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(54) **ALL DIGITAL PHASED ARRAY USING SPACE/TIME CASCADED PROCESSING**

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(57) **ABSTRACT**

The invention concerns a method and apparatus for cascaded processing of signals in a phased array antenna system in which a plurality of antenna elements are configured as a plurality of sub-arrays. A weighting factor is applied to each of the antenna elements to form a plurality of sub-array beams, each pointed in a selected direction. For each sub-array, an output from each the antenna elements in the sub-array can be combined to produce a sub-array output signal. The sub-array output signals are selectively weighted and combined in a fully adaptive process. Subsequently, the system can estimate an angle-of-arrival direction for a signal-of-interest ("SOI") and at least one signal-not-of-interest ("SNOI"). Based on this estimating step, the system calculates a new set of weighting factors for controlling one or more of the sub-array beams to improve the signal-to-noise plus interference ratio obtained for the SOI in the array output signal.

**28 Claims, 4 Drawing Sheets**

