. Brusev

Wireless battery-powered portable electronic devices give opportunity to the people to have faster communication with each other. The increased functionality of mobile phones enables large data packages to be transmitted in the real time. Decreasing of power losses in the electronic building blocks of the transmitter will increase the battery life and system run-time. Power amplifier (PA) is the most energy consuming block. In this paper are considered various power supply circuit architectures suitable for portable electronic devices. Buck dc-dc converter using Pulse-Width Modulation (PWM) designed on CMOS 0.35 µm process is presented. The power losses in the output switching transistors, filter inductor and filter capacitor and evaluated. The efficiency performance of the converter as function of switching frequency f_s and inductor current ripple Δi_L is investigated. The received results show that maximum efficiency can be achieved if Δi_L is twice higher than average output current of the dc-dc converter. Switching-mode dc-dc converters are discussed in terms of applications in the fourth generation Long-Term Evolution (4G LTE) wireless communications standard. Two-phase interleaved buck dc-dc converter is designed on CMOS 0.35 µm technology. The effect of decreased output current ripple compare to single-phase buck dc-dc converter is demonstrated. The received results demonstrate that two-phase dc-dc converters are appropriate choice for LTE applications, when a high frequency envelope signal has to be tracked.

Захранващи схеми за мобилни безжични приложения (Тихомир Брусев). *Преносимите безжични устройства захранвани от батерия дават възможност за по-бърза комуникация между хората. Увеличените функционални способности на мобилните телефони позволяват предаване на големи пакети от данни в реално време. Намаляването на загубите на мощност в изграждащите електронни блокове води до увеличаване на живота на батерията. Мощният усилвател е най-енергоемкия блок в предавателя. В тази статия са разгледани различни захранващи схеми подходящи за преносими електронни устройства. Представена е схема на преобразувател на постоянно напрежение в постоянно (ППН), управляван с широчинно-импулсната модулация (ШИМ), проектирана на CMOS 0.35 µm технология. Изследвани са загубите на мощност в изходните транзистори, филтриращите бобина L и кондензатор C, както и влиянието на честотата на превключване f_s, и амплитудата на променливата съставка на тока протичащ през бобината Δi_L върху коефициента на полезно действие к.п.д. на преобразувателя. Проектиран е двуфазен преобразувател на ППН на CMOS 0.35 µm технология. Демонстриран е ефектът на намаляване на амплитудата на променливата съставка на изходния ток при двуфазния преобразувател, в сравнение с еднофазния. Получените резултати представени в статията показват, че двуфазния преобразувател на ППН е подходящ за LTE приложения.*

Introduction

The rapid development of the telecommunication and the microelectronics technologies in the last twenty years changes substantially the human life. The sizes of the integrated circuits (IC) scale in the range of nanometers [1], [2], [3]. Therefore, large number of transistors could be integrated in the small silicon area, which allows the operation frequencies of the building electronic blocks to be in the range of several GHz [4]. On the other hand increasing of the number of transistor per unit area and frequency of operation of the electronic building blocks leads to increased power consumption of the integrated electronic circuits [5]. Battery-powered portable electronic devices with small sizes and volumes become very popular in the market. The mobile telecommunication devices have developed rapidly. In the nineties and in the beginning of the new century, only voice and text messages could be transferred. Today, except those opportunities, the mobile phones

Investigation of intrusion detection and intrusion prevention systems in eHealth hospital network

Maria V. Nenova

The fast growth of the requirements in the eHealth area leads to the problem of protection of personal data and the need of secure transmission via communication channels. The investigated and proposed in the paper solution may be used in a healthcare facility's corporate network where the patient sensor network is expected to send to the processing units the required in the fewest possible number of data packages, using just one of its sensor to make a connection. Another fact to be considered is that package size must be optimal so as not to incur a loss of large and significant information. The solutions proposed may be used for intrusion protection of networks, whose units must receive as little load as possible from the software products used and from the communication process. This is mostly required for units, whose task is to process or store a large volume of diverse information at the same time, as well as for units, whose task is to process and visualize information by using specialized software products.

Изследване на система за детекция и предотвратяване на интрузии в мрежа за електронно здравеопазване (Мария В. Ненова). *Непрекъснатото увеличаване на изискванията в областта на електронното здравеопазване води до проблема за защита на личните данни, както и необходимостта от сигурното им предаване по канала за връзка. Изследваното и предложено в доклада решение може да се използва в глобалната здравна мрежа, където се очаква, че сензорът на пациента изпраща на обработващите елементи, възможно най-малко на брой пакети от данни, като се използва само един сензор, за да се осъществи връзка. Друг факт, на който е необходимо да се обърне внимание е размера на пакета, който да е оптимален, така че да няма големи загуби на важна информация. Предложените решения могат да се използват за защита от проникване в мрежата, чиито елементи е необходимо да имат минимално натоварване, както от софтуерните продукти, така и от самия процес на комуникация. Това е необходимо, най-вече за устройства, чиято задача е да обработва или съхранява голям обем разнообразна информация по едно и също време. Това е в сила и за устройства, чиято цел е да обработва и визуализира информация чрез използване на специализирани софтуерни продукти.*

Introduction

The term e-Health entered popular use in late 1999 [1]. It brings together public healthcare, medical informatics, healthcare service provision and information by using state-of-the-art information and communication technology.

The purpose of e-Health is to solve to underlying yet fundamentally different issues. Most countries are facing the dilemma of how to maintain high level of healthcare vis-à-vis price increases in the healthcare services and specialized healthcare facilities. At the same time the underpopulated areas of developing countries suffer from abnormally high patient-physician ration, which stands at 1 500:1 for Latin America and South Asia, 5 000:1 for Northeast Asia, and 20 000:1 for Central Africa [2]. Both issues are solved by the introduction of e-Health.

For most countries, setting up an electronic health platform is an important step towards provision of more efficient and better quality healthcare services going forward. However, implementation of e-Health also needs appropriate software protections to ensure data security for patients and stakeholder institutions.

The focus herein is on this particular issue, namely protection against attacks (intrusions) on the corporate network of any healthcare facility taking part in e-health.

The main objective is to propose, following

Algorithms for carrier frequency recovery in DVB−S2 receivers

Lyubomir B. Laskov, Lidia T. Jordanova

In this paper six algorithm for carrier frequency recovery are examined, namely D&M, L&R, Fitz, M&M, Modified M&M and Kay. A mathematical description of algorithms and expressions for determining the frequency estimation depending on number of pilot symbols, delay, number of auto-correlators, number of summations of auto-correlations and number of data symbols between two pilot sequences are given. Parametric analysis of algorithms used in DVB-S2 has been performed, as well as optimization of their parameters. A comparative analysis of the studied algorithms for carrier frequency recovery in terms of magnitude of the frequency error and the number of mathematical operations required for the carrier frequency recovery is done.

Алгоритми за възстановяване на честотата на носещото трептение в DVB−S2 приемници (Любомир Б. Ласков, Лидия Т. Йорданова). *В статията са разгледани шест алгоритъма за възстановяване на честотата на носещото трептение, а именно D&M, L&R, Fitz, M&M, Модифициран M&M и Kay. Дадено е математическо описание на алгоритмите и изрази за определяне на честотната оценка във зависимост от броят на пилотните символи, закъснението, броя на използваните автокорелатори, броя на пилотните последователности върху които се извършва сумиране и броя на информационните символи между две пилотни последователности Извършен е параметричен анализ на наложилите се в DVB-S2 алгоритми, както и оптимизация на техните параметри. Направен е сравнителен анализ на изследваните алгоритми за възстановяване на честотата на носещото трептение по отношение на големината на честотната грешка и броя на математическите операции необходими за възстановяване на носещото трептение.*

Introduction

One of the main problems of digital satellite television receivers is carrier frequency and phase recovery, which is required of the process of demodulation. The reason for this is the fact that the DVB-S2 receiver should operate at very low SNRs and consumer-type DVB-S2 receivers typically use low cost oscillators, which introduce a large initial carrier frequency offset (e.g., 5MHz at 27.5 Mbaud) [1]. An additional problem occurs when operating in Adaptive Coding and Modulation (ACM) mode in which modulation can change at any package.

Numbers of fast-converging methods for solution of this problem have been presented in the literature, most of which are intended for application with linearly modulated, burst-mode signals transmitted over the Additive White Gaussian Noise (AWGN) channel. Depending on whether it is necessary to add extra information, they are divided into data aided (DA) and non data aided (NDA) algorithms. In the second case (NDA) it is possible to use the same algorithms as in the first (DA) case, provided that the received PSK signal is first operated on by a suitable nonlinear function that would make it independent of the symbol sequence [2].

Depending on whether the algorithm operates with a feedback or with feedforward, they are divided into two types: open loop (feed-forward) and closed loop (feed-back). The advantage of the first type of methods is more accurately determining the frequency and smaller dependence on intersymbol interference (ISI). Its disadvantage is the requirement of a larger number of periods of the carrier, required to ensure the needed accuracy of carrier frequency recovery [2].

The aim of this paper is to study the effectiveness of the algorithms for carrier frequency recovery in the digital satellite television receivers from second generation (working under the standard DVB-S2), and to make a comparative analysis of the recommended in the standard, and other suitable for this purpose algorithms.

A model of a single-phase synchronous generator with rare earth magnets

Nikola Georgiev

A model of a single-phase synchronous generator with rare earth magnets (Nikola Georgiev). *This paper makes a study of a single-phase synchronous 16-pole generator with axial magnetic field and rare earth magnets. A model of the synchronous generator has first been developed, taking into consideration its geometric dimensions, the materials it is made of, as well as the parameters of the windings and of its rare earth magnets. By means of the developed model, the voltages at idle running have been calculated for the case of connecting both of its sections in parallel. Replacement schemes of the generator for the modes of idle running and active load have been worked out. By means of them the output electrical parameters (voltage, current and power) of the 16-pole generator have been calculated. Experimental studies of the output electrical parameters of the real single-phase generator under the modes of idle running and active load have been conducted. The basic output characteristics, obtained from the model, have been compared to those, from the experiments.*

Модел на монофазен синхронен генератор с редкоземни магнити (Никола Георгиев). *Изследва се монофазен синхронен шестнадесет полюсен генератор с аксиално магнитно поле и редкоземни магнити. Първоначално е получен модел на синхронния генератор, в който са отчетени геометричните му размери, материалите, от които е изработен, както и параметрите на намотките и редкоземните му магнити. С помощта на получеият модел са изчислени напреженията на празен ход, при включени двете му секции в паралел. Съставени са заместващи схеми на генератора за режимите на празен ход и при активен товар. С тяхна помощ са изчислени изходните електрически параметри – напрежение, ток и мощност, на шестнадесетполюсния генератор. Направени са експериментални изследвания на изходните електрически параметри на разглеждания монофазен генератор в режими на празен ход и при активен товар. Сравнени са основните изходни характеристики, получени от модела с тези от извършените експериментални измервания.*

Introduction

The generators with permanent magnets and axial magnetic field are with a simple and reliable construction and high power per unit of weight. Their other advantages are the absence of excitation winding and current, which leads to high efficiency in operation. Additional improvement of their characteristics is achieved by using high power permanent magnets, such as the rare earth magnets NdFeB [1].

Initially, the generators with rare earth magnets and axial magnetic field were unilateral with one rotor and one stator. Then bilateral generators with one rotor and two stators or with two rotors and one stator appeared [2].

A model of a unilateral generator is considered in [3], while [4] discusses a bilateral generator with two rotors and one stator, where the total stator magnetic flux is calculated by means of the theorem of Stokes. In [5], again, a single-phase generator is examined, which is bilateral with two rotors and one stator, and the flux linkage is calculated by the finite element method, and then the r.m.s. value of the phase electromotive voltage is calculated. Similar are the models in [6], where the magnetic flux and the instantaneous value of the electromotive voltage are calculated, as well as in [7], where the r.m.s. value of the stator electromotive voltage is defined.

A low power single-phase synchronous 16-pole generator with axial magnetic field and rare earth magnets, composed of one rotor and two stators, has been modeled and studied in this paper.

Exposition

The paper presents the mathematical model of the considered synchronous 16-pole generator.

Performance evaluation of Internet traffic by network measurements

Georgi P. Georgiev

A review of the main methods for measurement Internet traffic is made. Some of software platforms for network measurements are discussed. The reasons for the need of measurement and monitoring of traffic in IP-based networks are: optimization and network planning, quality assurance of services and detect security breaches. Internet traffic is heterogeneous and highly bursty. The trial network is a LAN, and serves two households. A measurement of the load on the network for a certain period with different reporting intervals is made. The change of network traffic also has been measured. It has been done a distribution by application layer protocols and by size of the packets. It is confirmed that the traffic is heterogeneous and highly bursty. The main protocols are UDP, from which we can conclude that the network is mainly used for transmission of multimedia. It is measured the size of the transmitted packets and it is found that the quantity of useful information transmitted is equal to the quantity of transmitted service information. Through software approximation is made relating to the size of the package. With the expansion of modern IP-based networks, monitoring and measurement of traffic on them are becoming increasingly necessary.

Оценка на характеристиките на трафика в интернет мрежата чрез измервания (Георги Георгиев). *Направен е преглед на основните методи за измерване на трафика в Интернет. Разгледани са някои от софтуерните платформи за мрежови измервания. Причините за необходимостта от измервания и мониторинг на трафика в IP базираните мрежи са: оптимизация и планиране на мрежата, осигуряване на качество на услугите и откриване на пробиви в сигурността. Трафикът в Интернет е хетерогенен и силно неравномерен. Изследваната мрежа е локална и служи за нуждите на две домакинства. Направено е измерване на натоварването на мрежата за определен период от време с различни интервали на отчитане. Измерена е и промяната на трафика в мрежата. Направена е разбивка по протоколи на приложно ниво и разбивка по големина на пакетите. Потвърди се, че трафикът е хетерогенен и силно неравномерен. Използваните протоколи са основно UDP, от което може да се заключи, че мрежата се използва основно за предаване на мултимедия. Измерена е големината на предаваните пакети и е установено, че количеството на предаваната полезна информация е равен на количеството на предаваната служебна информация. С разрастването на съвременните IP базирани мрежи, мониторингът и измерванията на трафика върху тях стават все по- необходими.*

I. Introduction

Network monitoring approaches have been proposed and developed throughout the years, each of them serving a different purpose. They can generally be classified into two categories: active and passive. Active approaches, such as implemented by tools like Ping and Trace route, inject traffic into a network to perform different types of measurements. Passive approaches observe existing traffic as it passes by a measurement point and therefore observe traffic generated by users. One passive monitoring approach is packet capture. This method generally provides most insight into the network traffic, as complete packets can be captured and further analyzed. However, in high-speed networks with line rates of up to 100 Gbps, packet capture requires expensive hardware and substantial infrastructure for storage and analysis [3].

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National Science and Technical Centre,
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TELECOM is an annual national scientific-technical conference with foreign participation covering a wide range of issues in the area of state-of-the-art communication systems and networks - from the latest technical achievements to their successful practical implementation. The aim of the Conference is to create conditions, opportunities and a media for the specialists in different fields of telecommunications to exchange ideas, knowledge and experience. The discussions will hopefully contribute to the generation of new ideas and trends of development of Bulgarian telecommunications.

EXHIBITION

During the Conference an exhibition is organized, presenting the latest technical news and developments in the field of telecommunications (software, technologies, services, etc.). Applications for participation can be made by filling Form B by September 29, 2015.

MAIN TOPICS

1. **ELECTRONIC COMMUNICATIONS, POLICIES AND REGULATIONS.**
2. **NGN. FUTURE NETWORKS. SOFTWARE DEFINED NETWORKS.**
3. **INTERNET OF THINGS AND INTERNET OF PEOPLE.**
4. **ELECTRONIC CONTROL: E-GOVERNMENT, INTEROPERABILITY, CYBERSECURITY.**
5. **ECONOMICS AND MARKETING OF ELECTRONIC COMMUNICATIONS.**
6. **TELECOMMUNICATION NETWORKS AND TELETRAFFIC – POLITICS, PLANNING AND MANAGEMENT.**
7. **COMMUNICATION AND INFORMATION TECHNOLOGIES.**
8. **WIRELESS COMMUNICATIONS. SHARING OF RADIO SPECTRUM. DIGITAL SWITCHOVER.**
9. **COMMUNICATION CIRCUITS, SIGNALS AND SYSTEMS.**
10. **UP-TO-DATE ASPECTS OF POSTAL SERVICES.**
11. **EDUCATION IN THE FIELD OF TELECOMMUNICATION.**

PARTICIPATION IN THE CONFERENCE

Prospective authors are invited to send their Reply Form A by e-mail no later than September 15, 2015. The full text of the paper to be presented written in one of the conference languages, should not exceed 10 (ten) pages and should be sent by e-mail no later than September 29, 2015. The authors also have to send an abstract. The abstract should be in English and sent by e-mail. Submitted papers will be subject to peer review, by at least two reviewers. Authors will be informed by October 09, 2015 on the acceptance of their papers. Every author can participate as main author in one paper and as co-author in two. Manuscripts received after the deadline will not be included in the program. Detailed instructions on formatting of the abstracts and papers are available at

http://ceec.fnts.bg/telecom

Authors of accepted papers may also present their papers remotely via teleconference. They have to prepare and send their presentation file no later than 13.10.2015. After each remote presentation the conference attendees will participate in a discussion with the author via teleconference.

COMPANY PRESENTATIONS

Companies can apply for presentation of their products within the program of the Conference or for display of advertisements. Please, apply using Reply (form B) by September 29, 2015.

CONFERENCE LANGUAGES

The Conference Languages are Bulgarian and English.

DEADLINES

Registration for participation (Form A)	– **15.09.2015**
Submission of papers and abstracts	– **29.09.2015**
Notification for acceptance of paper	– **09.10.2015**
Application for Company presentation (Form B)	– **29.09.2015**
Application for exhibition (Form B)	– **29.09.2015**
Application for attendance without paper (Form A)	– **12.10.2015**
Registration fee	– **12.10.2015**

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