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WIRELESS IP AND BUILDING THE MOBILE INTERNET

EDITED BY SUDHIT DIXIT AND RAMJEE PRASAD, ARTECH HOUSE, ISBN 158053354X, HARDCOVER, 674 PAGES

REVIEWER: CLAUSS BAUER

The two fastest growing communication networks of the last decade were the Internet and wireless networks. Now these formerly separate networks have started to converge with the deployment of 2.5 and third-generation mobile networks as well as the emergence of wireless Internet hot spots based on the IEEE 802.11 standards. Future networks will consist of an enhanced IP-based backbone that seamlessly interconnects different wired and wireless access systems. They will be based on the Internet Protocol as a unifying layer that supports a variety of link layer standards.

This book presents an overview of the convergence of wireless and Internet technologies. The editors have divided the book into five sections covering wireless IP evolution, QoS and resource management, TCP/IP in wireless networks, handoff, mobility and signaling, and services and applications.

The first chapter introduces the concept of wireless IP. The second chapter describes the evolution of radio interface technologies from second- to third-generation (2G-4G) networks. The demand for IP-based wireless broadband access is driven by cost advantages, the consumer interest in access to traditional Internet and location-based services on wireless devices, and the possibility to provide open application platforms. The next three chapters describe the 2.5G technology general packet radio service (GPRS) and the 3G technology UMTS. GPRS is an enhancement of 2G networks that originally only supported the circuit-switched voice application to provide low-bandwidth data services with minimal QoS support. The initial releases, 3 and 4, of the UMTS architecture consist of a radio access system that supports both circuit-switched voice and packet-based data applications, but they require two separate circuit- and packet-switched networks. Release 5 introduces the IP multimedia core subsystem that supports multimedia applications based on the SIP protocol. Chapter 5 gives an overview of possible networking protocols and layer 2 technologies for the UMTS terrestrial radio access network (UTRAN) that deploys IP as the transport layer protocol. Architectural principles of 4G networks and actual research issues are presented in Chap-

ter 6. Chapter 7 gives an overview of ad hoc networks. Routing protocols, mobility management technologies, and a mechanism to provide global connectivity for ad hoc devices are explained.

The ability to guarantee end-to-end QoS is critical for the commercial success of future wireless technologies. Chapter 8 identifies the scarcity of resources and mobility of end users as the main obstacles to guaranteeing QoS in wireless networks. The traditional differentiated and integrated services models as well as the Resource Reservation Protocol (RSVP) are not feasible options for ensuring QoS over a wireless interface. An extension of the integrated services models that includes the transmission of additional parameters that characterize either the network or the way packets should be handled by network elements is illustrated. Chapter 9 proposes the deployment of an RSVP proxy at the edge of the wireless network in order to transparently support RSVP-capable applications over a wireless access network. Chapter 10 discusses the challenges to deliver VoIP with an acceptable perceptual quality over wireless networks and suggests a solution based on unequal error protection. QoS models, signaling and routing protocols that were designed for the wired internet are not efficiently applicable to mobile ad hoc networks. New technologies that are especially designed for ad hoc networks are presented in chapter 11. Chapter 12 gives a mathematical framework for the call and packet admission control problems for wireless interfaces. The concept of multicarrier allocation systems, frequency diversity, and carrier grouping on the downlink of a wireless IP network are explained in the next chapter.

TCP is not inherently adapted to error-prone and dynamic wireless channels. Chapter 14 describes technologies at the physical and medium access control (MAC) layer that try to hide losses from the TCP sender. Chapter 15 presents reliable multicast congestion control schemes and their adaptation to wireless media.

The mobility management in IP networks is split into macro- and micromobility management. Whereas Mobile IP handles macromobility, two approaches — hierarchical mobility management and host based routing protocols — are proposed for micromobility management. In order to achieve seamless roaming between wireless access points, handoff techniques that minimize packet loss and latency are required. Chapter 18 discusses different handoff strategies for a wireless networks that

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BOOK REVIEWS

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deploy Mobile IPv6. Chapter 21 completes this discussion by proposing a policy for the application of route optimization, a part of the Mobile IP protocol, in case of a handoff.

The Location Independent Network Architecture (LINA) is an alternative technology to Mobile IPv6. It splits the network layer into identification and delivery sublayers. Specific servers map the identification layer information of the target node to its actual location, which allows the delivery sublayer to send packets to the target node. The Integrated Cellular and Ad Hoc Relaying (iCAR) system is a technology that addresses the congestion problem in cellular networks. In order to divert traffic from a congested cell, a mobile host can use the bandwidth in neighboring cells by relaying through neighboring ad hoc relay stations. The application of Mobile IP to enable a Wireless Access Protocol (WAP) handover between GSM and IEEE 802.11b networks is treated in Chapter 22. Chapter 23 describes differ-

ent network layer architectures for interworking and handover between a wireless LAN and an UMTS network. The next two chapters present a location-based push architecture for the mobile Internet and a proposal for a unified signaling network architecture in wireless IP overlay networks.

Chapter 26 discusses technologies that enhance the distribution of content in wireless networks. Actual research focuses on air interface protocol optimizations, content adaptation, and proxy

services. The next chapter explains the concept of perceptual quality of service for voice and video applications. The book ends with two chapters that treat the importance of video transcoding for video streaming applications, and give an overview of security services and algorithms in wireless networks.

The book maintains a clear style throughout all chapters and provides the reader an in-depth understanding of wireless IP network technologies and open research problems.

SOLUTION TO PUZZLE 255

"I find that when I go to a meeting of the Acoustics Society I can't hear the speaker, at the Optical Society I can't read the slides, while at the Information Theory Society I can't understand a blessed word the speaker is saying."

Sarcastic remark by Paul Green

- A Steady
- B Attention
- C Ratio
- D Coherent detection
- E Attack
- F Site
- G Thesis
- H Infinity
- I Chat room
- J Roaches
- K Effect
- L Middleware
- M Ache
- N Radio
- O Kinship
- P Bursitis
- Q Yellow Pages
- R Phase
- S Atheist
- T Unsteady
- U Latching
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- W Radiation
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