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(54) **Title:** METHODS AND APPARATUS FOR MSG-A TRANSMISSION IN TWO-STEP RACH

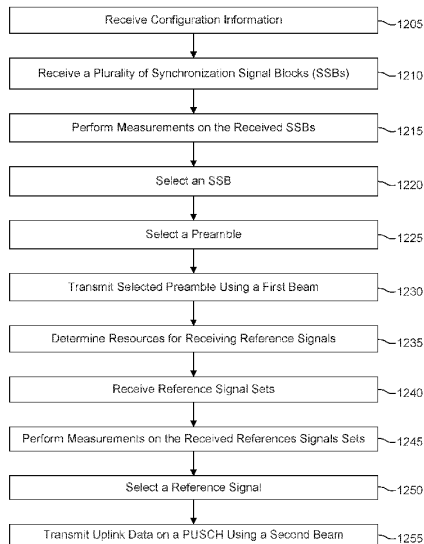


FIG. 12

(57) **Abstract:** Methods and apparatus for beam refinement are disclosed. A wireless transmit/receive unit (WTRU) may be configured to receive configuration information. The configuration information may indicate an association between preambles, synchronization signal blocks (SSBs), reference signal (RS) sets, and physical uplink shared channel (PUSCH) resources. The WTRU may be configured to receive a plurality of SSBs, determine a measurement of the received SSBs, and select an SSB based on the determined measurement. The WTRU may be configured to select and transmit a preamble using a first beam. The WTRU may be configured to receive a plurality of sets of RSs based on the transmitted preamble and determine a measurement of the received sets of RSs. The WTRU may be configured to select a RS based on the determined measurement of the received sets of RSs. The WTRU may be configured to transmit uplink data on a PUSCH using a second beam.

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