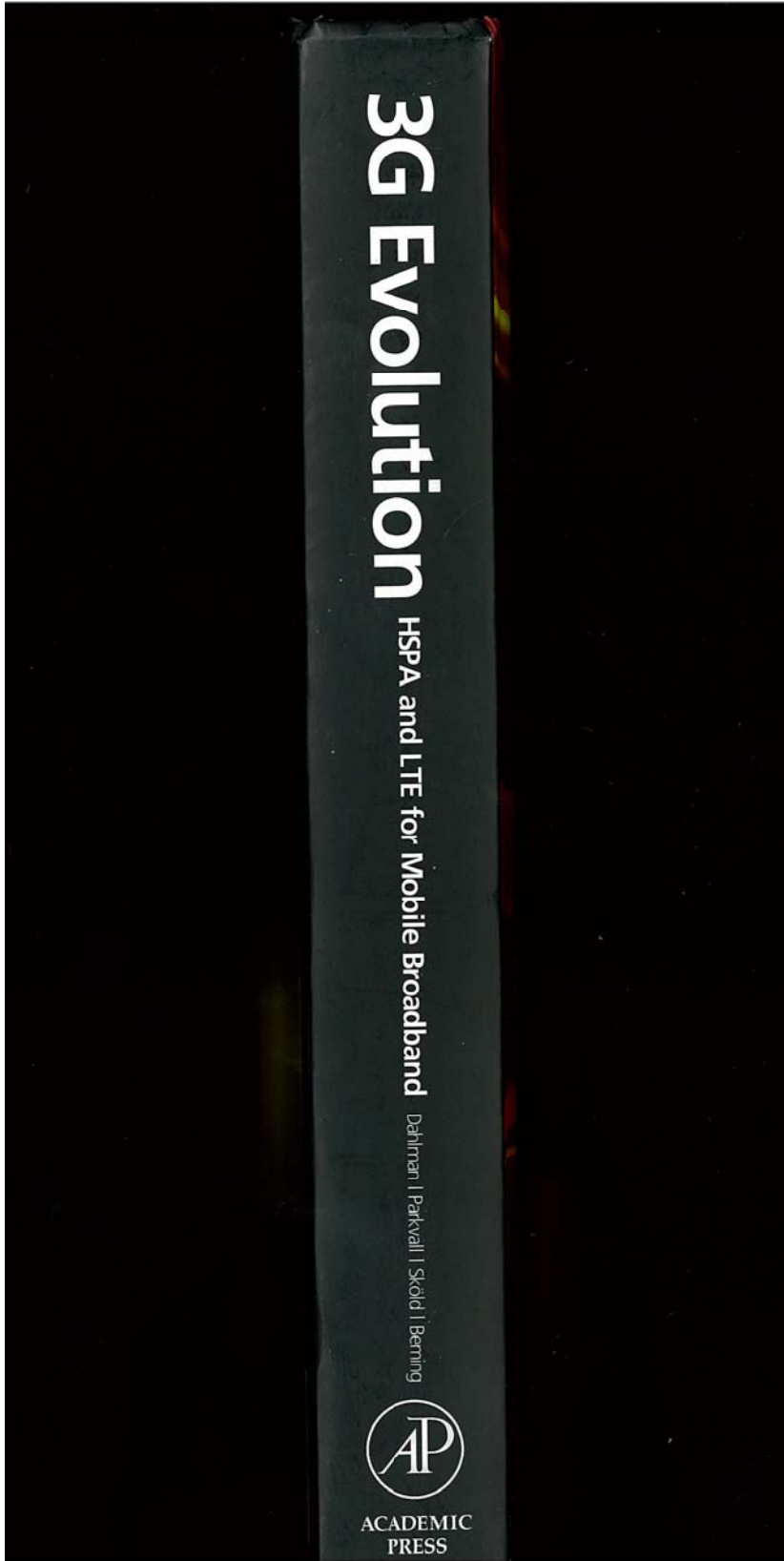# 3G Evolution

HSPA and LTE for Mobile Broadband

Erik Dahlman
Stefan Parkvall
Johan Sköld
Per Beming

AP

3G Evolution

HSPA and LTE for Mobile Broadband

Dahlman | Parkvall | Sköld | Beming

ACADEMIC PRESS

3G Evolution

HSPA and LTE for Mobile Broadband

Erik Dahlman, Stefan Parkvall, Johan Sköld and Per Beming

For information on all Academic Press publications
visit our website at books.elsevier.com

Printed and bound in *Great Britain*

07 08 09 10 10 9 8 7 6 5 4

17

LTE access procedures

The previous chapters have described the LTE uplink and downlink transmission schemes. However, prior to transmission of data, the mobile terminal needs to connect to the network. In this chapter, procedures necessary for a terminal to be able to access an LTE-based network will be described.

17.1 Cell search

Cell search is the procedure by which the terminal finds a cell for potential connection to. As part of the cell-search procedure, the terminal obtains the identity of the cell and estimates the frame timing of the identified cell. Furthermore, the cell-search procedure also provides estimates of parameters essential for reception of system information on the broadcast channel, containing the remaining parameters required for accessing the system.

To avoid complicated cell planning, the number of physical layer cell identities should be sufficiently large. As mentioned in Chapter 16, LTE supports 510 different cell identities, divided into 170 cell-identity groups of three identities each.

In order to reduce the cell-search complexity, cell search for LTE is typically done in several steps, similarly to the three-step cell-search procedure of WCDMA. To assist the terminal in this procedure, LTE provides a *primary synchronization signal* and a *secondary synchronization signal* on the downlink. The primary and secondary synchronization signals are specific sequences, inserted into the last two OFDM symbols in the first slot of subframe zero and five as illustrated in Figure 17.1. In addition to the synchronization signals, the cell-search procedure may also exploit the reference signals as part of its operation.

17.1.1 Cell-search procedure

In the first step of the cell-search procedure, the mobile terminal uses the primary synchronization signal to find the timing on a 5 ms basis. Note that the primary synchronization signal is transmitted *twice* in each frame. One reason is to simplify

357

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.