

PETITIONERS'
TRIAL HEARING DEMONSTRATIVES
ERICSSON INC.
NOKIA OF AMERICA CORPORATION
Petitioners,
v.
XR Communications LLC
Patent Owner

Inter Partes Review No.: IPR2024-00868
U.S. Patent No. 8,737,511

TRIAL HEARING
SEPTEMBER 24, 2025

DUANE MORRIS LLP

Overview of Grounds

Ground	Basis	Cited Art	'511 Claims
1	103	Trigui in view of the knowledge of a POSA	1-2, 4-6, 9-11, 13-15, and 18-20
2	103	Trigui in view of Rudrapatna and the knowledge of a POSA	4-6, 9, 13-15, and 18

Pet. 18.

Overview of Disputes

Dispute	Basis	Claims
1	Trigui discloses n bidirectional beams	1, 20
2	Trigui discloses n multiple-input multiple-output transceivers (MIMO) from elements 1[b], 1[c]	1, 20

Overview of Ground 1 Trigui

Claim 1

1. A system comprising:

m antenna arrays configured to receive a propagating radio frequency signal and configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different bi-directional beams using the plurality of antenna elements; and

n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver configured to process m different received signals, wherein an i-th received signal to a j-th MIMO receiver corresponds to a j-th beam of an i-th antenna array; and

a MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a z-th beam of a v-th antenna array,

wherein m, n, v, and z are integer number values, wherein $i=1, \dots, m$, $j=1, \dots, n$, and $v=1, \dots, m$, wherein $n \geq 2$ and $m \geq 2$, wherein $z=1, \dots, w$, and wherein $n \geq w \geq 2$.

Overview of '511 Patent

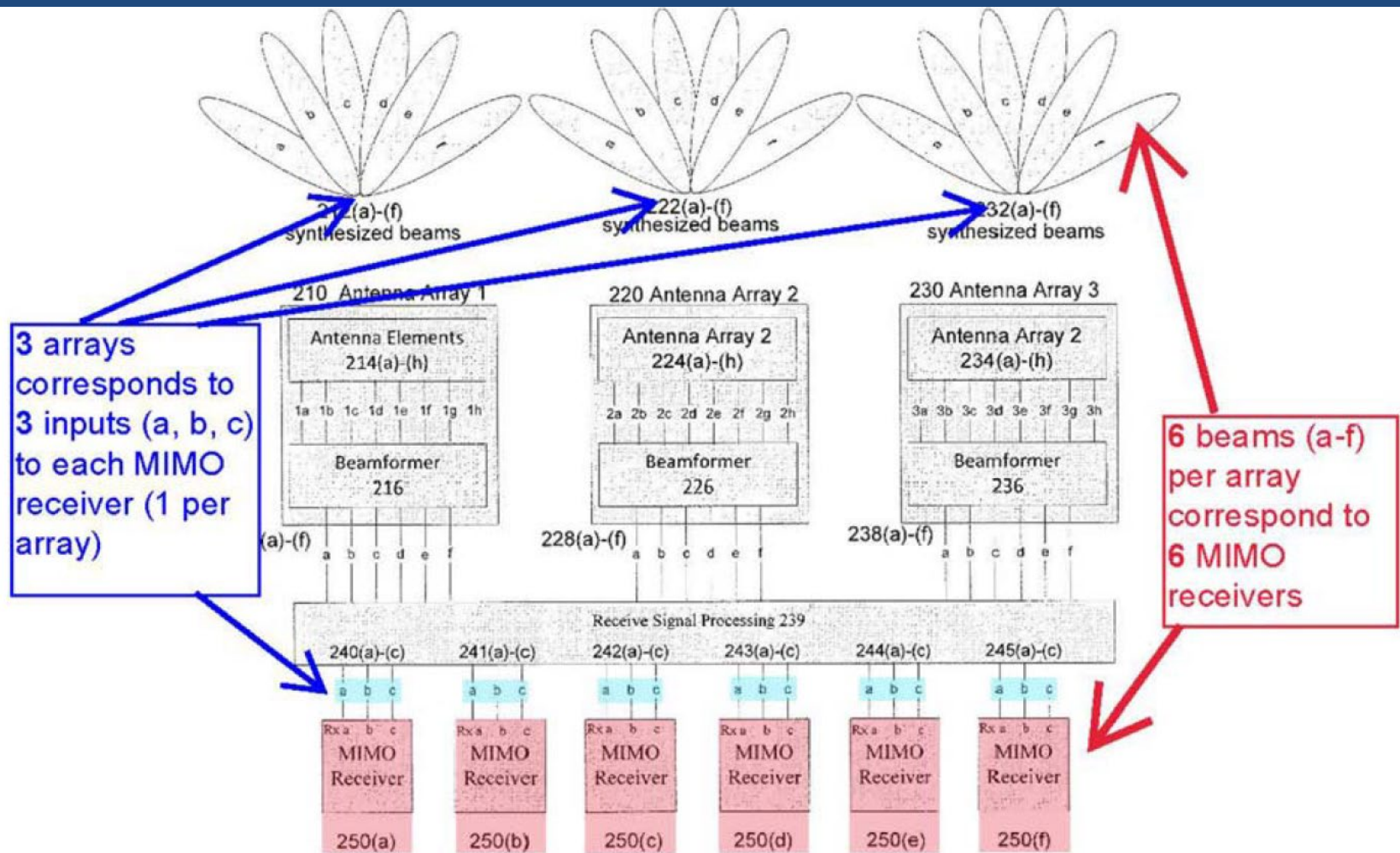


FIG. 2

Overview of Trigui

(19) **United States**

(12) **Patent Application Publication**
TRIGUI et al.

(10) **Pub. No.: US 2011/0150050 A1**

(43) **Pub. Date: Jun. 23, 2011**

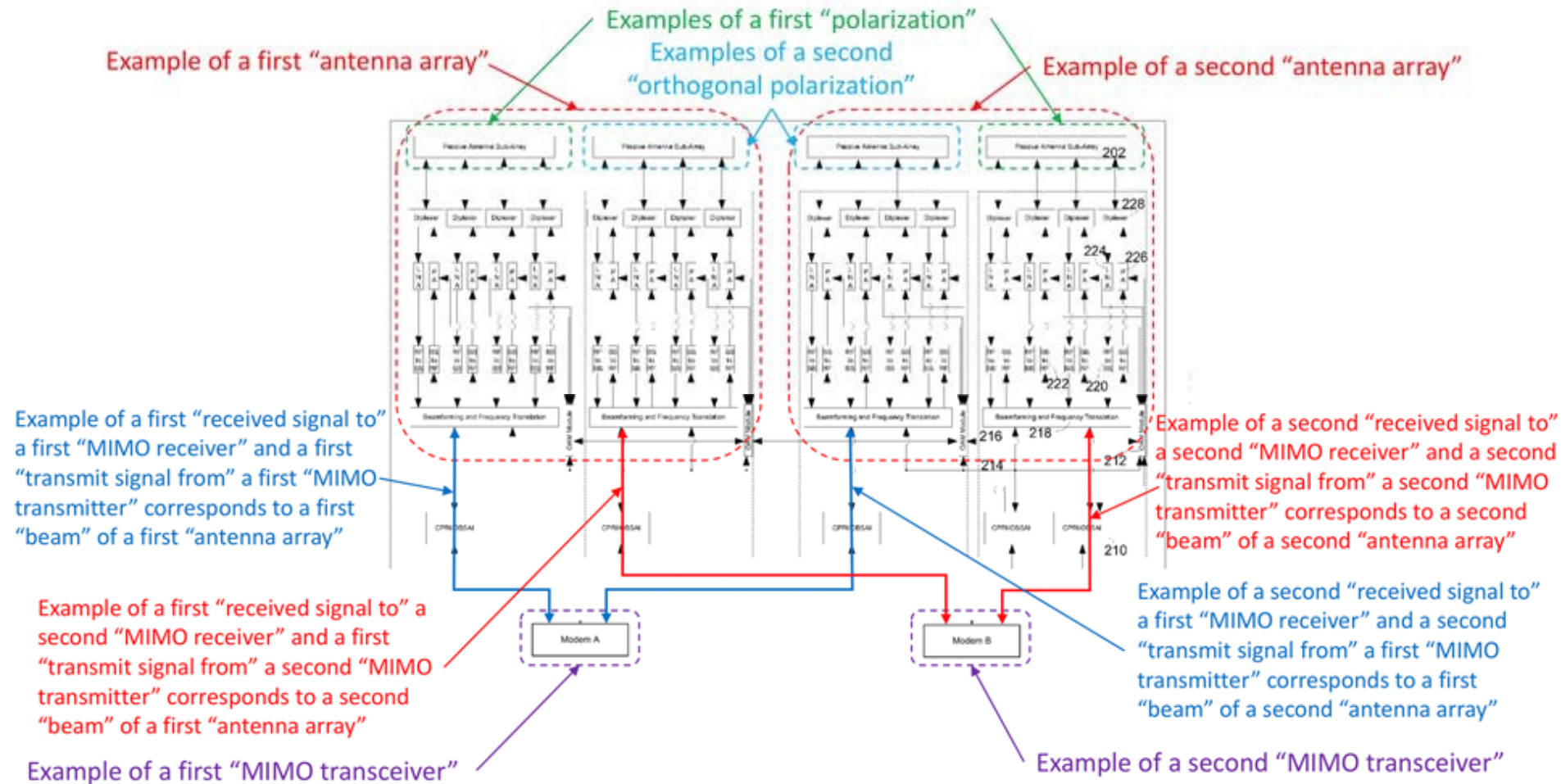
(54) **DIGITAL INTEGRATED ANTENNA ARRAY
FOR ENHANCING COVERAGE AND
CAPACITY OF A WIRELESS NETWORK**

(52) **U.S. Cl. 375/219; 375/260**

“[Trigui] relates generally to ... using a **digital integrated antenna array** for enhancing coverage and capacity of a wireless network, and enabling a versatile solution for sharing antenna elements and active electronics between multiple operators servicing the same geographic area”
Ex-1004, [0002]

Petition 16, 18, 22, 44, 54

Overview of Trigui



"Each antenna array has two beams (a blue polarized beam and a green polarized beam)." (Pet. 32)

Dispute 1: Trigui discloses n bidirectional beams

Claim 1

1. A system comprising:

m antenna arrays ..., each ... comprising: ...

a beamformer configured to produce **n different bi-directional beams** ... and

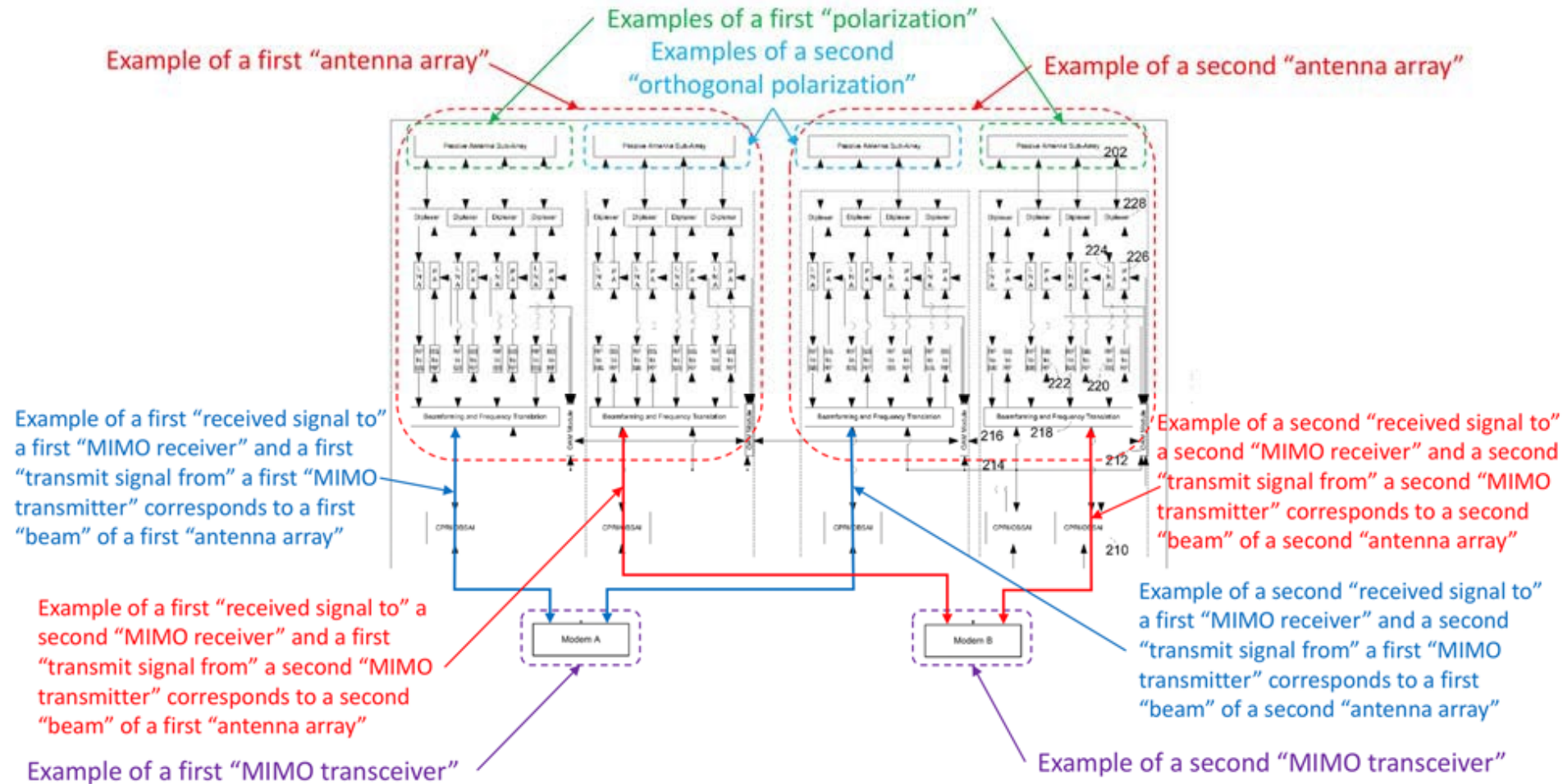
n multiple-input multiple-output transceivers (MIMO), each MIMO transceiver comprising:

a MIMO receiver ...; and

a MIMO transmitter configured to process **m different transmit signals**, wherein a v-th transmit signal from a z-th MIMO transmitter corresponds to a **z-th beam** of a v-th antenna array, ... wherein **$n \geq 2$** and $m \geq 2$,

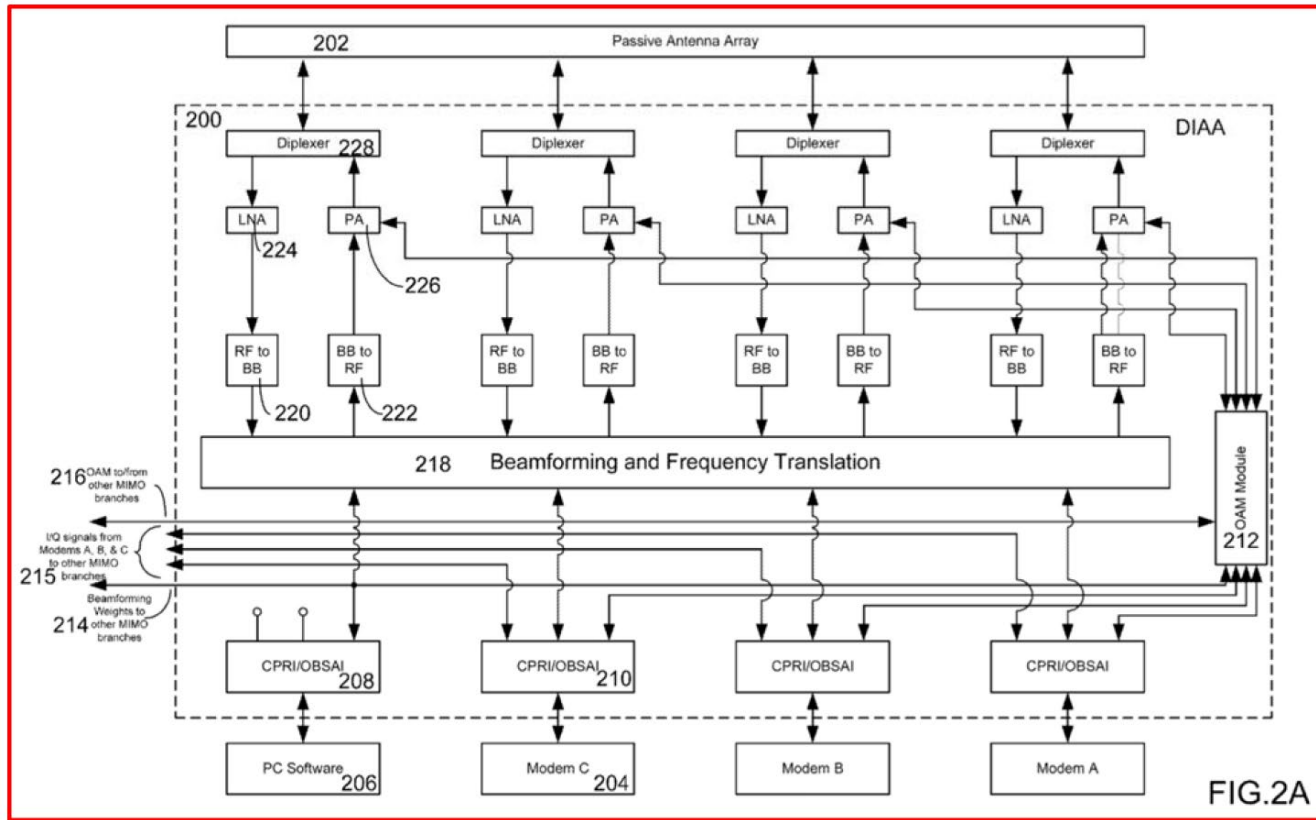
...

Overview of Trigui



"Each antenna array has two beams (a blue polarized beam and a green polarized beam)." (Pet. 32)s

Overview of Trigui (Fig. 2A)



“FIG. 2A... represents a single MIMO branch of a DIAA system...An exemplary implementation of a $2 \times N$ MIMO DIAA, essentially including multiples of the hardware of FIGS. 2A and 2B, is illustrated FIG. 6 Additionally, exemplary implementations of $4 \times N$ MIMO DIAAs, essentially including multiples of the hardware of FIGS. 2A and 2B, are illustrated by FIGS. 7-11....” EX-1004, [0036].

Overview of Trigui (Figs. 2A / 6)

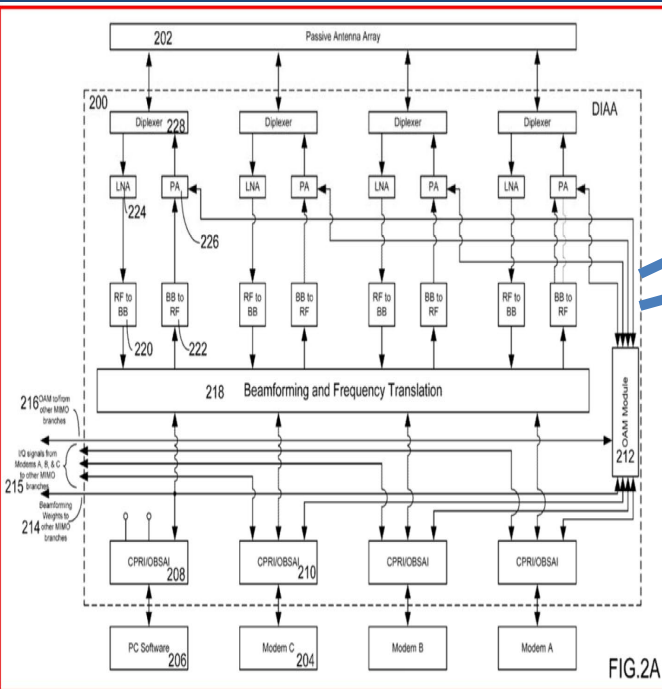


FIG.2A

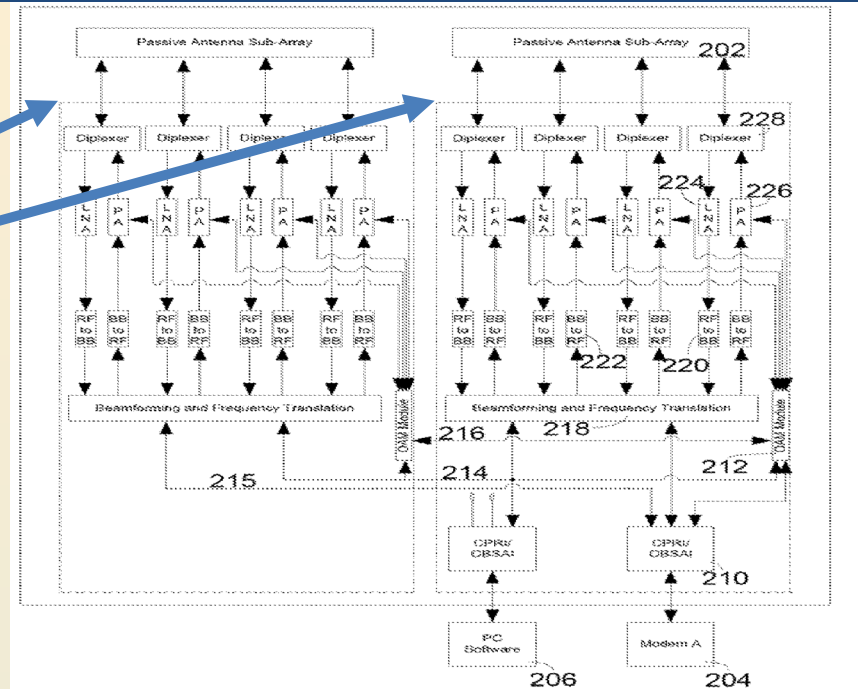
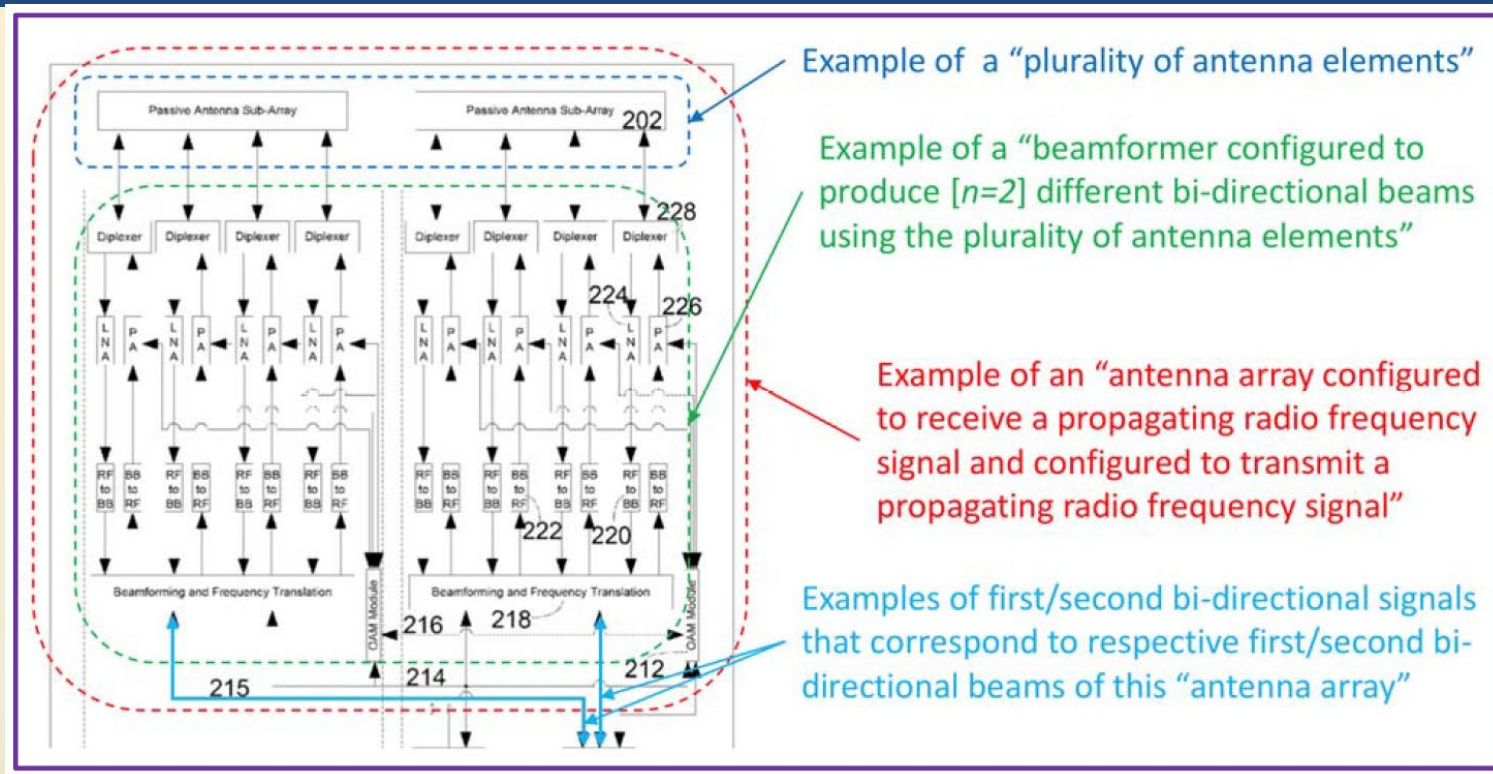


FIG.6

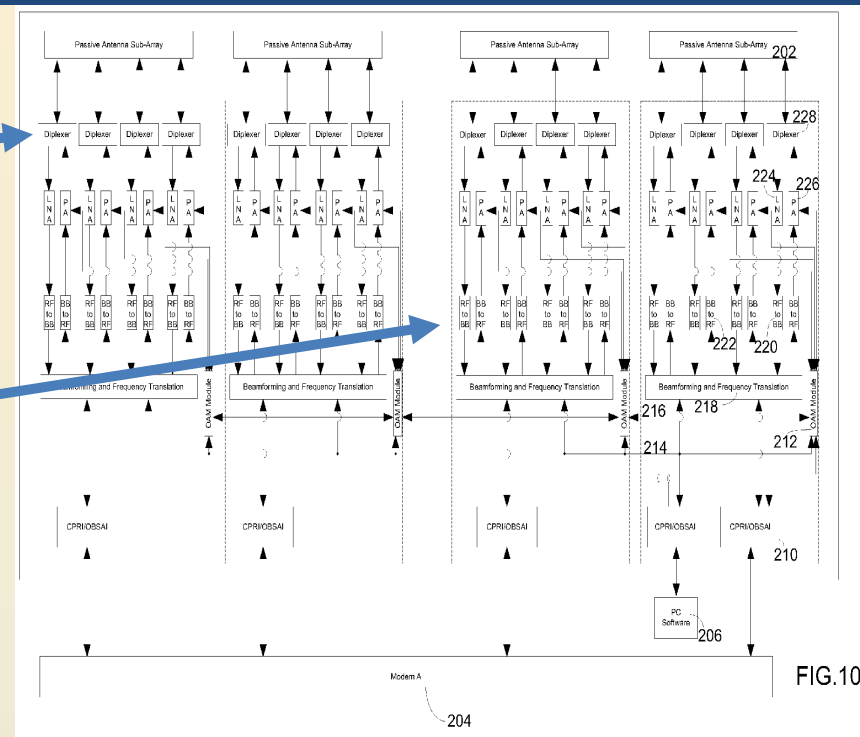
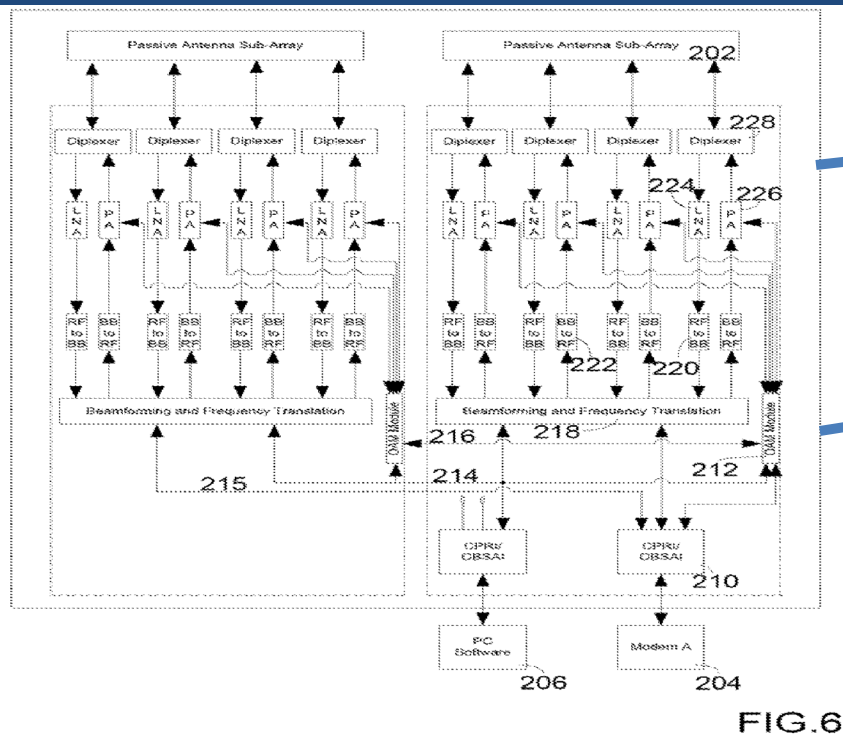
“An exemplary implementation of a 2×N MIMO DIAA, essentially including multiples of the hardware of FIGS. 2A and 2B, is illustrated FIG. 6.” EX-1004, [0036].

Overview of Trigui (Fig. 6)



"FIG. 6 illustrates a $2 \times N$ MIMO DIAA system. ... FIG. 6 illustrates two MIMO branches ... each antenna sub-array of FIG. 6 may provide a specified polarization as required by an application" Ex-1004, [0081]. "Each MIMO transceiver branch has one beam for transmit and receive." Ex-1004, [0077].

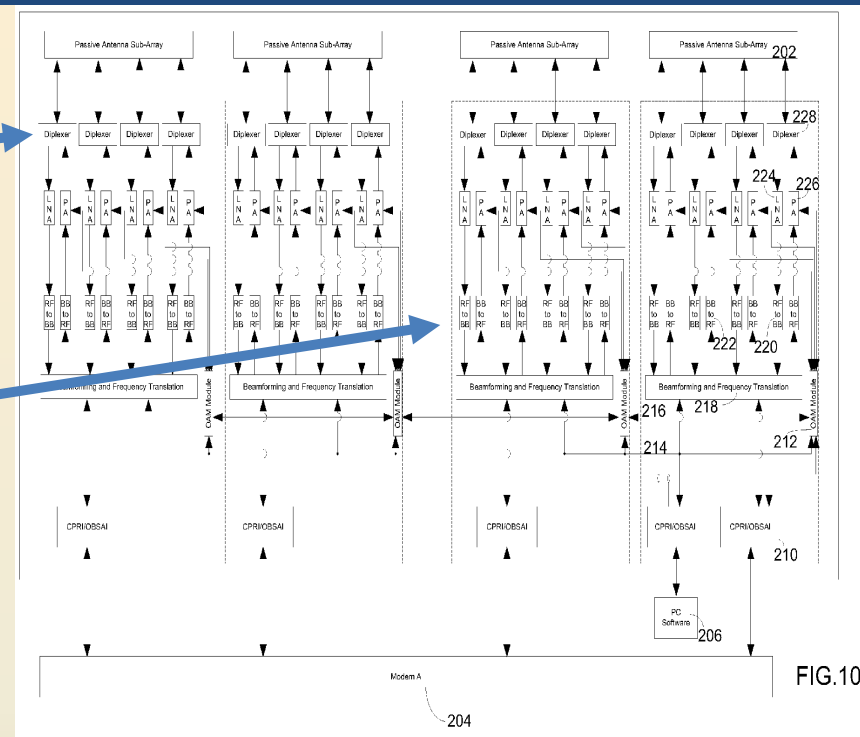
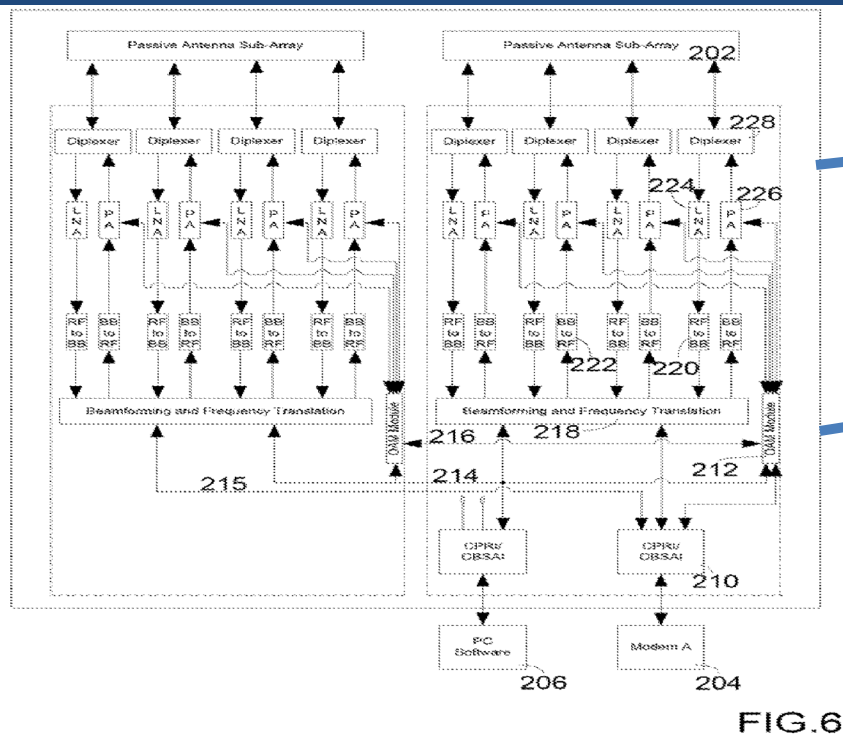
Overview of Trigui (Figs. 6 / 10)



“An exemplary implementation of a 2×N MIMO DIAA, essentially including multiples of the hardware of FIGS. 2A and 2B, is illustrated FIG. 6.” EX-1004, [0036].

Petition 28-30, 40; Ex-1003, ¶¶ 194-198, 249-256, 225, 235-237, 46, 122, Ex-1004, [0036]

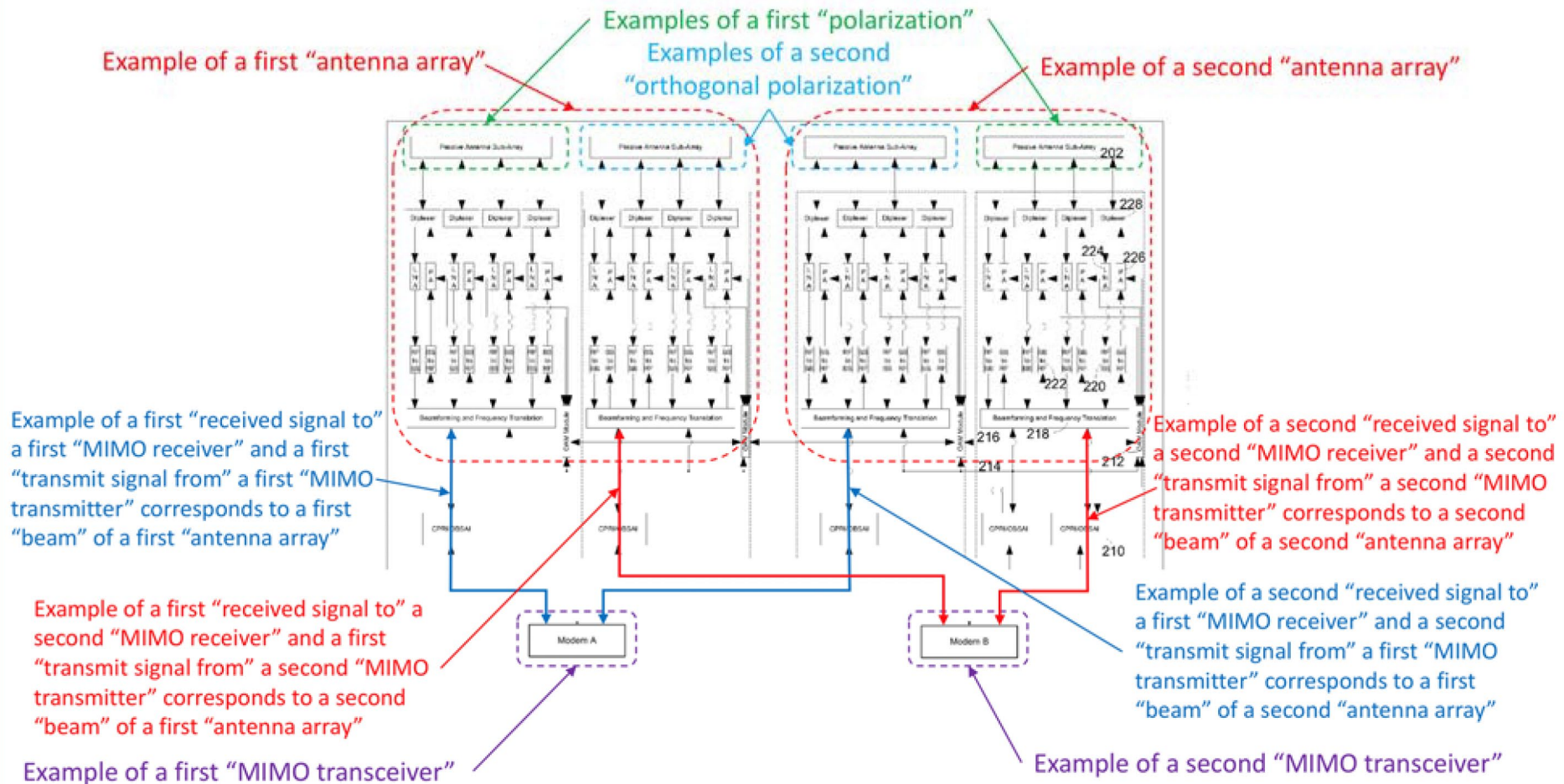
Overview of Trigui (Figs. 6 / 10)



“Trigui also discloses that ‘exemplary implementations of 4×N MIMO DIAAs, essentially including multiples of the hardware of FIG. 2A’ are ‘illustrated by FIGS. 7-11’... discloses that these ‘4×N MIMO DIAAs’ are ‘implemented as two independent 2×N MIMO DIAAs’ (see, for example, ¶¶ 112-113, 120 and 122 above).” Ex-1003, ¶194 (quoting Ex-1004, [0036], [0082])

Petition 28-30, Ex-1003, ¶¶ 194-198, 249-256, 225, 235-237, 46, 122, Ex-1004, [0036]

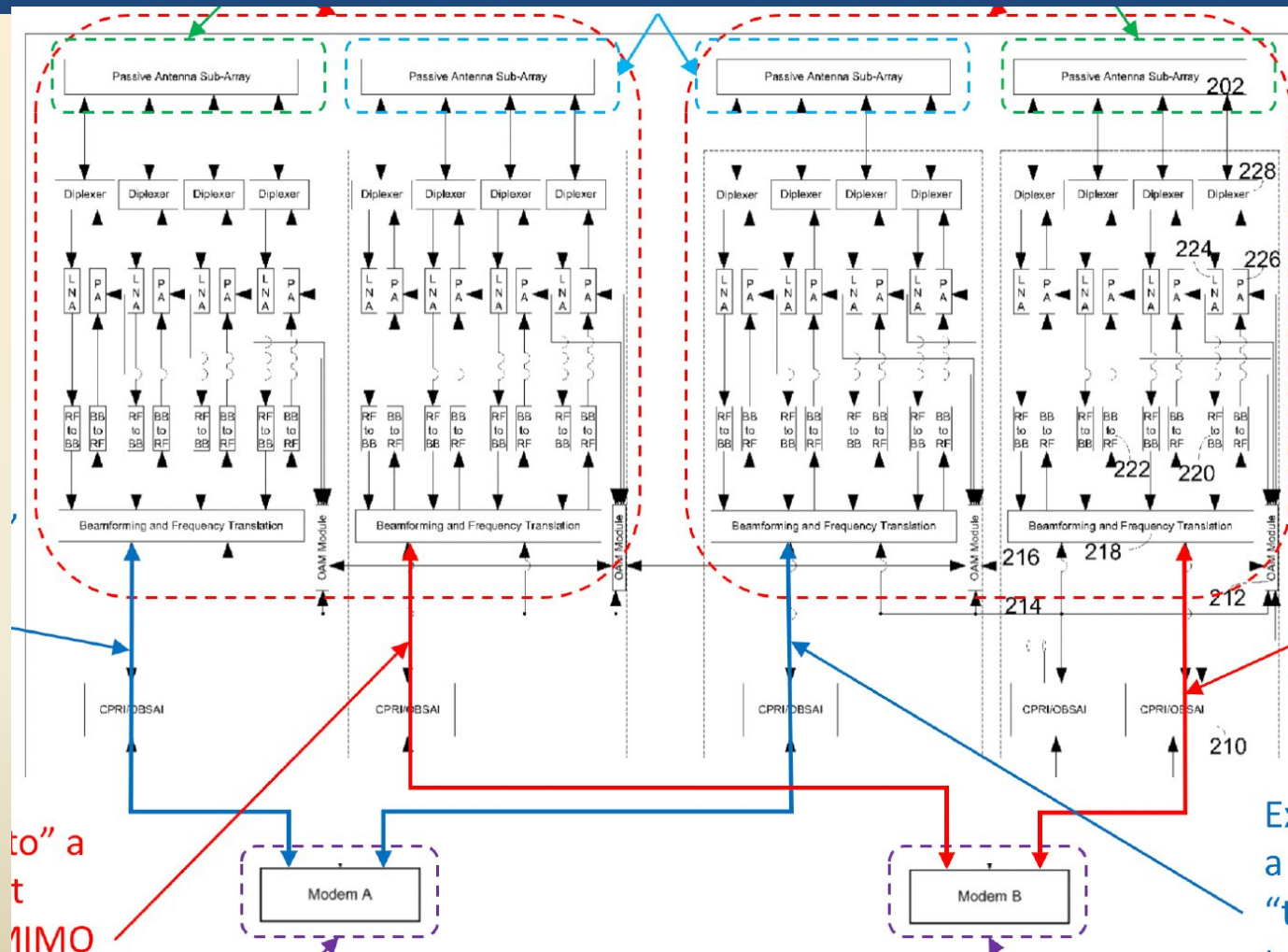
Overview of Trigui (Fig. 10)



"Each antenna array has two beams (a blue polarized beam and a green polarized beam)." (Pet. 32)

Petition 32, Ex-1004, Fig. 10; Ex-1003, ¶¶218-221; 251-253

Overview of Trigui (Fig. 10)



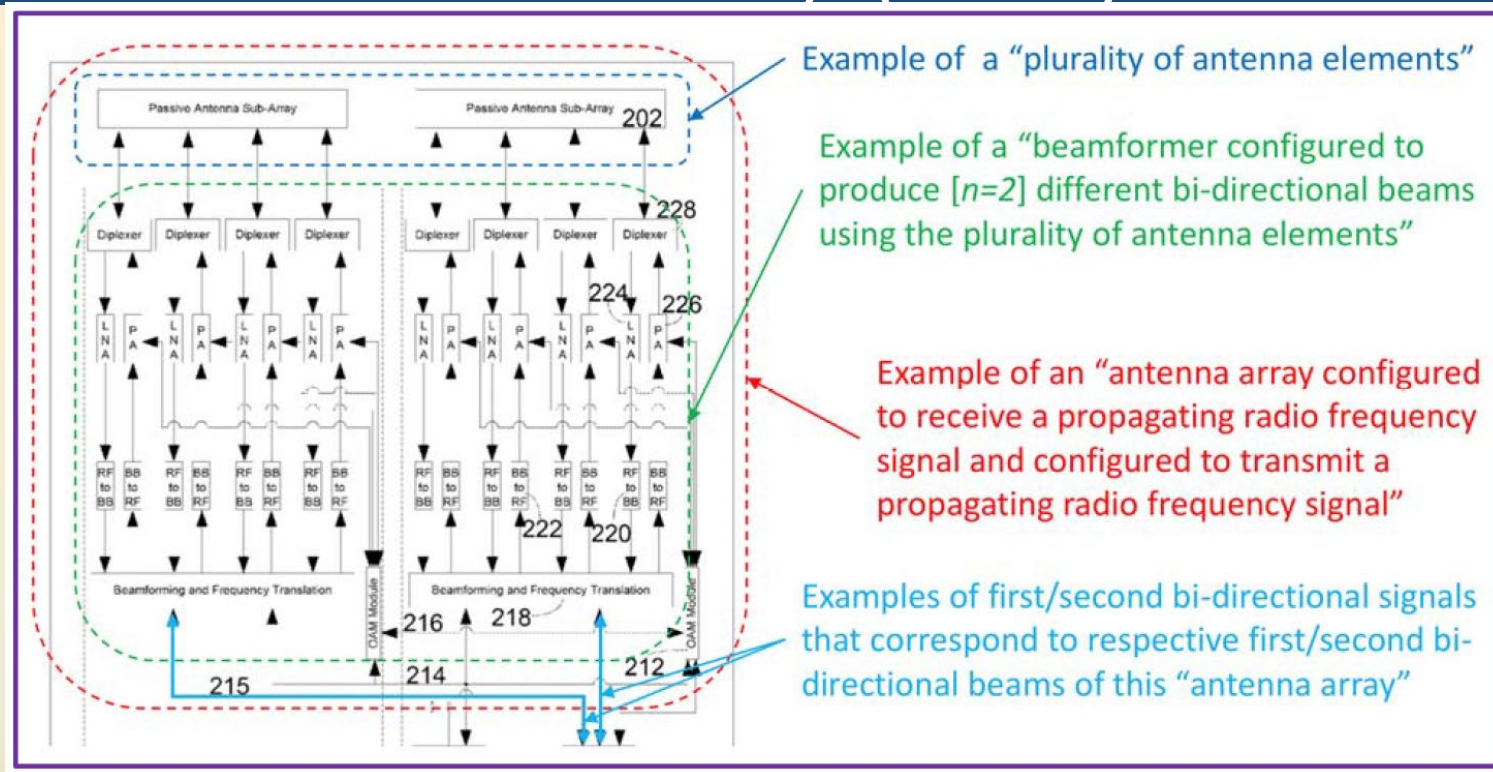
“Each antenna array has two beams (a blue polarized beam and a green polarized beam).” (Pet. 32).

Petition 32, Ex-1004, Fig. 10; Ex-1003, ¶¶251-253, 218-223

PO Arguments

- PO arguments:
 - *“Petitioner argues that Trigui Figure 6 discloses $n=2$ beams. Reply at 7-8. Not so. Dr. Negus drew a box around a cluster of components and added the annotation ‘ $[n=2]$ different bi-directional beams,’ but that is not supported.”* PO Sur-reply at 11.

Trigui (Fig. 6) (“n bidirectional beams”) (n=2)

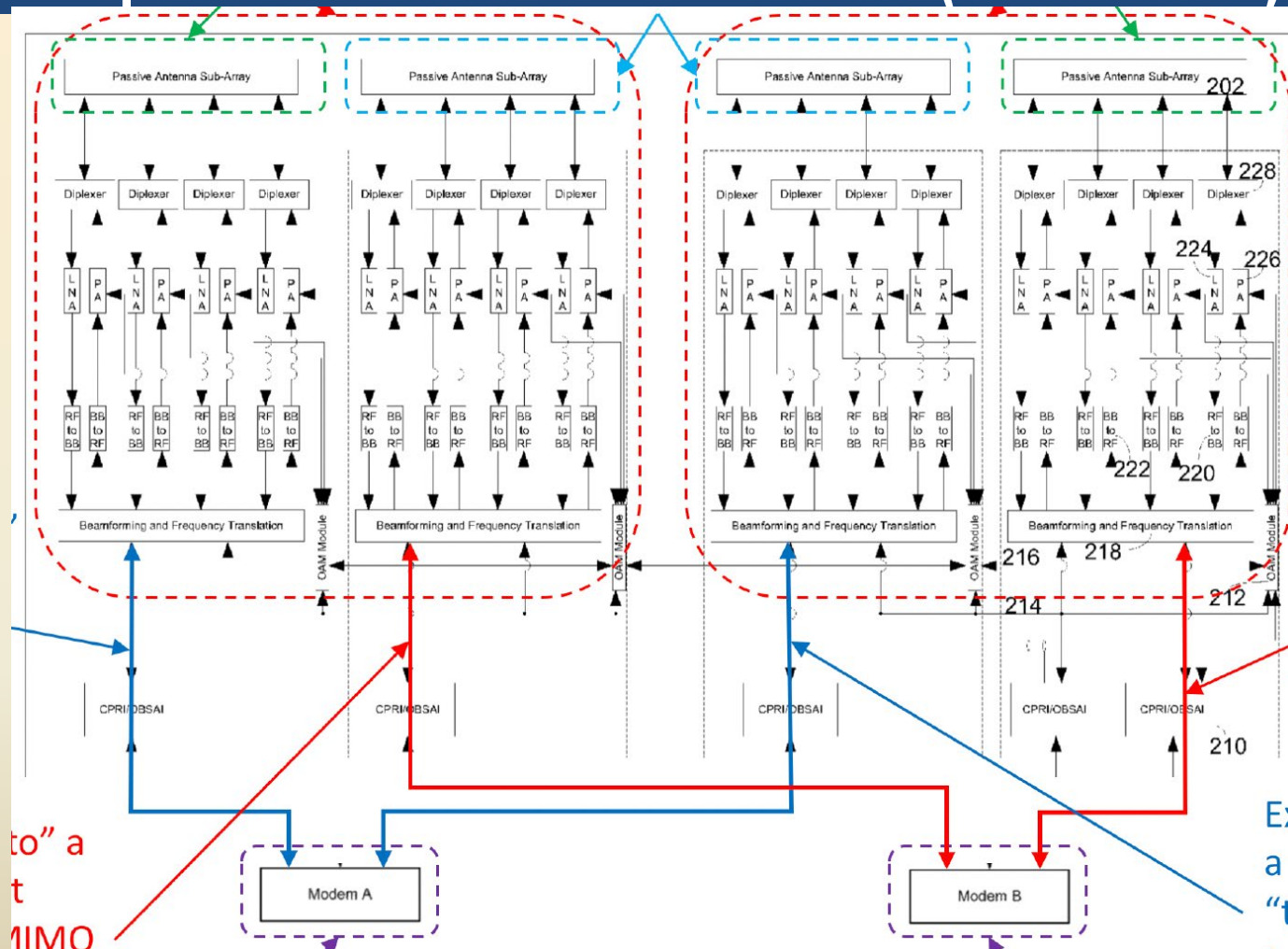


“FIG. 6 illustrates a 2×N MIMO DIAA system. ... FIG. 6 illustrates two MIMO branches ... each antenna sub-array of FIG. 6 may provide a specified polarization as required by an application....” Ex-1004, [0081]. “Each MIMO transceiver branch has one beam for transmit and receive.” Ex-1004, [0077].

Petition 27-28, 32 Ex-1003, ¶¶189, 192-193, Ex-1004, Fig. 6s

Dispute 2: “*n multiple-input multiple-output transceivers (MIMO)*”

Trigui “n multiple-input multiple-output transceivers (MIMO)”



“A POSA would understand that there are two MIMO transceivers (Modems A and B)....” (Pet. 32).

Petition 32, Ex-1004, Fig. 10; Ex-1003, ¶¶251-253, 218-223, 225-232

Trigui “n multiple-input multiple-output transceivers (MIMO)” (modems)

“The present invention relates generally to the field of wireless networking, and more specifically to using a digital integrated antenna array for enhancing coverage and capacity of a wireless network, and enabling a versatile solution for sharing antenna elements and active electronics between multiple operators servicing the same geographic area regardless of the supported base stations' multi-antenna schemes and the number of RF carriers.” Ex-1004, 0002

“An additional feature of the present invention is enabling multiple operator sharing of a passive antenna array, transceivers, and the total available power of the DIAA. Additionally, splitting resources between the multiple operators is flexible and should be done on the basis of the individual operator needs.” Ex-1004, 0048.

“The DIAA is capable of providing each service provider with total flexibility to tailor the provider's coverage areas to a given need at any time, ... sharing actual or virtual portions of the DIAA to operators; actual portions refers to physical components such as antenna columns, sub-arrays, polarizations, transceivers, and the like.” Ex-1004, [0072].

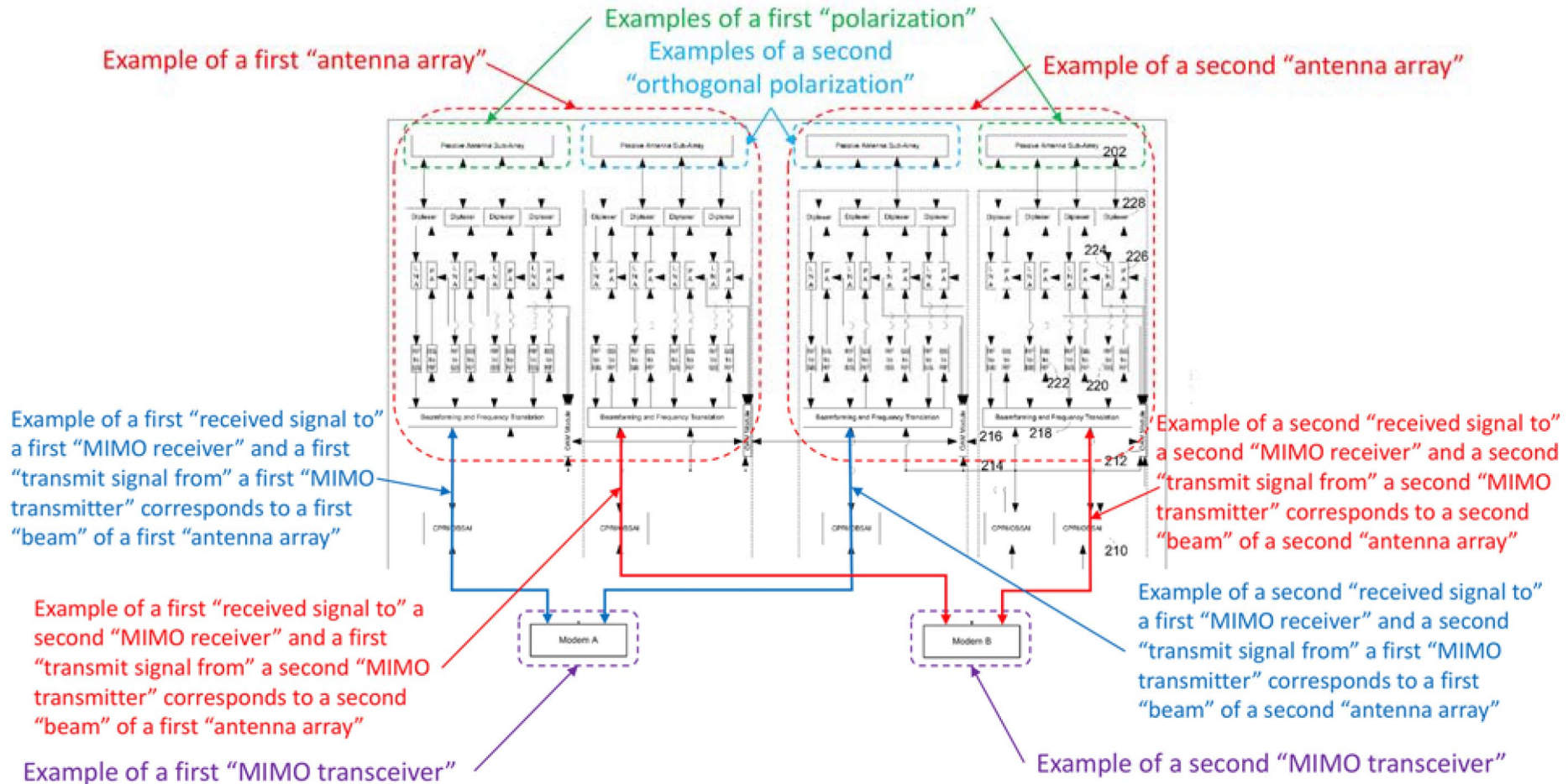
Trigui “n multiple-input multiple-output transceivers (MIMO)” (modems)

226. Accordingly, a POSITA would understand that Trigui discloses for such exemplary “4×N MIMO DIAAs” when applied to the described “two operator system”, including where “ $N = 4$ ”, that the “one or more modems 204” within such a “DIAA system” would be implemented as two independent “modems” (i.e. as “n multiple-input multiple-output transceivers (MIMO)” wherein “ $n=2$ ”) ... for at least the following reasons. Ex-1003, ¶226.

See Ex-1003, ¶¶ 227-232.

See Petition 39-41, 33.

Overview of Trigui (Fig. 10)



"Each antenna array has two beams (a blue polarized beam and a green polarized beam)." (Pet. 32)

Petition 32, Ex-1004, Fig. 10; Ex-1003, ¶¶218-221; 251-253

Trigui “n multiple-input multiple-output transceivers (MIMO)” (modems)

235. A POSITA would understand that for any of the exemplary “4×N MIMO DIAAs” as “illustrated by FIGS. 7-11” being “implemented as two independent 2×N MIMO DIAAs”, ... (see, for example, annotated FIG. 10 at ¶ 196 above), that there would be **only two possible ways to interconnect** such disclosed two “independent 2×N MIMO DIAAs” (i.e. “m antenna arrays” wherein “m=2”) with the disclosed two independent “modems” (i.e. as “n multiple-input multiple-output transceivers (MIMO)” wherein “n=2”) for the “two operator system” that is “sharing” the “passive antenna, transceivers, and the total power of the DIAA”. Ex-1003, ¶235.

See Ex-1003, ¶¶ 236-251.

See Petition, 42-49.

PO Arguments

- PO arguments:
 - *“But the critical error of the Petition’s theory is its assumption that, when adding ‘Modem B’ to Trigui’s Figure 10, a POSITA would be motivated to disconnect Modem A from two of the four MIMO branches and would connect Modem B to only those two MIMO branches.”* PO Sur-reply at 4-5.

Background

Claim 20

20. An apparatus comprising:

m antenna arrays configured to transmit a propagating radio frequency signal, each of the antenna arrays comprising:

a plurality of antenna elements; and

a beamformer configured to produce n different transmit beams using the plurality of antenna elements; and

n multiple-input multiple-output transmitters (MIMO), each MIMO transmitter configured to process m different transmit signals, wherein a v-th transmit signal from a z-th MIMO transmitter corresponding to a z-th beam of a v-th antenna array is selected for transmission,

wherein m, n, v, and z are integer number values, and

wherein $z=1, \dots, n$, and $v=1, \dots, m$, and

wherein $n \geq 2$ and $m \geq 2$.