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(54) Title: ACTIVE BUTLER AND BLASS MATRICES

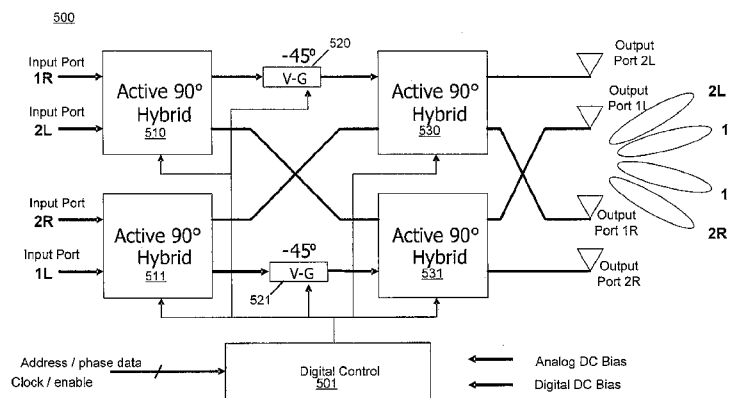
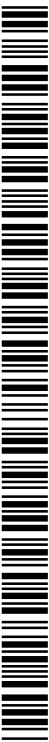


Figure 5

(57) Abstract: In an exemplary embodiment, a monolithic active solution is configured to generate the fixed spatial beams of a Butler matrix operation or a Blass matrix operation. The exemplary Butler matrix comprises active RF hybrids and vector generators, and is designed for broadband performance in an ultra-compact size, which is size independent of the operating frequency. Furthermore, an exemplary Blass matrix comprises vector generators, active power combiners, and active power splitters. The Blass matrix is designed for broadband performance in an ultra-compact size, which is size independent of the operating frequency. Both the exemplary Butler matrix and exemplary Blass matrix may be configured generate steerable beams. Advantages of both the exemplary Butler matrix and exemplary Blass matrix include that they have neutral or slight positive power gain rather than high losses, and have ultra broadband range which enables operation over multiple frequency bands.



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**A. CLASSIFICATION OF SUBJECT MATTER****H01Q 3/24(2006.01)i, H01Q 5/00(2006.01)i**

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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

H01Q 3/24; H01Q 21/20; G01S 7/40; H01Q 3/22; G01R 29/10; H04B 1/06; H01P 5/16; H01Q 3/26; G01S 3/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) &amp; Keywords: bulter, blass, hybrid, adaptive, array, beam, generator

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6061553 A1 (MATSUOKA, HIDEHIRO et al.) 09 May 2000 See the abstract; figures 6-8; column 8 line 16 - column 9 line 32; and claims 1-7	1-19
A	WO 00-03456 A1 (NTT MOBILE COMMUNICATIONS NETWORK, INC. et al.) 20 January 2000 See the abstract; figures 1-7, 19; page 12 line 19 - page 18 line 3; and claims 1-4	1-19
A	WO 00-33419 A1 (RAYTHEON COMPANY) 08 June 2000 See the abstract; figures 6-7, 12-14; page 9 line 30 - page 10 line 33, page 17 line 1 - page 19 line 2; and claims 19-25	1-19
A	JP 2002-057515 A (NIPPON TELEGR & TELEPH CORP <NTT>) 22 February 2002 See the abstract; figures 8-16; paragraphs 16-29; and claims 1-3	1-19
A	US 5086302 A1 (MILLER, GEORGE M.) 04 February 1992 See the abstract; figure 3; column 6 line 3 - column 9 line 28; and claims 1-5	1-19

 Further documents are listed in the continuation of Box C. See patent family annex.

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