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(54) METHOD AND MOBILE STATION TO PERFORM THE INITIAL CELL SEARCH IN TIME SLOTTED SYSTEMS

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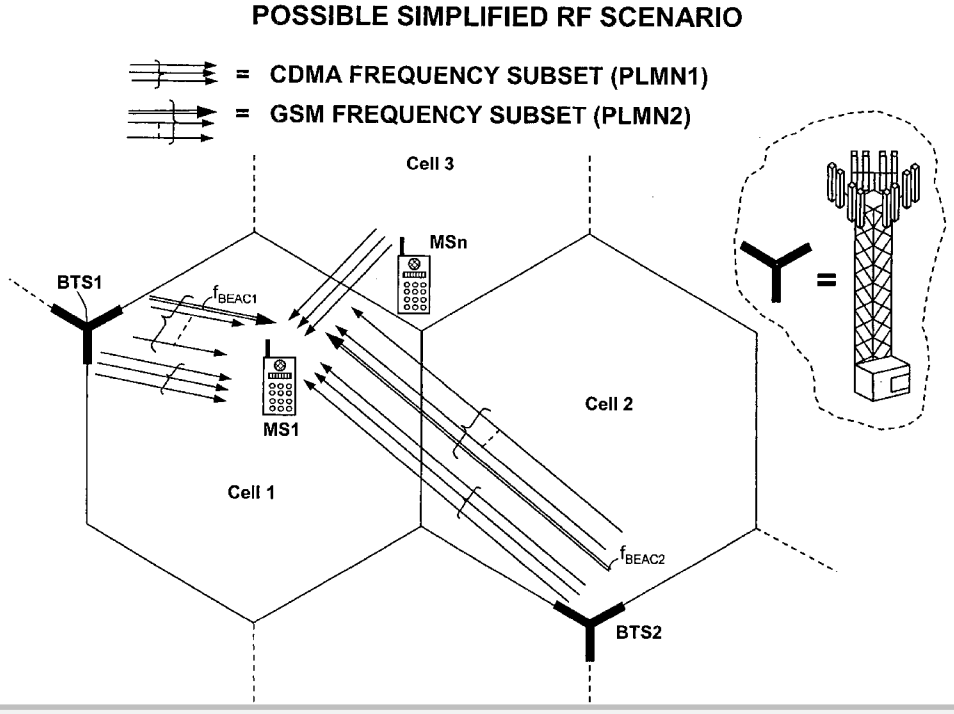
(57) **ABSTRACT**

A method is disclosed that a Mobile Station MS performs at switch-on to search the most favorable target cell in UMTS systems like the 3GPP CDMA—LCR (Low Chip Rate) option at 1.28 Mcps—TDD (Time Division Duplex) mode and the equivalent TD-SCDMA (Time Division—Synchronous CDMA). Signal at the MS antenna is the sum of different RF downlink frames coming from different carriers in the assigned frequency ranges. A DL synchronization timeslot and a BCCH TS**0** are both transmitted with full power in the frames, the first one includes one out of 32 SYNC codes assigned on cell basis. Following a conventional approach the absence of a common downlink pilot and without prior knowledge of the used frequencies would force the MS, for all the frequencies of the channel raster stored in the SIM card, the correlation of the received frame with all the 32 SYNCs stored in the MS, in order to detect the BSIC of a cell to which associate the power measures. Following the two-step method of the invention the power measures are performed in two-step scan of the PLMN band without interleaved correlation steps; once a final frequency is selected the respective frame is the only correlated one. At least one frame duration about 5 ms long of the whole 15 MHz bandwidth is acquired, IF converted, A/D converted and the digital set is stored. A rough scan is performed multiplying the digital set by a digital IF tuned in steps wide as the channel band (1.6 MHz) along the 15 MHz band, and filtering the baseband signal with a Root Raise Cosine low-pass filter. The 5 ms baseband signal is subdivided into 15 blocks of half timeslot (337.5 μs) and the power of each block is measured. The power of the strongest block indicates the priority of the respective frequency. The strongest power values are put in a Spectral Table together with respective frame load indicators. The load indicator is the percentage of timeslots in a frame almost equally loaded as the strongest block. The three strongest frequencies are selected for the successive scan. The second step search is performed like the first one but the IF steps are now 200 kHz wide and cover the only 1.6 MHz spectrum around a selected frequency. A final frequency is selected for the successive correlation step. Then the frequency error of the MS reference oscillator is corrected with data-aided techniques and a calibration value stored for successive connections (FIG. **9**).



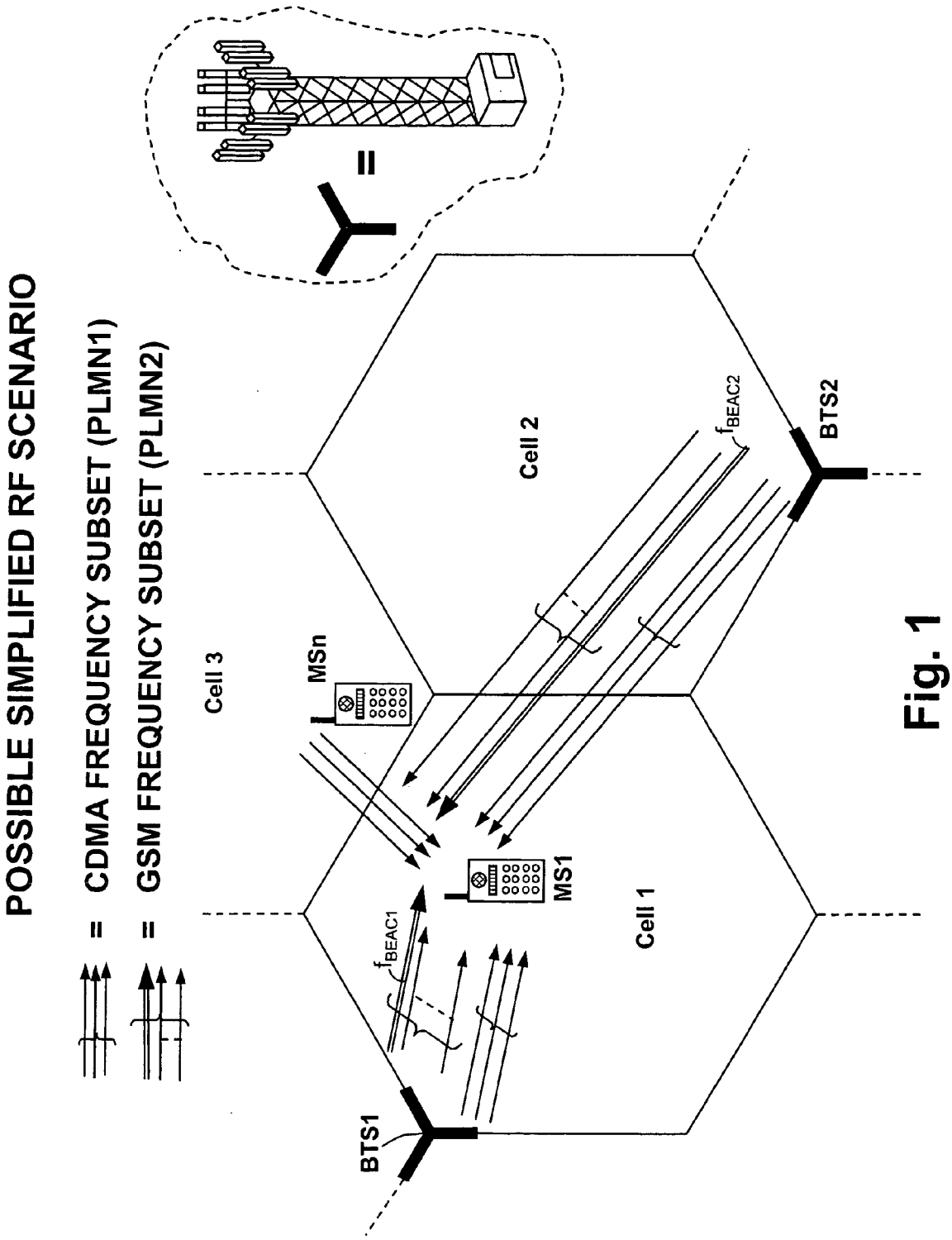


Fig. 1

KNOWN ART

GSM (or DCS) DOWNLINK SYNCHRONIZATION MULTIFRAME

TS0-C0 Channels: F = FCCH; S = SCH; B = BCCH; C = CCCH; (–) = idle

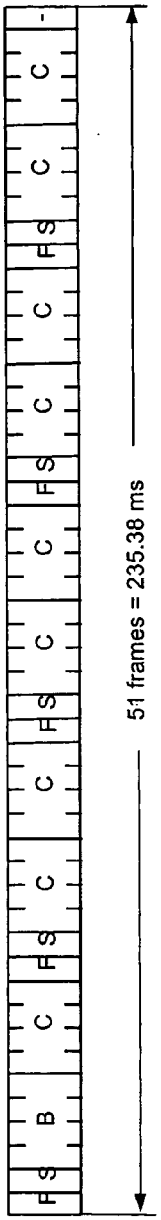


Fig. 2a

GSM (or DCS) FREQUENCY CORRECTION AND SYNCRONIZATION BURSTS

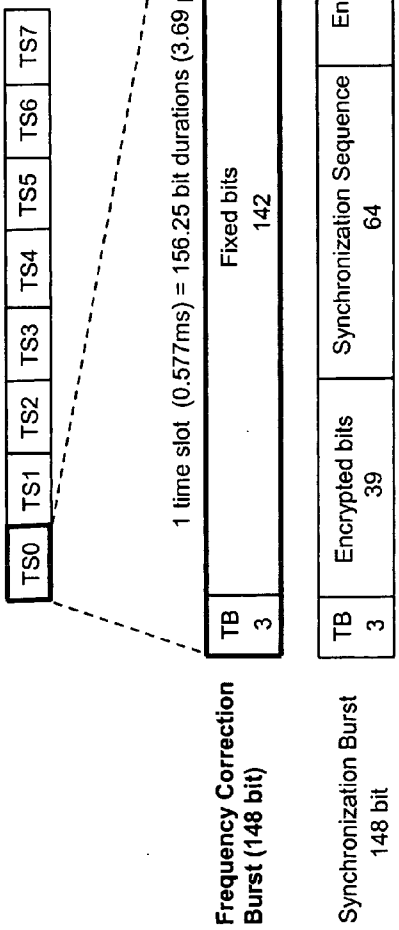


Fig. 2b

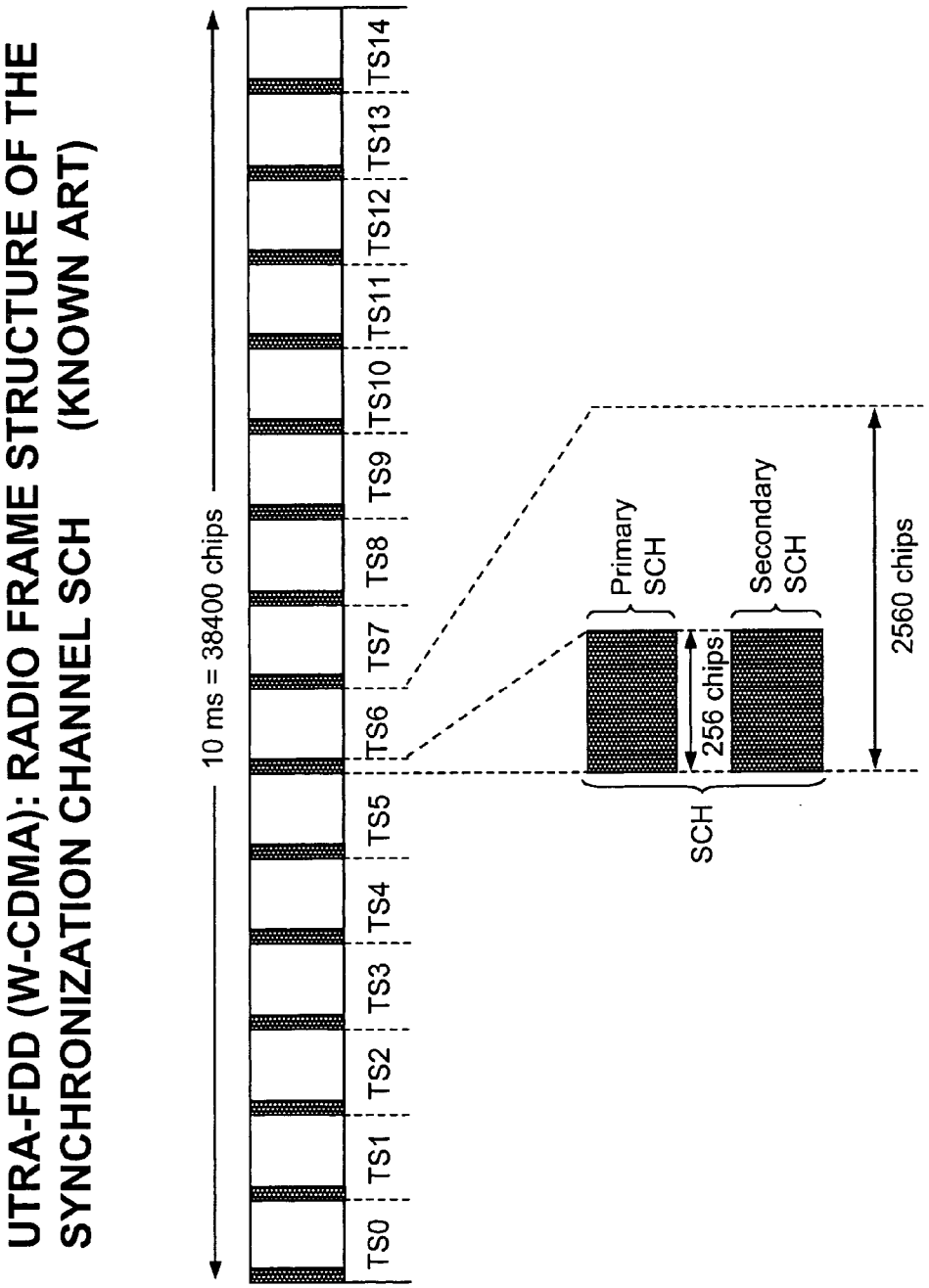


Fig. 3

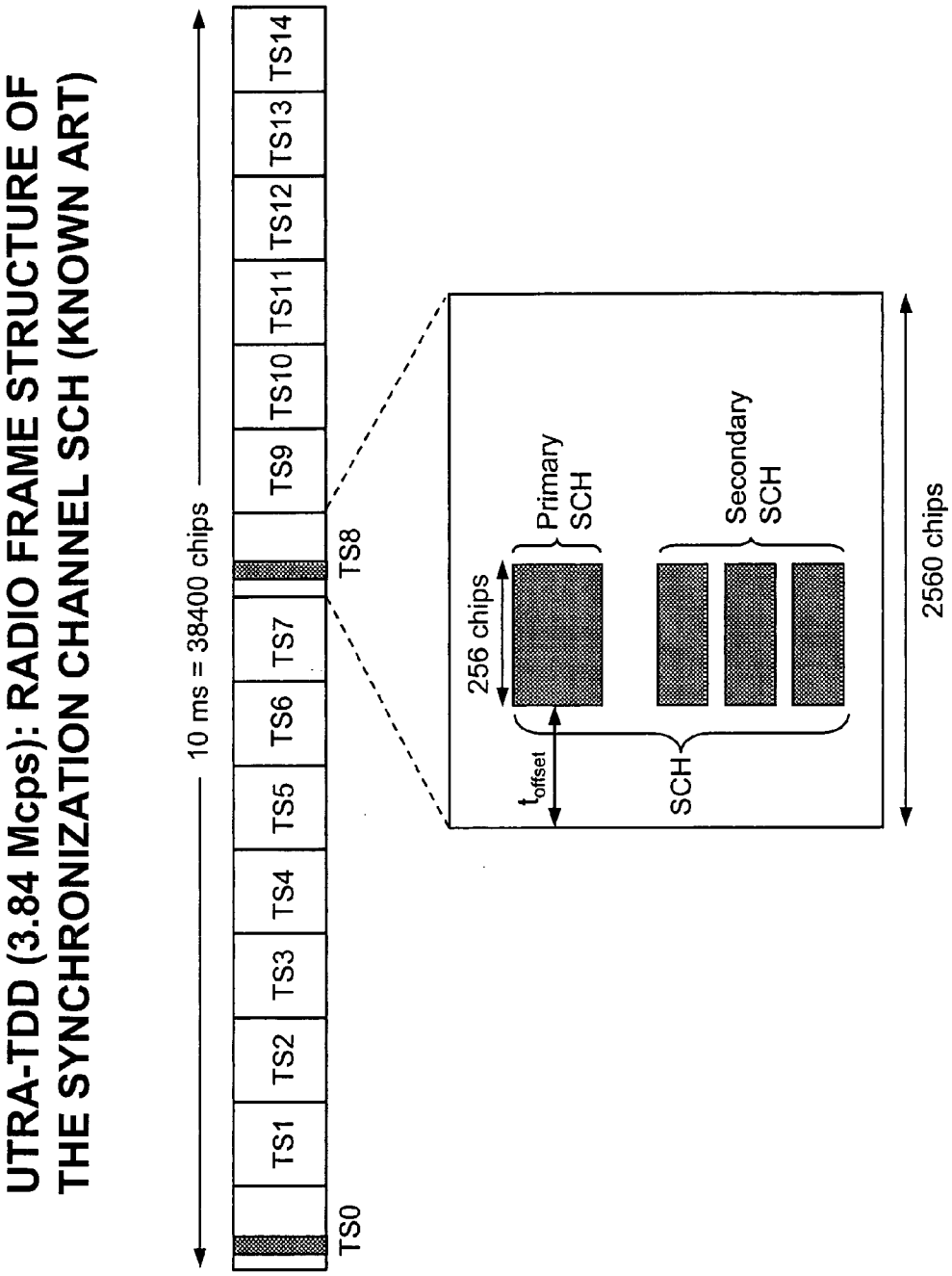


Fig. 4

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