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(54) **Title**: METHOD AND APPARATUS FOR CHANNEL RESOURCE MAPPING IN CARRIER AGGREGATION

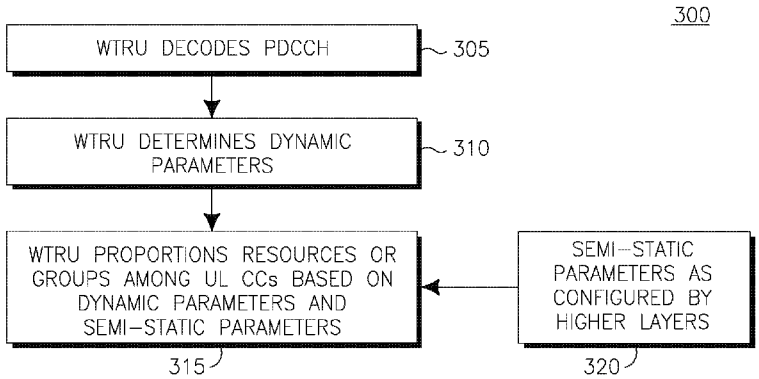

FIG. 3

(57) **Abstract**: Methods and apparatus for preventing physical hybrid automatic repeat request (HARQ) indicator channel (PHICH) ambiguities or collisions, for example, in a multi-carrier system or when transmitting multiple streams over multiple antennas, are described. Methods may include dividing resources or groups among multiple component carriers (CCs), using and assigning unused or vacant resources to CCs, forcing usage of adaptive HARQ processes in specified scenarios, setting a value for the cyclic shift of the corresponding uplink demodulation reference signals (DMRS) to a previous value for semi-persistent scheduling, and assigning a different first resource block for semi-persistent scheduling uplink resources and random access response grants for multiple CCs.

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