
Optimization Of Tcp Over Wireless Networks

Cognitive Radio Communications and Networks

Ad Hoc Wireless Networks

First International ICST Conference, EuropeComm 2009, London, UK, August 11-13, 2009, Revised Selected Papers

Technology Trends in Wireless Communications

A Practical Guide

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

Services with Initiative

Optimizing Wireless Communication Systems

Wireless Communications

Connecting Offices and Homes

Mobile Computing Handbook

Wireless LANs and Home Networks

Data Services Performance Optimization in 2G/3G

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Cross-layer Optimization of Coded Wireless Networks
Architectures and Protocols
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GSM, GPRS and EDGE Performance
7th International Conference, GPC 2012, Hong Kong, China, May 11-13, 2012, Proceedings

*Optimization Of Tcp Over Wireless
Networks*

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KAUFMAN NADIA

Cognitive Radio Communications and Networks Springer Nature
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.

Ad Hoc Wireless Networks Artech House

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 IGI Global

With the popularity of and the advances in wireless networking technologies, wireless multimedia tra c 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.

Technology Trends in Wireless Communications John Wiley &

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Optimization of Tcp Over Wireless Networks LAP Lambert
Academic Publishing

A Practical Guide Springer Science & Business Media
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.

*9th European Conference, EWSN 2012, Trento, Italy, February
15-17, 2012, Proceedings* Now Publishers Inc

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 *Services with Initiative* Cambridge University Press This book constitutes the refereed proceedings of the 9th European Conference on Wireless Sensor Networks, EWSN 2012, held in Trento, Italy, in Februar 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. Optimizing Wireless Communication Systems CRC Press 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 **Wireless Communications** CRC Press 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 books 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.

Connecting Offices and Homes Optimization of Tcp Over Wireless Networks

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. *Mobile Computing Handbook* Springer Science & Business Media

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.

Wireless LANs and Home Networks Springer Science & Business Media

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.

Data Services Performance Optimization in 2G/3G Springer Science & Business Media

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

Network Optimization and Control LAP Lambert Academic Publishing

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.

Wireless Sensor Networks KHANNA PUBLISHING HOUSE

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.

Voice over IP in Wireless Heterogeneous Networks Springer Science & Business Media

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.

Applications and Future Development John Wiley & Sons

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.

UMTS Network Planning, Optimization, and Inter-Operation with

GSM Springer Science & Business Media

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.

Communications Infrastructure, Systems and Applications CRC Press

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.

What every web developer should know about networking and web performance Springer Science & Business Media

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, ecurity, and mobility management Predicting performance using link-level and system-level simulations WiMAX network architecture: design principles, reference models, authentication, QoS, and mobility management

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