



LTE Signaling: Troubleshooting and Optimization

By Ralf Kreher, Karsten Gaenger

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A comprehensive reference on the call procedures of 4G RAN and Core networks, *LTE Signaling, Troubleshooting and Optimization* describes the protocols and procedures of LTE. It explains essential topics from basic performance measurement counters, radio quality and user plane quality to the standards, architecture, objectives and functions of the different interfaces. The first section gives an overview of LTE/EPC network architecture, reference points, protocol stacks, information elements and elementary procedures. The proceeding parts target more advanced topics to cover LTE/EPC signalling and radio quality analysis.

This book supplements the information provided in the 3GPP standards by giving readers access to a universal LTE/EPC protocol sequence to ensure they have a clear understanding of the issues involved. It describes the normal signaling procedures as well as explaining how to identify and troubleshoot abnormal network behavior and common failure causes.

- Enables the reader to understand the signaling procedures and parameters that need to be analyzed when monitoring UMTS networks
- Covers the essential facts on signaling procedures by providing first hand information taken from real LTE/EPC traces
- A useful reference on the topic, also providing sufficient details for test and measurement experts who need to analyze LTE/EPC signaling procedures and measurements at the most detailed level
- Contains a description of LTE air interface monitoring scenarios as well as other key topics up to an advanced level

LTE Signaling, Troubleshooting and Optimization is the Long Term Evolution successor to the previous Wiley books *UMTS Signaling* and *UMTS Performance Measurement*.



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Editorial Review

Review

"A comprehensive reference on the call procedures of 4G RAN and Core networks, LTE (News - Alert) Signaling, Troubleshooting and Optimization describes the protocols and procedures of LTE.". (InfoTECH Spotlight - TMCnet, 16 March 2011)

From the Back Cover

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About the Author

Ralf Kreher works as Senior Software Architect for Tektronix Communications (Test and Optimization) business with focus on UMTS and LTE Performance Measurement and Key Performance Indicator (KPI) implementation. Before joining the engineering department he lead the Tektronix Mobile Protocol Test Customer Training Department for almost four years being responsible for a world-class seminar portfolio for mobile technologies and measurement products. Kreher holds a Communication Engineering Degree of the University of Applied Science, Deutsche Telekom Leipzig. He is internationally recognized author of the books *UMTS Signaling* and *UMTS Performance Measurement*.

Karsten Gaenger received a Dipl.-Ing. degree in electrical engineering from the Berlin University of Technology. He was with the Fraunhofer HHI research institute from 2004 to 2006. During this time he published several IEEE papers on his development of a reliable real-time streaming system and protocol for Mobile Ad-Hoc networks. His research interests are mobile communications, IPTV, and robust real-time

video streaming. Currently he is with Tektronix, Inc. and takes part in the mobile test and optimization division for 3G and LTE networks. He is a Solution Architect with RAN focus for testing and monitoring real-time multi-media streaming in next generation mobile networks. His current projects include the development of a passive LTE air interface probe.

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