

Fundamentals of LTE (Prentice Hall Communications Engineering and Emerging Technologies Series from Ted Rappaport)

By Arunabha Ghosh, Jun Zhang, Jeffrey G. Andrews, Rias Muhamed

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The Definitive Guide to LTE Technology

Long-Term Evolution (LTE) is the next step in the GSM evolutionary path beyond 3G technology, and it is strongly positioned to be the dominant global standard for 4G cellular networks. LTE also represents the first generation of cellular networks to be based on a flat IP architecture and is designed to seamlessly support a variety of different services, such as broadband data, voice, and multicast video. Its design incorporates many of the key innovations of digital communication, such as MIMO (multiple input multiple output) and OFDMA (orthogonal frequency division multiple access), that mandate new skills to plan, build, and deploy an LTE network.

In ***Fundamentals of LTE*** , four leading experts from academia and industry explain the technical foundations of LTE in a tutorial style—providing a comprehensive overview of the standards. Following the same approach that made their recent *Fundamentals of WiMAX* successful, the authors offer a complete framework for understanding and evaluating LTE.

Topics include

- Cellular wireless history and evolution: Technical advances, market drivers, and foundational networking and communications technologies
- Multicarrier modulation theory and practice: OFDM system design, peak-to-average power ratios, and SC-FDE solutions
- Frequency Domain Multiple Access: OFDMA downlinks, SC-FDMA uplinks, resource allocation, and LTE-specific implementation
- Multiple antenna techniques and tradeoffs: spatial diversity, interference cancellation, spatial multiplexing, and multiuser/networked MIMO
- LTE standard overview: air interface protocol, channel structure, and physical layers
- Downlink and uplink transport channel processing: channel encoding, modulation mapping, Hybrid ARQ, multi-antenna processing, and more
- Physical/MAC layer procedures and scheduling: channel-aware scheduling,

closed/open-loop multi-antenna processing, and more
- Packet flow, radio resource, and mobility management: RLC, PDCP, RRM, and LTE radio access network mobility/handoff procedures

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Editorial Review

Review
"*Fundamentals of LTE* is a clear yet detailed introduction to the 3GPP Long-Term Evolution. I would recommend it both to those wishing to get up to speed on the fundamentals of LTE and those who are already involved but in need of a reference for this critical technology."

—Dr. Alan Gatherer
CTO of Baseband System-on-Chip
Huawei

"Excellent . . . . A comprehensive and in-depth treatment of what is likely to become the dominant world broadband wireless standard."
—Dr. Reinaldo Valenzuela
Director of Wireless Communications Research
Bell Labs, Alcatel-Lucent

"*Fundamentals of LTE* is a well-written and self-contained book featuring a unique blend of leading industry and academic perspectives. Comprehensive and highly accessible."
—Dr. Angel Lozano
Professor, Information & Communication Technologies
University of Pompeu, Fabra

"This book offers a good entry point to the world of LTE for newcomers, since it contains useful background material for understanding the technology. It can serve as an instrumental reference for the general LTE community."
—Dr. Eko Onggosanusi
Senior member of technical staff and 3GPP RAN1 lead delegate
Texas Instruments

From the Back Cover
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About the Author
Arunabha Ghosh is a lead member of technical staff in the Wireless Communications Group in AT&T Laboratories. He received his B.S. with highest distinction from the Indian Institute of Technology at Kanpur in 1992 and his Ph.D. from the University of Illinois at Urbana Champaign in 1998. As a technical member at AT&T Labs, Dr. Ghosh's primary area of research is mobile wireless systems, with particular emphasis on MIMO-OFDM systems. Dr. Ghosh has worked extensively in the area of closed-loop single-user and multiuser MIMO solutions for technologies such as LTE and WiMAX and has been an active participant in many standards bodies such as 3GPP, IEEE, and WiMAX Forum.

Jun Zhang is a visiting assistant professor in the Department of Electronic and Computer Engineering at the Hong Kong University of Science and Technology. He received his B.Eng. in electronic engineering from the University of Science and Technology of China (USTC) in 2004, his M.Phil. in information engineering from the Chinese University of Hong Kong (CUHK) in 2006, and his Ph.D. in electrical and computer engineering from the University of Texas at Austin in 2009. He was an intern at AT&T Labs in the summers of 2007 and 2008.

Jeffrey G. Andrews is an associate professor in the Department of Electrical and Computer Engineering at the University of Texas at Austin, where he is the director of the Wireless Networking and Communications Group. He received his B.S. in engineering with high distinction from Harvey Mudd College, and his M.S. and Ph.D. in electrical engineering from Stanford University. Dr. Andrews has industry experience at companies including Qualcomm, Intel, and Microsoft, and is the co-recipient of three IEEE best paper awards and the National Science Foundation CAREER Award.

Rias Muhamed is a director of business development with the AT&T Corporate Strategy and Development Team. His area of focus is on developing and incubating new business applications and services for AT&T using emerging technologies. He was previously with AT&T Labs, where he led technology assessment of a variety of wireless communication systems. He received his B.S. in electrical engineering from Pondicherry University, India in 1990; his M.S. in electrical engineering from Virginia Tech in 1996; and his M.B.A. from St. Edward University in Austin in 2000.

Users Review

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Karen Jude:

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