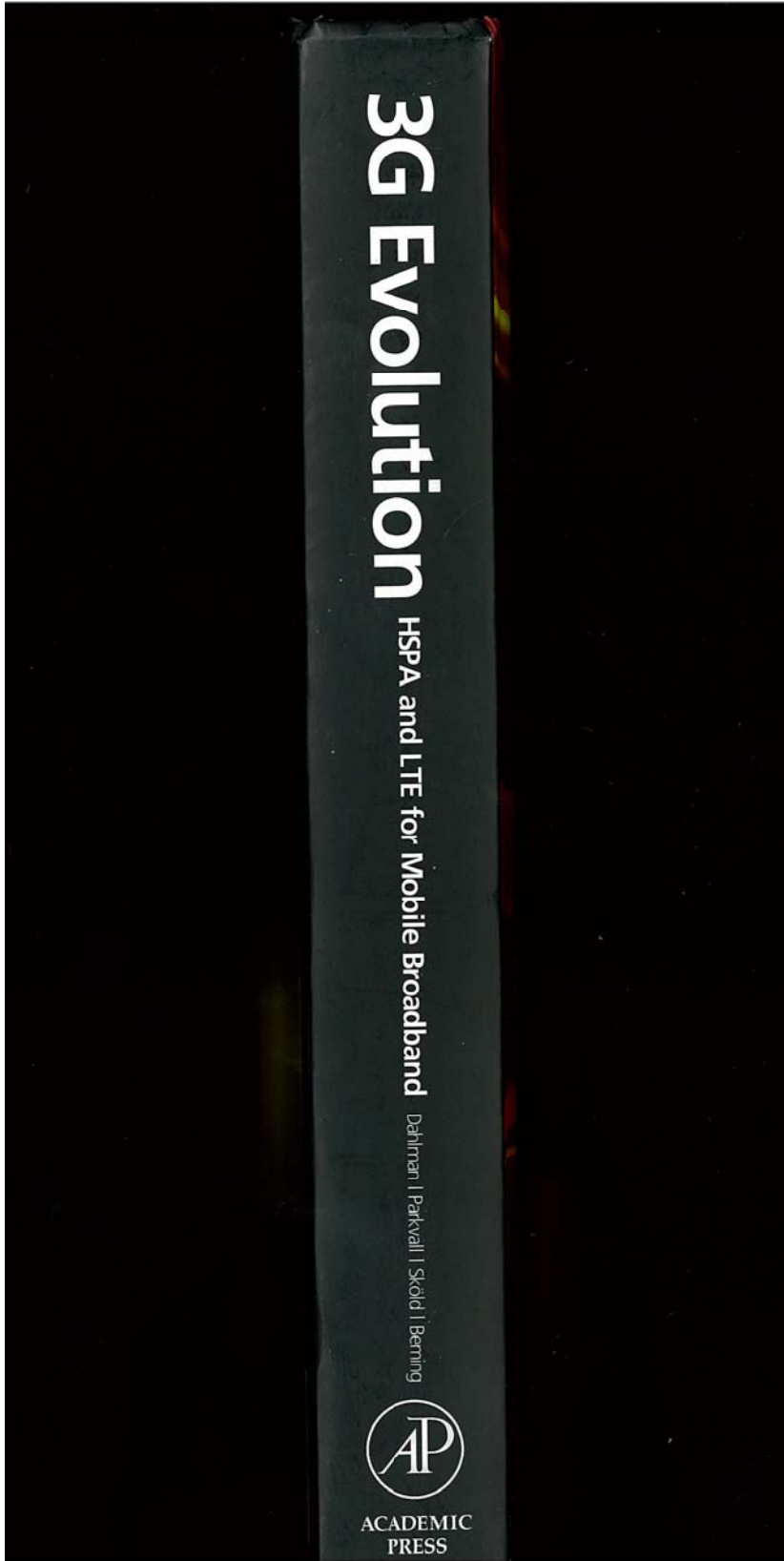


3G Evolution

HSPA and LTE for
Mobile Broadband

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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

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