

## Optimization Of Tcp Over Wireless Networks

**Mobile ad-hoc networks have attracted considerable attention and interest from the commercial sector as well as the standards community. Many new ad-hoc networking applications have been conceived to help enable new commercial and personal communication beyond the domain of tactical networks, including personal area networking, home networking, law enforcement operations, search and rescue operations, commercial and educational applications, and sensor networks. Emerging Technologies in Wireless Ad-hoc Networks: Applications and Future Development provides the rationale, state-of-the-art studies and practical applications, proof-of-concepts, experimental studies, and future development on the use of emerging technologies in wireless ad-hoc networks. In addition, this work explores emerging wireless ad hoc technologies based on communication coverage areas: body sensor networks, personal area networks, local area networks, and metropolitan area networks and their applications in critical sectors, for example, agriculture, environment, public health and public transportation.**

**This comprehensive resource contains a detailed methodology for assessing, analyzing and optimizing End-to-End Service Performance under different cellular technologies (GPRS, EDGE, WCDMA and CDMA2000). It includes guidelines for analyzing numerous different services, including FTP, WEB streaming and POC, including examples of analysis and troubleshooting from a user point-of-view. Focuses on the end-user perspective, with a detailed analysis of the main sources of service performance degradation and a comprehensive description of mobile data services Includes a detailed presentation of generic key performance indicators (KPIs) which can be re-defined to comply with each particular network Provides service performance benchmarking for different technologies from real networks Explores a new approach to service management known as customer experience management, including the reasons why it is overcoming traditional service management and its impact on revenues and customer satisfaction Illustrates all points throughout using real world examples gleaned from cutting-edge research This book draws together findings from authoritative sources that will appeal to cellular network operators and vendors. The theory-based, practical approach will be of interest to postgraduate students and telecommunication and consulting companies working in the field of cellular technologies.**

**This volume constitutes the second of three parts of the refereed proceedings of the First International Conference on Computer Science and Information Technology, CCSIT 2010, held in Bangalore, India, in January 2011. The 66 revised full papers presented in this volume were carefully reviewed and selected. The papers are organized in topical sections on networks and communications; network and communications security; wireless and mobile networks.**

**The network coding paradigm advocates that intermediate nodes should not only forward, but also process and combine packets, which has the potential to increase throughput and facilitate distributed operation of networks. This dissertation focuses on wireless networks, where network coding can be gracefully combined with and exploit the properties of the wireless networks. The goal is to design and evaluate algorithms and protocols, on top of given constructive network coding schemes, so as to fully exploit the network coding capabilities. The contributions of this dissertation are the joint optimization of (i) video streaming, (ii) rate control, and (iii) error correction, together with the**

**underlying network coding mechanisms. We first study video streaming over coded wireless networks. Our key insight is that, when the transmitted flows are video, network codes should be selected so as to maximize not only the network throughput but also the video quality. We propose video-aware opportunistic network coding schemes that take into account the importance and deadlines of video packets. Second, we study rate control and scheduling. The key intuition is that network coding introduces network coded flows and new conflicts between nodes, which should be taken into account both in rate control and scheduling. We consider two types of traffic; video and TCP. In the case of video, its time-varying nature affects the underlying network coding opportunities. We observe that by delaying some scenes and by optimizing the rate allocation, we can create more network coding opportunities and thus improve video quality. In the case of TCP traffic, TCP flows do not fully exploit the network coding opportunities due to their bursty behavior and due to the fact that TCP is agnostic to network coding. In order to improve the performance of TCP flows over coded wireless networks, we propose a network-coding aware queue management scheme. In the last part of this thesis, we combine inter- and intra-session network coding (I2NC). Our scheme, I2NC provides resilience to loss thanks to the error-correcting capabilities of intra-session network coding. Furthermore, it allows intermediate nodes to operate without the knowledge of the decoding buffers at their neighbors.**

**For Wireless Networks**

**Wireless Communications**

**End-to-End Quality of Service over Cellular Networks**

**Web Content Delivery**

**Cross-Layer Optimization for TCP Over Wireless Networks**

**Mobile Computing Handbook**

**Inventive Communication and Computational Technologies**

*Web caching and content delivery technologies provide the infrastructure on which systems are built for the scalable distribution of information. This proceedings of the eighth annual workshop, captures a cross-section of the latest issues and techniques of interest to network architects and researchers in large-scale content delivery. Topics covered include the distribution of streaming multimedia, edge caching and computation, multicast, delivery of dynamic content, enterprise content delivery, streaming proxies and servers, content transcoding, replication and caching strategies, peer-to-peer content delivery, and Web prefetching. Web Content Caching and Distribution encompasses all areas relating to the intersection of storage and networking for Internet content services. The book is divided into eight parts: mobility, applications, architectures, multimedia, customization, peer-to-peer, performance and measurement, and delta encoding.*

*This book constitutes the refereed proceedings of the 7th International Conference on Grid and Pervasive Computing, GPC 2012, held in Hong Kong, China, in May 2012. The 9 revised full papers and 19 short papers were carefully revised and selected from 55 submissions. They are organized in topical sections on cloud computing, grid and service computing, green computing, mobile and pervasive computing, scheduling and performance,*

and trust and security. Also included are 4 papers presented at the 2012 International Workshop on Mobile Cloud and Ubiquitous Computing (Mobi-Cloud 2012) held in conjunction with GPC 2012.

The Internet is evolving from the perspective of both usage and connectivity. The meteoric rise of smartphones has not only facilitated connectivity for the masses, it has also increased their appetite for more responsive applications. The widespread availability of wireless networks has caused a paradigm shift in the way we access the Internet. This shift has resulted in a new trend where traditional applications are getting migrated to the cloud, e.g., Microsoft Office 365, Google Apps etc. As a result, modern web content has become extremely complex and requires efficient web delivery protocols to maintain users' experience regardless of the technology they use to connect to the Internet and despite variations in the quality of users' Internet connectivity. To achieve this goal, efforts have been put into optimizing existing web and transport protocols, designing new low latency transport protocols and introducing enhancements in the WiFi MAC layer. In recent years, several improvements have been introduced in the HTTP protocol resulting in the HTTP/2 standard which allows more efficient use of network resources and a reduced perception of latency. QUIC transport protocol is another example of these ambitious efforts. Initially developed by Google as an experiment, the protocol has already made phenomenal strides, thanks to its support in Google's servers and Chrome browser. However there is a lack of sufficient understanding and evaluation of these new protocols across a range of environments, which opens new opportunities for research in this direction. This thesis provides a comprehensive study on the behavior, usage and performance of HTTP/2 and QUIC, and advances them by implementing several optimizations. First, in order to understand the behavior of HTTP/1 and HTTP/2 traffic we analyze datasets of passive measurements collected in various operational networks and discover that they have very different characteristics. This calls for a reappraisal of traffic models, as well as HTTP traffic simulation and benchmarking approaches that were built on the understanding of HTTP/1 traffic only and may no longer be valid for modern web traffic. We develop a machine learning-based method compatible with existing flow monitoring systems for the classification of encrypted web traffic into appropriate HTTP versions. This will enable network administrators to identify HTTP/1 and HTTP/2 flows for network managements tasks such as traffic shaping or prioritization. We also investigate the behavior of HTTP/2 stream multiplexing in the wild. We devise a methodology for analysis of large datasets of network traffic comprising over 200 million flows to quantify the usage of H2 multiplexing in the wild and to understand its implications for network infrastructure. Next, we show with the help of emulations that HTTP/2 exhibits poor performance in adverse scenarios such as under high packet losses or network congestion. We confirm that the use of a single connection sometimes impairs application performance of HTTP/2 and implement an optimization in Chromium browser to make it more robust in

*such scenarios. Finally, we collect and analyze QUIC and TCP traffic in a production wireless mesh network. Our results show that while QUIC outperforms TCP in fixed networks, it exhibits significantly lower performance than TCP when there are wireless links in the end-to-end path. To see why this is the case, we carefully examine how delay variations which are common in wireless networks impact the congestion control and loss detection algorithms of QUIC. We also explore the interaction of QUIC transport with the advanced link layer features of WiFi such as frame aggregation. We fine-tune QUIC based on our findings and show notable increase in performance.*

*Mobile computing is rapidly becoming a way of life. This is the fastest emerging field, which has created a need for new techniques and solutions. To fulfill need of the hour, this book is designed for graduate and postgraduate students in B. Tech. computer science & Information Technology, computer applications, research scholars and for professionals. First International ICST Conference, EuropeComm 2009, London, UK, August 11-13, 2009, Revised Selected Papers*

*Signaling, Mobility and Security*

*Emerging Technologies in Wireless Ad-hoc Networks: Applications and Future Development*

*Understanding Broadband Wireless Networking*

*What every web developer should know about networking and web performance*

*Proceedings : PIMRC2003 : September 7-10, 2003, Beijing, China*

*Artificial Intelligence and Quantum Computing for Advanced Wireless Networks*

The first book to cover one of the hottest subjects in wireless communications today, Mobile WiMAX Summarises the fundamental theory and practice of Mobile WiMAX Presents topics at introductory level for readers interested in understanding communication and networking knowledge for Mobile WiMAX, whilst addressing advanced / specialised subjects related to Mobile WiMAX Contains the latest advances and research from the field and shares knowledge from the key players working in this area Chapter 1 updates Mobile WiMAX status and standards; Chapters 2-6 are related to physical layer transmission; Chapters 7-12 deal with MAC and networking issues; Chapters 13-14 discuss relay networks for mobile WiMAX; and Chapters 15-19 present multimedia networking for mobile WiMAX and application scenarios. Ideal for Mobile WiMAX R&D/practicing engineers (systems, applications and services, field, terminal, IC design, integration), business development professionals, academic researchers. Graduate students conducting research and graduate students studying in mobile WiMAX and next generation wireless communications. Undergraduate students studying mobile WiMAX related subjects

In June 2000, GTEL (Wireless Telecommunications Research Group) at

the Federal University of Ceara was founded by Professor Rodrigo Cavalcanti and his colleagues with the mission of developing wireless communications technology and impact the development of the Brazilian telecommunications sector. From the start, this research effort has been supported by Ericsson Research providing a dynamic environment where academia and industry together can address timely and relevant research challenges. This book summarized much of the research output that has resulted from GTEL 's efforts. It provides a comprehensive treatment of the physical and multiple access layers in mobile communication systems describing different generations of systems but with a focus on 3G systems. The team of Professor Cavalcanti has contributed scientifically to the development of this field and built up an impressive expertise. In the chapters that follow, they share their views and knowledge on the underlying principles and technical trade-offs when designing the air interface of 3G systems. The complexity of 3G systems and the interaction between the physical and multiple access layers present a tremendous challenge when modeling, designing, and analyzing the mobile communication system. Herein, the authors tackle this problem in an impressive manner. Their work is very much in line with the developments in 3GPP providing a deeper understanding of the evolution of 3G and also future enhancements.

Whether gaming, constant communications and connectivity, or streaming video and audio is the future killer app that keeps consumers reaching for mobile devices, you can turn to this book for the hands-on technology details you need to know to prepare yourself and your organizations for tomorrow's world of wireless multimedia. The book includes in-depth discussions on the hottest topics in this area, including AAA, multiple access protocols, IPv6 and adaptive technologies. Such resource management strategies as power control, user admission techniques, and congestion control are fully explained, helping you design wireless multimedia systems that provide the required degree of quality of service by effectively utilizing limited radio resources.

Cognitive Radio Communications and Networks gives comprehensive and balanced coverage of the principles of cognitive radio communications, cognitive networks, and details of their implementation, including the latest developments in the standards and spectrum policy. Case studies, end-of-chapter questions, and descriptions of various platforms and test beds, together with sample code, give hands-on knowledge of how cognitive radio systems can be implemented in practice. Extensive treatment is given to several standards, including IEEE 802.22 for TV White Spaces and IEEE SCC41. Written by leading people in the field, both at universities and major industrial research laboratories, this tutorial text gives communications engineers, R&D engineers,

researchers, undergraduate and post graduate students a complete reference on the application of wireless communications and network theory for the design and implementation of cognitive radio systems and networks Each chapter is written by internationally renowned experts, giving complete and balanced treatment of the fundamentals of both cognitive radio communications and cognitive networks, together with implementation details Extensive treatment of the latest standards and spectrum policy developments enables the development of compliant cognitive systems Strong practical orientation – through case studies and descriptions of cognitive radio platforms and testbeds – shows how real world cognitive radio systems and network architectures have been built Alexander M. Wyglinski is an Assistant Professor of Electrical and Computer Engineering at Worcester Polytechnic Institute (WPI), Director of the WPI Limerick Project Center, and Director of the Wireless Innovation Laboratory (WI Lab) Each chapter is written by internationally renowned experts, giving complete and balanced treatment of the fundamentals of both cognitive radio communications and cognitive networks, together with implementation details Extensive treatment of the latest standards and spectrum policy developments enables the development of compliant cognitive systems Strong practical orientation – through case studies and descriptions of cognitive radio platforms and testbeds – shows how "real world" cognitive radio systems and network architectures have been built

The 14th IEEE 2003 International Symposium on Personal, Indoor, and Mobile Radio Communications

Proceedings of the 8th International Workshop

First International Conference on Computer Science and Information Technology, CCSIT 2011, Bangalore, India, January 2-4, 2011.

Proceedings, Part II

Resource Allocation and Performance Optimization in Communication Networks and the Internet

Communications Infrastructure, Systems and Applications

Ad Hoc Wireless Networks

Principles and Practice

***This book provides a comprehensive introduction to the underlying theory, design techniques and analytical results of wireless communication networks, focusing on the core principles of wireless network design. It elaborates the network utility maximization (NUM) theory with applications in resource allocation of wireless networks, with a central aim of design and the QoS guarantee. It presents and discusses state-of-the-art developments in resource allocation and performance optimization in wireless communication networks. It provides an overview of the general background including the basic wireless communication networks and the***

*relevant protocols, architectures, methods and algorithms.*

*The Definitive Guide to WiMAX Technology WiMAX is the most promising new technology for broadband wireless access to IP services. It can serve an extraordinary range of applications and environments: data, voice, and multimedia; fixed and mobile; licensed and unlicensed. However, until now, wireless professionals have had little reliable information to guide them.*

*Fundamentals of WiMAX is the first comprehensive guide to WiMAX—its technical foundations, features, and performance. Three leading wireless experts systematically cut through the hype surrounding WiMAX and illuminate the realities. They combine complete information for wireless professionals and basic, accessible knowledge for non-experts.*

*Professionals will especially appreciate their detailed discussion of the performance of WiMAX based on comprehensive link- and system-level simulations. Whether you're a wireless engineer, network architect, manager, or system designer, this book delivers essential information for succeeding with WiMAX—from planning through deployment. Topics include Applications, history, spectrum options, technical and business challenges, and competitive technologies of WiMAX 802.16 standards: physical and MAC layers, channel access, scheduling services, mobility, advanced antenna features, hybrid-ARQ, and more Broadband wireless channels: pathloss, shadowing, cellular systems, sectoring, and fading—including modeling and mitigation OFDM: from basic multicarrier concepts to synchronization, PAR reduction, and clipping MIMO: Multiple antennas, spatial diversity, beamforming, and a cutting-edge treatment of the use of MIMO in WiMAX OFDMA: multiple access, multiuser diversity, adaptive modulation, and resource allocation Networking and services aspects: architecture and protocols for IP QoS, session management, security, and mobility management Predicting performance using link-level and system-level simulations WiMAX network architecture: design principles, reference models, authentication, QoS, and mobility management*

*This book gathers selected papers presented at the Inventive Communication and Computational Technologies conference (ICICCT 2019), held on 29–30 April 2019 at Gnanamani College of Technology, Tamil Nadu, India. The respective contributions highlight recent research efforts and advances in a new paradigm called ISMAC (IoT in Social, Mobile, Analytics and Cloud contexts). Topics covered include the Internet of Things, Social Networks, Mobile Communications, Big Data Analytics, Bio-inspired Computing and Cloud Computing. The book is chiefly intended for academics and practitioners working to resolve practical issues in this area.*

*The focus of this book is on mechanisms that affect the VoIP user satisfaction while not explicitly involved in the media session. The book*

*thus investigates and proposes cross-layer techniques for realizing time-efficient control mechanisms for VoIP.*

*From LTE to LTE-Advanced Pro and 5G*

*Architectures and Protocols*

*Connecting Offices and Homes*

*Technology Trends in Wireless Communications*

*Fundamentals of WiMAX*

*Wireless Sensor Networks*

*Dynamic Spectrum Access and Management in Cognitive Radio Networks*

While there are countless books on wireless networks, few actually quantify the key performance-limiting factors of wireless local area networks (WLANs) and describe various methods for improving WLAN performance. Fulfilling these needs, *Improving the Performance of Wireless LANs: A Practical Guide* provides both theoretical background and empirical

"This book serves as a vital resource for practitioners to learn about the latest research and methodology within the field of wireless technology, covering important aspects of emerging technologies in the heterogeneous next generation network environment with a focus on wireless communications and their quality"--Provided by publisher.

The First International ICST Conference on Communications Infrastructure, Systems and Applications in Europe (EuropeComm 2009) was held August 11–13, 2009, in London. EuropeComm 2009 brought together decision makers from the EU commission, top researchers and industry executives to discuss the directions of communications research and development in Europe. The event also attracted academia and industry representatives, as well as government officials to discuss the current developments and future trends in technology, applications and services in the communications field. Organizing this conference was motivated by the fact that the development and deployment of future services will require a common global-scale infrastructure, and therefore it is important that designers and stakeholders from all the systems stacks come together to discuss these developments. Rapidly decreasing costs of computational power, storage capacity, and communication bandwidth have led to the development of a multitude of applications carrying an increasingly huge amount of traffic on the global networking infrastructure. What we have seen is an evolution: an infrastructure looking for networked applications has evolved into an infrastructure struggling to meet the social, technological and business challenges posed by the plethora of bandwidth-hungry emerging applications.

With the popularity of and the advances in wireless networking

technologies, wireless multimedia traffic has grown dramatically in recent years. Despite having many advantages, wireless multimedia services, particularly video services, still pose a number of challenges due to the time-varying, error-prone and bandwidth-fluctuating channels in the wireless networks. Therefore, provisioning end-to-end Quality of Service and Quality of Experience (QoS and QoE) of video transmission over wireless channels is of great importance. □ Video transmission is often described to be bursty as video is basically a sequence of frames transmitted at a particular frame rate. A video frame cannot be decoded or played out at the receiver side until all or most of its transmitted constituent packets are received in time. Depending on the application scenarios, video services may have different emphases in terms of QoE and QoS. While video streaming (e.g., Netflix and YouTube) allows for modest delay (on the order of a few seconds) at the beginning of the playout, video teleconferencing (e.g., FaceTime and WebRTC) is much more delay constrained (less than a few hundred milliseconds). This is because in real-time video systems, each frame must be delivered and decoded by its playback time, and any packet that is retransmitted due to loss in the last transmission or arriving late becomes useless when its stringent decoding and display deadline cannot be met. In this dissertation, we propose several optimization algorithms to improve the QoE and QoS for both video streaming (non real-time) and video teleconferencing (real-time) over wireless networks. □ In optimizing wireless video streaming, we focus on MPEG-DASH (ISO/IEC Standard 23009-1), the current standard for video streaming. We optimize video streaming by leveraging a technique called User Adaptive Video (UAV), which exploits the perceptual limits of the human visual system to modulate a video stream's bit rate based on the viewing conditions, such as viewing distance and ambient illuminance, resulting in significant bandwidth saving without perceived loss of quality to the user. UAV presents an opportunity to significantly improve the efficiency of DASH by not requesting unnecessarily high bit rate videos. We design UAV-enabled DASH (UDASH) and evaluate its performance in Wi-Fi networks. Simulation results show that UDASH in a Wi-Fi network has the benefits of not only significantly improving the video streaming performance such as reducing the rebuffering probability, but also enhancing the performance of cross traffic. □ In addition, the MPEG-DASH standard uses TCP as the underlying transport layer protocol, and more importantly, TCP is one type of dominant traffic in the Internet. Therefore, we investigate how to improve TCP performance in wireless networks. We identify two issues of TCP performance degradation due to common channel

errors via both analytical study and simulations in a typical Wi-Fi network. Motivated by these issues, a MAC layer optimization technique is proposed, which is based on the adaptation of the Retry Limit parameter after considering TCP traffic characteristics and throughput model. The evaluation results confirm that the proposed technique achieves higher performance gain. □ In optimizing video teleconferencing, we consider WebRTC, which is Google's open source real-time communication framework. In wireless networks such as those based on IEEE 802.11, packet losses due to fading and interference are often misinterpreted as indications of congestion, causing unnecessary decrease in the data sending rate due to congestion control by the RTCP protocol working beneath WebRTC and above RTP. For delay-constrained applications such as video teleconferencing, packet losses may result in excessive artifacts or freeze in the decoded video. We propose a simple and yet effective mechanism to detect and reduce channel-caused packet losses by dynamically adjusting the retry limit parameter of the IEEE 802.11 protocol. Since the retry limit is left configurable in the IEEE 802.11 standard, and does not require cross-layer coordination, the proposed scheme can be easily implemented and incrementally deployed. We also propose to use a delay constrained retry limit adaptation algorithm to control transmission delays so that delay constraints required by different application scenarios can be met. Experimental results of applying the proposed scheme to a WebRTC based real-time video communication prototype show significant performance gain compared to the case where retry limit is configured statically. □ In addition to the optimization techniques proposed for the IEEE 802.11 protocol, we also propose a cross-layer approach to optimize video teleconferencing, termed early packet loss feedback (EPLF). In EPLF, if a packet loss is due to channel errors, the MAC layer directly feeds back the loss information to the RTP layer with a spoofed RTCP packet that carries a NACK message so that the RTP layer can retransmit the lost RTP packet. Since the whole feedback process takes place in the same device (the video sender), the latency is negligible in relation to the RTT, and hence the term 'early' in EPLF. Theoretical analysis and prototype-based experimental results show that EPLF almost completely eliminates channel-caused video freezes in the decoded video while improving congestion control. □ Furthermore, we also apply the technique of UAV to video teleconferencing to further reduce bandwidth consumption, and build a prototype based on WebRTC and Licode (a video teleconferencing hub platform) to validate the bandwidth savings.

Solutions and Application

## Mobile WiMAX

### Improving the Performance of Wireless LANs

### Cognitive Radio Communications and Networks

### Cross-layer Optimization of Coded Wireless Networks

### Services with Initiative

### Data Services Performance Optimization in 2G/3G

The 2001 International Conference on Wireless LANs and Home Networks showcased some of the world's most dynamic presenters, including Dr Leonard Keirrock (inventor of Internet technology), as well as leading experts from 20 countries who dealt with the latest technological breakthroughs. This book is a collection of technical papers presented at the conference. It comprises 32 high-quality papers that have been carefully selected from more than 100 submissions. Contents: Mobile Computing Quality of Service and Wireless Internet Error Control and Mobile Applications Bluetooth and 802.11 Network Security Power Control and Performance Evaluation Medium Access Control Protocol Design and Mobility Support Interoperability and Co-Existence Multicarrier Systems Antennas and Interference Control Mobile Ad-Hoc Networks Readership: Graduate students, researchers and academics in networking and electrical & electronic engineering. Keywords: Wireless LANs; Home Networking; Bluetooth; 802.11; Quality of Service; Roaming; Ad-hoc networking; HiperLAN; Protocols; OFDM

An all-inclusive introduction to this revolutionary technology, presenting the key research issues and state-of-the-art design, analysis, and optimization techniques. This book constitutes the refereed proceedings of the 9th European Conference on Wireless Sensor Networks, EWSN 2012, held in Trento, Italy, in February 2012. The 16 revised full papers presented were carefully reviewed and selected from 78 submissions. The papers are organized in topical sections on communication and security, system issues, reliability, localization and smart cameras, and hardware and sensing.

How prepared are you to build fast and efficient web applications? This eloquent book provides what every web developer should know about the network, from fundamental limitations that affect performance to major innovations for building even more powerful browser applications—including HTTP 2.0 and XHR improvements, Server-Sent Events (SSE), WebSocket, and WebRTC. Author Ilya Grigorik, a web performance engineer at Google, demonstrates performance optimization best practices for TCP, UDP, and TLS protocols, and explains unique wireless and mobile network optimization requirements. You'll then dive into performance characteristics of technologies such as HTTP 2.0, client-side network scripting with XHR, real-time streaming with SSE and WebSocket, and P2P communication with WebRTC. Deliver superlative TCP, UDP, and TLS performance Speed up network performance over 3G/4G mobile networks Develop fast and energy-efficient mobile applications Address bottlenecks in HTTP 1.x and other browser protocols Plan for and deliver the best HTTP 2.0 performance Enable efficient real-time streaming in the browser Create efficient peer-to-peer videoconferencing and low-latency applications with real-time WebRTC transports SIP-based VoIP Call Setup Delay Measurement and Performance Optimization Over Wireless Networks Optimization of Tcp Over Wireless Networks

Voice over IP in Wireless Heterogeneous Networks

Towards 4G Technologies

Wireless LANs and Home Networks

Evolution Towards 3G/UMTS

TCP Flavors are Covered with New Suggested Approach to Enhance All of Them Over Heterogeneous Networks

Practical design and performance solutions for every ad hoc wireless network Ad Hoc Wireless Networks comprise mobile devices that use wireless transmission for communication. They can be set up anywhere and any time because they eliminate the complexities of infrastructure setup and central administration-and they have enormous commercial and military potential. Now, there's a book that addresses every major issue related to their design and performance. Ad Hoc Wireless Networks: Architectures and Protocols presents state-of-the-art techniques and solutions, and supports them with easy-to-understand examples. The book starts off with the fundamentals of wireless networking (wireless PANs, LANs, MANs, WANs, and wireless Internet) and goes on to address such current topics as Wi-Fi networks, optical wireless networks, and hybrid wireless architectures. Coverage includes: Medium access control, routing, multicasting, and transport protocols QoS provisioning, energy management, security, multihop pricing, and much more In-depth discussion of wireless sensor networks and ultra wideband technology More than 200 examples and end-of-chapter problems Ad Hoc Wireless Networks is an invaluable resource for every network engineer, technical manager, and researcher designing or building ad hoc wireless networks.

As mobile devices are becoming the popular portals for internet users, it has exposed some basic design limitations of the dominant Transmission Control Protocol. A crucial feature of TCP is the congestion control algorithm. The basic assumption is that, packet loss being nominal is a sign of network congestion. But in mobile wireless networks non congestion related packet losses due to varying signal power are dominant. This book provides an overview of the challenges and suggested optimization techniques for TCP in wireless network environments.

UMTS Network Planning, Optimization, and Inter-Operation with GSM is an accessible, one-stop reference to help engineers effectively reduce the time and costs involved in UMTS deployment and optimization. Rahnema includes detailed coverage from both a theoretical and practical perspective on the planning and optimization aspects of UMTS, and a number of other new techniques to help operators get the most out of their networks. Provides an end-to-end perspective, from network design to optimization Incorporates the hands-on experiences of numerous researchers Single authorship allows for strong coherency and accessibility Details the complete iteration cycle of radio link budgeting for coverage planning and dimensioning Rahnema demonstrates detailed formulation of radio capacity and coverage in UMTS, and discusses the tradeoffs involved. He presents complete link budgeting and iterative simulations for capacity and coverage planning, along

with practical guidelines. UMTS Network Planning contains seventeen cohesive and well-organized chapters which cover numerous topics, including: Radio channel structures, radio channel models, parameters, model tuning Techniques for capacity and coverage enhancements Complete treatment of power control, handoffs and radio resource practical management processes and parameters Detailed coverage of TCP protocol enhancement for operation over wireless links, particularly UMTS Application of GSM measurements to plan and re-engineer for UMTS radio sites Guidelines for site co-location with GSM, the QoS classes, parameters and inter-workings in UMTS AMR voice codecs and tradeoffs, core and access network design, architectural evolution, and protocols Comprehensive discussion and presentation of practical techniques for radio performance analysis, trending, and troubleshooting Perfect for professionals in the field and researchers specializing in network enhancement. Engineers working on other air interfaces and next generation technologies will find many of the techniques introduced helpful in designing and deploying future wireless networks as well. Students and professionals new to the wireless field will also find this book to be a good foundation in network planning, performance analysis, and optimization.

The debut of small, inexpensive, yet powerful portable computers has coincided with the exponential growth of the Internet, making it possible to access computing resources and information at nearly any location at almost any time. This new trend, mobile computing, is poised to become the main technology driver for a decade to come.

There are many

Advances in Grid and Pervasive Computing

GSM, GPRS and EDGE Performance

9th European Conference, EWSN 2012, Trento, Italy, February 15-17,

2012, Proceedings

Connecting Offices and Homes : Proceedings of the International

Conference on Wireless LANs and Home Networks : Singapore, 5-7

December 2001

Dissecting HTTP/2 and QUIC : Measurement, Evaluation and Optimization

Adaptive Wireless Video Streaming and Teleconferencing

Web Content Caching and Distribution

**ARTIFICIAL INTELLIGENCE AND QUANTUM COMPUTING FOR ADVANCED**

**WIRELESS NETWORKS** A practical overview of the implementation of artificial intelligence and quantum computing technology in large-scale communication networks Increasingly dense and flexible wireless networks require the use of artificial intelligence (AI) for planning network deployment, optimization, and dynamic control. Machine learning algorithms are now often used to predict traffic and network state in order to reserve resources for smooth communication with high reliability and low latency. In *Artificial Intelligence and Quantum Computing for Advanced Wireless Networks*, the authors deliver a practical and timely review of AI-based learning algorithms, with several case studies in both Python and R. The book discusses the game-theory-based learning algorithms used in decision making, along with various specific applications in wireless networks, like channel, network state, and traffic prediction. Additional chapters

include Fundamentals of ML, Artificial Neural Networks (NN), Explainable and Graph NN, Learning Equilibria and Games, AI Algorithms in Networks, Fundamentals of Quantum Communications, Quantum Channel, Information Theory and Error Correction, Quantum Optimization Theory, and Quantum Internet, to name a few. The authors offer readers an intuitive and accessible path from basic topics on machine learning through advanced concepts and techniques in quantum networks. Readers will benefit from: A thorough introduction to the fundamentals of machine learning algorithms, including linear and logistic regression, decision trees, random forests, bagging, boosting, and support vector machines An exploration of artificial neural networks, including multilayer neural networks, training and backpropagation, FIR architecture spatial-temporal representations, quantum ML, quantum information theory, fundamentals of quantum internet, and more Discussions of explainable neural networks and XAI Examinations of graph neural networks, including learning algorithms and linear and nonlinear GNNs in both classical and quantum computing technology Perfect for network engineers, researchers, and graduate and masters students in computer science and electrical engineering, Artificial Intelligence and Quantum Computing for Advanced Wireless Networks is also an indispensable resource for IT support staff, along with policymakers and regulators who work in technology.

This practical hands-on new resource presents LTE technologies from end-to-end, including network planning and the optimization tradeoff process. This book examines the features of LTE-Advanced and LTE-Advanced Pro and how they integrate into existing LTE networks. Professionals find in-depth coverage of how the air interface is structured at the physical layer and how the related link level protocols are designed and work. This resource highlights potential 5G solutions as considered in releases 14 and beyond, the migration paths, and the challenges involved with the latest updates and standardization process. Moreover, the book covers performance analysis and results, as well as SON specifications and realization. Readers learn about OFDMA, and how DFT is used to implement it. Link budgeting, parameter estimations, and network planning and sizing is explained. Insight into core network architecture is provided, including the protocols and signaling used for both data and voice services. The book also presents a detailed chapter on the end-to-end data transfer optimization mechanisms based on the TCP protocol. This book provides the tools needed for network planning and optimization while addressing the challenges of LTE and LTE-advanced networks.

GSM, GPRS and EDGE Performance - Second Edition provides a complete overview of the entire GSM system. GSM (Global System for Mobile Communications) is the digital transmission technique widely adopted in Europe and supported in North America. It features comprehensive descriptions of GSM's main evolutionary milestones - GPRS, (General Packet Radio Services) is a packet-based wireless communication service that promises data rates from 56 up to 114 Kbps and continuous connection to the Internet for mobile phone and computer users. AMR and EDGE (Enhanced Data GSM Environment), and such developments have now positioned GERAN (GSM/EDGE Radio Access Network) as a full 3G radio standard. The radio network performance and capabilities of GSM, GPRS, AMR and EDGE solutions are studied in-depth by using revealing

simulations and field trials. Cellular operators must now roll out new 3G technologies capable of delivering wireless Internet based multimedia services in a competitive and cost-effective way and this volume, divided into three parts, helps to explain how: 1. Provides an introduction to the complete evolution of GSM towards a radio access network that efficiently supports UMTS services (GERAN). 2. Features a comprehensive study of system performance with simulations and field trials. Covers all the major features such as basic GSM, GPRS, EDGE and AMR and the full capability of the GERAN radio interface for 3G service support is envisaged. 3. Discusses different 3G radio technologies and the position of GERAN within such technologies. Featuring fully revised and updated chapters throughout, the second edition contains 90 pages of new material and features the following new sections, enabling this reference to remain as a leading text in the area: Expanded material on GPRS Includes IMS architecture (Rel'5) and GERAN (Rel'6) features Presents field trial results for AMR and narrowband Provides EGPRS deployment guidelines Features a new chapter on Service Performance An invaluable reference for Engineering Professionals, Research and Development Engineers, Business Development Managers, Technical Managers and Technical Specialists working for cellular operators

Find out how the exciting new developments towards 4G mobile services and technologies will put the user at centre stage. Towards 4G Technologies provides a comprehensive explanation of future networking and service delivering technologies for next generation mobile systems. The authors explain how personalization, mobile middleware, peer-to-peer services, semantic computing, and content-awareness fit into this new concept and why they will become a necessity for future mobile services. The book presents the latest challenges and opportunities of Next Generation Mobile Systems, explaining new paradigms of service provisioning that include flexible and adaptable services. Towards 4G Technologies: Gives a comprehensive description of future networking and service delivering technologies. Covers hot topics such as intelligent user profiling, proactive service selection, context-aware service provisioning and ubiquitous computing. Introduces seemingly diverse technologies to show how they will play together to create a new user experience. Includes case studies to illustrate the theory. This invaluable guide will provide telecoms engineers in R&D departments, CTOs, and telecoms managers as well as academic researchers in electrical, electronic engineering and telecommunications with a comprehensive understanding of next generation mobile system technologies and services.

Proceedings of ICICCT 2019

UMTS Network Planning, Optimization, and Inter-Operation with GSM

Optimizing Wireless Communication Systems

7th International Conference, GPC 2012, Hong Kong, China, May 11-13, 2012,

Proceedings

Advances in Networks and Communications

Applications and Future Development

Scheduling and Congestion Control for Wireless Internet

This volume contains papers based on invited talks given at the

2005 IMA Summer Workshop on Wireless Communications, held at the Institute for Mathematics and Its Applications, University of Minnesota, June 22 - July 1, 2005. It presents some of the highlights of the workshop, and collects papers covering a broad spectrum of important and pressing issues in wireless communications.

The 2001 International Conference on Wireless LANs and Home Networks showcased some of the world's most dynamic presenters, including Dr Leonard Keinrock (inventor of Internet technology), as well as leading experts from 20 countries who dealt with the latest technological breakthroughs. This book is a collection of technical papers presented at the conference. It comprises 32 high-quality papers that have been carefully selected from more than 100 submissions.

The concept of content delivery (also known as content distribution) is becoming increasingly important due to rapidly growing demands for efficient distribution and fast access of information in the Internet. Content delivery is very broad and comprehensive in that the contents for distribution cover a wide range of types with significantly different characteristics and performance concerns, including HTML documents, images, multimedia streams, database tables, and dynamically generated contents. Moreover, to facilitate ubiquitous information access, the network architectures and hardware devices also vary widely. They range from broadband wired/fixed networks to bandwidth-constrained wireless/mobile networks, and from powerful workstations/PCs to personal digital assistants (PDAs) and cellular phones with limited processing and display capabilities. All these levels of diversity are introducing numerous challenges on content delivery technologies. It is desirable to deliver contents in their best quality based on the nature of the contents, network connections and client devices. This book aims at providing a snapshot of the state-of-the-art research and development activities on web content delivery and laying the foundations for future web applications. The book focuses on four main areas: (1) web content delivery; (2) dynamic web content; (3) streaming media delivery; and (4) ubiquitous web access. It consists of 17 chapters written by leading experts in the field. The book is designed for a professional audience including academic researchers and industrial practitioners who are interested in the most recent research and development activities on web content delivery. This brief proposes that the keys to internet cross-layer optimization are the development of non-standard implicit primal-dual solvers for underlying optimization problems, and design of jointly optimal network protocols as decomposition of such

solvers. Relying on this novel design-space oriented approach, the author develops joint TCP congestion control and wireless-link scheduling schemes for wireless applications over Internet with centralized and distributed (multi-hop) wireless links. Different from the existing solutions, the proposed schemes can be asynchronously implemented without message passing among network nodes; thus they are readily deployed with current infrastructure. Moreover, global convergence/stability of the proposed schemes to optimal equilibrium is established using the Lyapunov method in the network fluid model. Simulation results are provided to evaluate the proposed schemes in practical networks.

Mobile Computing

A Practical Guide

High Performance Browser Networking

Wireless Multi-Access Environments and Quality of Service

Provisioning: Solutions and Application

Analysis and Model Based Optimization of TCP