

Preface

Why I Wrote this Book

LTE-Advanced becomes a truly global standard for 4G cellular communications. Relay, as one of the key technologies of LTE-Advanced, can significantly extend the coverage, and improve the system throughput. LTE-A standards and technologies were described in several recent books where the limited pages for relay feature prevent the detailed explanations of the technology. In this book, we tried to provide an in-depth description of LTE-A relay development. More specifically, significant portions are spent on relay channel modeling and potential technologies during the study item phase of the development, although some of those technologies, such as Type 2 cooperative relay, multi-hop relay, relay with backhaul of carrier aggregation, were not standardized in Release 10 LTE. The purpose of those discussions was to offer some insights of relay research in future LTE releases. For Type 1 relay which was standardized in Release 10, our focus is to describe the design principles and rationales of key features, rather than literally explaining the specifications. By doing so, we hope that readers can get the intuitions of major candidate techniques for Release 10 relay, regardless of whether they were adopted in the specifications.

Besides the standardization of relay, some implementation aspects of relay were also discussed with the aim to provide a high-level view on how to build a relay node and deploy the relay systems.

Structure of this Book

The arrangement of the chapters follows naturally the standardization process and implementation steps. It starts with the application scenario and channel modeling, followed by the open study on technology and system performance evaluations,

then narrowed down to a short list of techniques that would ultimately be standardized, beginning from physical layer, then upper layer working groups, and then in performance working groups. Once the performance requirements are set, the implementation aspects come next. In the end, we provide the outlook of future relay study.

- [Chapter 1](#): Introduction
- [Chapter 2](#): LTE-A Relay Scenarios and Evaluation Methodology
- [Chapter 3](#): LTE-A Relay Study and Related Technologies
- [Chapter 4](#): Physical Layer Standardization of Release 10 Relay
- [Chapter 5](#): Higher Layer Aspects and RAN4 Performance Aspects
- [Chapter 6](#): Implementation Aspects of Release 10 Relay
- [Chapter 7](#): Outlook of Relay in Future LTE Releases

How to Use this Book

This book is written for researchers and engineers working on wireless communications, in particular, in the field of 3G and 4G cellular communications. [Chapters 2](#) and [3](#) target for researchers with broader interest in relay and related technologies. [Chapters 4–6](#) would be more useful for engineers specialized in designing and implementing the relay systems. The discussions in [Chaps. 1](#) and [7](#) are more general and suitable for both researchers and engineers.

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