

Amended

Exhibit 10

Exhibit 10

Claim 7 of U.S. Patent No. 10,44

"7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to"

7. A mobile device in a wireless packet system using a frame structure of multiple frames for transmission, each frame comprising a plurality of time intervals, each time interval comprising a plurality of orthogonal frequency division multiplexing (OFDM) symbols, and each OFDM symbol containing a plurality of frequency subcarriers, the mobile device configured to:

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For clarity, release 8 of the 3GPP specifications was frozen in December 2008 and used as the basis for the first wave of LTE equipment. The LTE marketplaces have released releases from Release 8 through Release 17. Though for ease of review releases cited below, the same or functionally identical content exists in each corresponding release.

5 Physical Layer for E-UTRA

Downlink and uplink transmissions are organized into radio frames with 10 ms duration. Two radio frame structures are supported:

- Type 1, applicable to FDD,
- Type 2, applicable to TDD.

Frame structure Type 1 is illustrated in Figure 5.1-1. Each 10 ms radio frame is divided into ten equal sub-frames. Each sub-frame consists of two equally sized slots. For FDD, 10 subframes are available for downlink transmissions and 10 subframes are available for uplink transmissions in each 10 ms interval. Uplink and downlink transmissions are separated in the frequency domain.

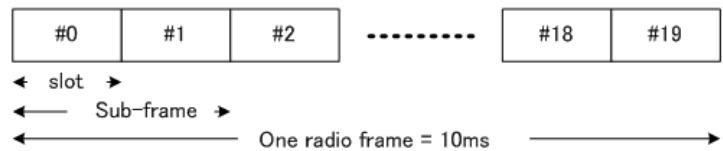


Figure 5.1-1: Frame structure type 1

Frame structure Type 2 is illustrated in Figure 5.1-2. Each 10 ms radio frame consists of two half-frames. Each half-frame consists of eight slots of length 0.5 ms and three special fields: DwPTS, GP and UpPTS. DwPTS and UpPTS is configurable subject to the total length of DwPTS, GP and UpPTS being equal to 3ms. 1.5ms and 10ms switch-point periodicity are supported. Subframe 1 in all configurations and subframe 6 in configuration with 1.5ms switch-point periodicity consist of DwPTS, GP and UpPTS. Subframe 6 in configuration with 10ms switch-point periodicity consists of DwPTS only. All other subframes consist of two equally sized slots.

For TDD, GP is reserved for downlink to uplink transition. Other Subframes/Fields are assigned for uplink transmission. Uplink and downlink transmissions are separated in the time domain.

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See e.g., 3GPP TS 36.300 V8.12.0 at pg. 23.

The LTE downlink uses orthogonal frequency division multiplexing (OFDM). In the downlink, OFDM symbols are transmitted.

5.1 Downlink Transmission Scheme

5.1.1 Basic transmission scheme based on OFDM

The downlink transmission scheme is based on conventional OFDM using a cyclic prefix. The sub-carrier spacing is $\Delta f = 15$ kHz. 12 consecutive sub-carriers during one slot correspond to one downlink resource block. In the frequency domain, the number of resource blocks, N_{RB} , can range from $N_{RB-min} = 6$ to N_{RB-max} .

In addition there is also a reduced sub-carrier spacing $\Delta f_{low} = 7.5$ kHz, only for MBMS-dedicated channels.

In the case of 15 kHz sub-carrier spacing there are two cyclic-prefix lengths, corresponding to normal and extended OFDM symbols per slot respectively.

- Normal cyclic prefix: $T_{CP} = 160 \times T_s$ (OFDM symbol #0), $T_{CP} = 144 \times T_s$ (OFDM symbol #1-11)

See e.g., 3GPP TS 36.300 V8.12.0 at pg. 25.

A subframe contains two slots, and in each slot multiple OFDM symbols are transmitted. Each OFDM symbol includes a plurality of subcarriers.

6.2 Slot structure and physical resource elements

6.2.1 Resource grid

The transmitted signal in each slot is described by a resource grid of $N_{RB}^{DL} N_{sc}^{RB}$ subcarriers and N_{symb}^{DL} OFDM symbols.

The resource grid structure is illustrated in Figure 6.2.2-1. The quantity N_{RB}^{DL} depends on the downlink bandwidth configured in the cell and shall fulfil

$$N_{RB}^{min,DL} \leq N_{RB}^{DL} \leq N_{RB}^{max,DL}$$

where $N_{RB}^{min,DL} = 6$ and $N_{RB}^{max,DL} = 110$ are the smallest and largest downlink bandwidth, respectively, in the current version of this specification.

U.S. Patent No. 10,447,450: Claim 7(a)

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	<i>See e.g.</i> , 3GPP TS 36.211 V8.9.0 at pg. 45.
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