



mobile communications series

**Gunnar Heine  
Holger Sagkob**

# GPRS

## Gateway to Third Generation Mobile Networks

S9	D48...43										
D'1	D48...43	1	D42...37	1	D'1	D36...31	1	D'9	D30...2		
0	1	2	3	4	5	6	7	8	9	10	

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# 3

## The Air Interface in GPRS

### 3.1 The 52 Multiframe

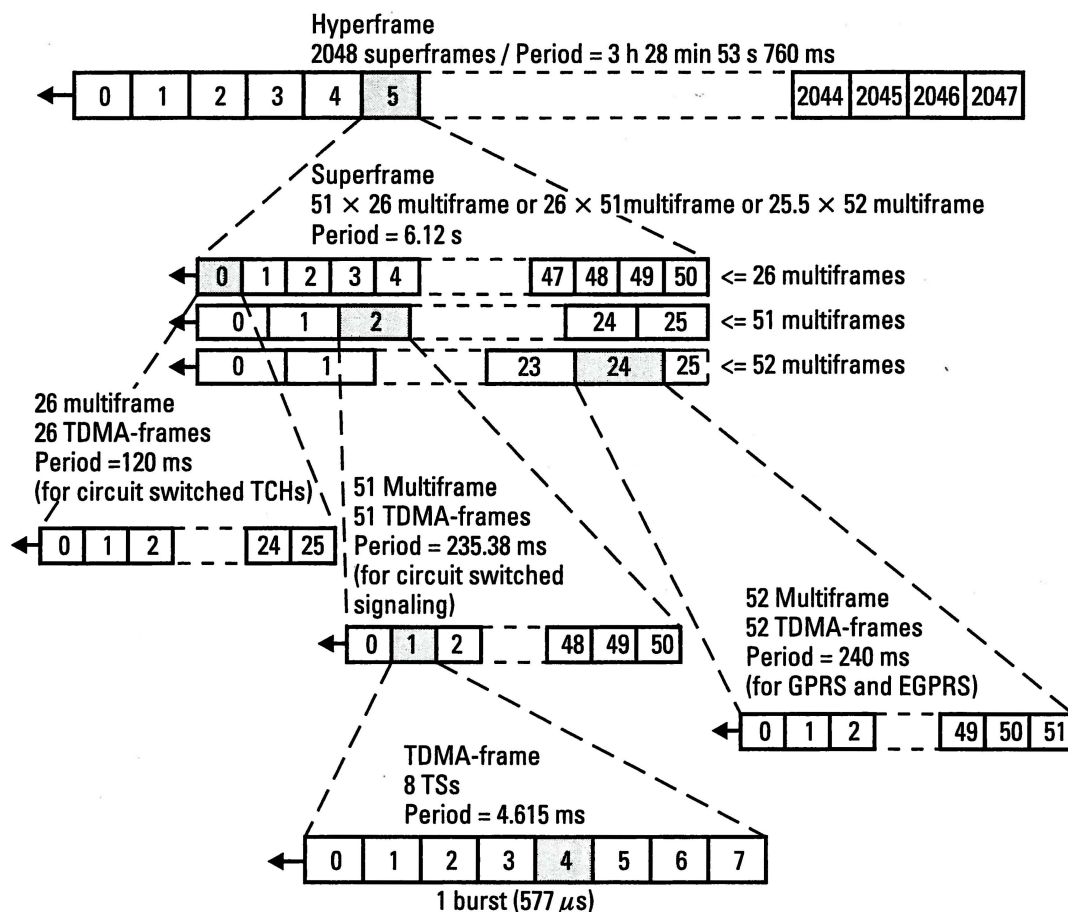
In the first chapter, we paid special attention to describing the frame hierarchy with 26 multiframe and 51 multiframe. One of the reasons for this is the definition of an additional multiframe type especially for GPRS. This new 52 multiframe with a period of exactly 240 ms is essential for understanding the resource administration and operation of GPRS.

Note that the 52 multiframe corresponds in terms of period to exactly two consecutive 26 multiframe as illustrated in Figure 3.1. For this reason, the function of synchronizing the mobile station to the BTS does not have to be altered (see also 1.6.6.1). In short, the 52 multiframe number is obtained by halving the 26 multiframe number. The current GPRS burden determines how many time slots on which ARFCNs traverse the 52 multiframe instead of the 26 multiframe and 51 multiframe. At a given point, there may only be one time slot configured for GPRS, which means using the 52 multiframe, whereas later, all eight time slots may be reserved on this frequency for GPRS and therefore configured with the 52 multiframe. Whatever the case may be, GPRS and GSM cannot coexist on one time slot. Depending on the burden, the services are switched from one to the other. We are pointing this out so clearly here because this is one of the most frequently asked questions in our GPRS courses.

#### 3.1.1 Structure and Multiplexing on the 52 Multiframe

The decisive factor for GPRS is the division of a 52 multiframe into 12 radio blocks, where each radio block is four repetitions of the same time





**Figure 3.1** The GSM frame hierarchy with the 52 multiframe for GPRS.

slot. Figure 3.2 shows the fine structure of the 52 multiframe with the 12 radio blocks and the TDMA frames for timing advance control and interference measurements.

It is the radio blocks that constitute the atomic resource unit of GPRS. While a user in GSM always receives a complete time slot as a resource for data transmission, only radio blocks, as parts of time slots, are allocated in GPRS. In this way, several subscribers can share a single time slot. A further peculiarity of GPRS is that the resources in the uplink and downlink directions are almost completely independent from one another. In particular, the allocation of radio blocks for data transmission in GPRS is either uplink or downlink. Of course, bidirectional data transmission is also possible and is used. These, however, require two resource allocations, one per direction. There is no certainty that a subscriber will be allocated the same time slot(s) for transmission in both directions. This depends in particular on the multislot class of his device.

In other words, a subscriber only receives the resources that are actually needed at any given time in accordance with the resource on demand concept



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