U.S. Patent No. 11,031,677 Claim Limitation Comparison Chart

I. Claim 6

REF	Limitation	REF	Limitation
6.PRE	A wireless device comprising:	1.PRE	A wireless device comprising:
6.a	an antenna system comprising:	1.a	an antenna system comprising:
6.b	a ground plane;	1.b	a ground plane;
6.c	a first antenna within the wireless device and configured to support at least two frequency bands contained within first and second frequency ranges of the electromagnetic spectrum,	1.c	a first antenna within the wireless device and configured to support at least three frequency bands contained within first and second frequency ranges of the electromagnetic spectrum,
6.d	the second frequency range being higher in frequency than the first frequency range,	1.d	the second frequency range being higher in frequency than the first frequency range and at least one of the three frequency bands being associated with a 4G communication standard,
6.e	the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane and defining a first antenna contour comprising an entire perimeter of the first antenna,	1.e	the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane and defining a first antenna contour comprising an entire perimeter of the first antenna,

REF	Limitation	REF	Limitation
6.f	wherein the first antenna contour has a level of complexity defined by complexity factor F_{21} having a value of at least 1.20 and complexity factor F_{32} having a value less than 1.75; and	1.f	wherein the first antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value less than 1.75; and
6.g	a second antenna within the wireless device and defining a second antenna contour comprising an entire perimeter of the second antenna,		
6.h	the second antenna being proximate to a second short side of the ground plane rectangle that is opposite to the first short side of the ground plane rectangle,		
6.i	a minimum-sized parallelepiped of rectangular faces that completely encloses a volume of the second antenna defining an antenna box, and		
6.j	an orthogonal projection of the antenna box along a normal to a face with a largest area of the second antenna defining an antenna rectangle,		

REF	Limitation	REF	Limitation
6.k	wherein a length of the second antenna contour is greater than four times a diagonal of the antenna rectangle.		

II. CLAIM 12

Ref	Limitation	Ref	Corresponding limitation
12.PRE	A wireless device comprising:	1.PRE	A wireless device comprising:
12.a	an antenna system comprising:	1.a	an antenna system comprising:
12.b	a ground plane;	1.b	a ground plane;
12.c	a first antenna within the wireless device and configured to provide operation in at least four frequency bands, at least one of the at least four frequency bands is contained within a first frequency range and at least one other of the four frequency bands is contained within a second frequency range,	1.c	a first antenna within the wireless device and configured to support at least three frequency bands contained within first and second frequency ranges of the electromagnetic spectrum,
12.d	the first frequency range being lower in frequency than the second frequency range,	1.d	the second frequency range being higher in frequency than the first frequency range and at least one of the three frequency bands being associated with a 4G communication standard,

Ref	Limitation	Ref	Corresponding limitation
12.e	the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane, the first antenna defining a first antenna contour comprising an entire perimeter of the first antenna, and	1.e	the first antenna being proximate to a first short side of a ground plane rectangle enclosing the ground plane and defining a first antenna contour comprising an entire perimeter of the first antenna,
12.f	wherein the first antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value less than 1.75, and	1.f	wherein the first antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value less than 1.75; and
12.g	wherein the first antenna is configured to transmit and receive signals from a 4G communication standard; and		
12.h	a second antenna within the wireless device and configured to receive signals from a 4G communication standard,		
12.i	a minimum-sized parallelepiped of rectangular faces that completely encloses a volume of the second antenna defining an antenna box,	6.i	[a second antenna contour comprising] a minimum-sized parallelepiped of rectangular faces that completely encloses a volume of the second antenna defining an antenna box, and

Ref	Limitation	Ref	Corresponding limitation
12.j	an orthogonal projection of the antenna box along a normal to a face with a largest area of the second antenna defining an antenna rectangle,	6.j	[a second antenna contour comprising] an orthogonal projection of the antenna box along a normal to a face with a largest area of the second antenna defining an antenna rectangle,
12.k	an aspect ratio of the antenna rectangle being defined as a ratio between a width and a height of the antenna rectangle, and wherein the aspect ratio has a value of at least 2.		

III. CLAIMS 2, 7, 13

Claim	Limitation	Claim	Corresponding limitation	Claim	Corresponding limitation
2	The wireless device of claim 1, wherein the first antenna contour comprises at least 20 segments.	7	The wireless device of claim 6, wherein the first antenna contour comprises at least 20 segments.	13	The wireless device of claim 12, wherein the first antenna contour comprises at least 20 segments.

IV. CLAIMS 3, 8, 14

Claim	Limitation	Claim	Corresponding limitation	Claim	Corresponding limitation
3	The wireless device of claim 2, wherein the perimeter of the first antenna contour comprises at least 35 segments.	8	The wireless device of claim 7, wherein the first antenna contour comprises at least 35 segments.	14	The wireless device of claim 13, wherein the first antenna contour comprises at least 35 segments.

V. CLAIMS 5, 11, 19

Claim	Limitation	Claim	Corresponding limitation	Claim	Corresponding limitation
5.a	The wireless device of claim 4, wherein the third antenna defines an antenna contour comprising an entire perimeter of the third antenna, and	11.a	The wireless device of claim 10, wherein the third antenna defines a third antenna contour comprising an entire perimeter of the third antenna, and	19.a	The wireless device of claim 18, wherein the third antenna defines a third antenna contour comprising an entire perimeter of the third antenna, and
5.b	wherein the antenna contour of the third antenna has a level of complexity defined by complexity factor F21 having a value of at least 1.2 and a complexity factor F32 having a value of at least 1.35.	11.b	wherein the third antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value of at least 1.35.	19.b	wherein the third antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value of at least 1.35.

VI. Claim 15-16

Ref	Limitation	Ref	Corresponding limitation
15	The wireless device of claim 12, wherein the second antenna is proximate to a second short side of the ground plane rectangle that is opposite to the first short side of the ground plane rectangle.	6.h	the second antenna being proximate to a second short side of the ground plane rectangle that is opposite to the first short side of the ground plane rectangle,
16.a	The wireless device of claim 12, wherein the second antenna defines a second antenna contour comprising an entire perimeter of the second antenna, and	6.g	a second antenna within the wireless device and defining a second antenna contour comprising an entire perimeter of the second antenna,
16.b	wherein the second antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.20 and complexity factor F32 having a value of at least 1.35.	9	The wireless device of claim 6, wherein the second antenna contour has a level of complexity defined by complexity factor F21 having a value of at least 1.2 and a complexity factor F32 having a value of at least 1.35.

VII. Claim 18

Ref	Limitation	Ref	Corresponding limitation
18	The wireless device of claim 12, wherein the antenna system comprises a third antenna configured to provide wireless connectivity in at least two frequency bands.	10	The wireless device of claim 6, wherein the antenna system comprises a third antenna configured to provide wireless connectivity in at least two frequency bands.