UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF TEXAS
WACO DIVISION

PARKERVISION, INC., Plaintiff, **v.** **BUFFALO INC.,** Defendants.	**Case No. 6:20-cv-01009** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff ParkerVision, Inc. ("ParkerVision"), by and through its undersigned counsel, files this Complaint against Defendant Buffalo Inc. ("Buffalo" or "Defendant") for patent infringement of United States Patent Nos. 6,049,706; 6,266,518; 6,580,902; 7,110,444; 7,292,835; 8,588,725; 8,660,513; 9,118,528; 9,246,736 and 9,444,673 (the "patents-in-suit") and alleges as follows:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq*.

PARTIES

2. Plaintiff ParkerVision is a Florida corporation with its principal place of business at 9446 Philips Highway, Jacksonville, Florida 32256.

3. Defendant Buffalo Inc. is a corporation organized and existing under the laws of Japan, having its principal place of business at 3-30-20 Ohsu Naka-ku Nagoya, 460-0011 Japan.

JURISDICTION AND VENUE

4. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a) because the action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq*.

5. Buffalo is subject to this Court's personal jurisdiction in accordance with due process and/or the Texas Long-Arm Statute. *See* Tex. Civ. Prac. & Rem. Code §§ 17.041 *et seq*.

6. This Court has personal jurisdiction over Buffalo because Buffalo has sufficient minimum contacts with this forum as a result of business conducted within the State of Texas and this judicial district. In particular, this Court has personal jurisdiction over Buffalo because, *inter alia*, Buffalo, on information and belief, has substantial, continuous, and systematic business contacts in this judicial district, and derives substantial revenue from goods provided to individuals in this judicial district.

7. Buffalo has purposefully availed itself of the privileges of conducting business within this judicial district, has established sufficient minimum contacts with this judicial district such that it should reasonably and fairly anticipate being hauled into court in this judicial district, has purposefully directed activities at residents of this judicial district, and at least a portion of the patent infringement claims alleged in this Complaint arise out of or are related to one or more of the foregoing activities.

8. This Court has personal jurisdiction over Buffalo because Buffalo (directly and/or through its subsidiaries, affiliates, or intermediaries) has committed and continues to commit acts of infringement in this judicial district in violation of at least 35 U.S.C. § 271(a). In particular, on information and belief, Buffalo uses, sells, offers for sale, imports, advertises, and/or otherwise promotes infringing products in the United States, the State of Texas, and this judicial district.

9. Venue is proper as to Defendant Buffalo Communications Corporation, which is organized under the laws of Japan. 28 U.S.C. § 1391(c)(3) provides that "a defendant not resident in the United States may be sued in any judicial district, and the joinder of such a defendant shall be disregarded in determining where the action may be brought with respect to other defendants."

BACKGROUND

10. In 1989, Jeff Parker and David Sorrells started ParkerVision in Jacksonville, Florida. Through the mid-1990s, ParkerVision focused on developing commercial video cameras, e.g., for television broadcasts. The cameras used radio frequency (RF) technology to automatically track the camera's subject.

11. When developing consumer video cameras, however, ParkerVision, encountered a problem – the power and battery requirements for RF communications made a cost effective, consumer-sized product impractical. So, Mr. Sorrels and ParkerVision's engineering team began researching ways to solve this problem.

12. At the time, a decade's-old RF technology called super-heterodyne dominated the consumer products industry. But this technology was not without its own problems – the circuity was large and required significant power.

13. From 1995 through 1998, ParkerVision engineers developed an innovative method of RF direct conversion by a process of sampling a RF carrier signal and transferring energy to create a down-converted baseband signal.

14. After creating prototype chips and conducting tests, ParkerVision soon realized that its technology led to improved RF receiver performance, lower power consumption, reduced size and integration benefits. In other words, RF receivers could be built smaller, cheaper and with greater improved performance.

15. ParkerVision's innovations did not stop there. ParkerVision went on to develop additional RF down-conversion technologies, RF up-conversion technologies and other related direct-conversion technologies. ParkerVision also developed complementary wireless communications technologies that involved interactions, processes, and controls between the baseband processor and the transceiver, which improved and enhanced the operation of transceivers that incorporate ParkerVision's down-converter and up-converter technologies. To date, ParkerVision has been granted over 200 patents related to its innovations including, the patents-in-suit.

16. ParkerVision's technology helped make today's wireless devices, such as televisions, a reality by enabling RF chips used in these devices to be smaller, cheaper, and more efficient, and with higher performance.

BUFFALO

17. Buffalo is a Japanese multinational electronics company headquartered in Nagoya, Japan.

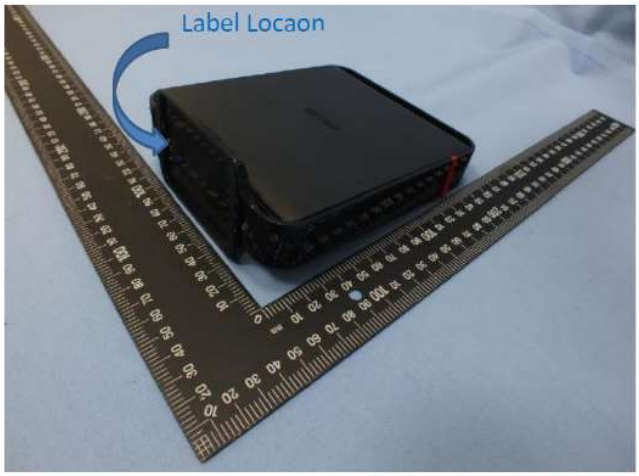
18. On information and belief, since at least 2012, Buffalo (or those acting on its behalf) has made, used, sold, offered for sale and/or networking equipment in/into the United States ("Buffalo Products"). https://pcper.com/2012/05/buffalo-first-to-market-with-802-11ac-gigabit-wi-fi-router/.

19. On information and belief, Buffalo sells its networking equipment in the United States via partnerships with resellers, systems integrators and IT solutions providers. https://www.buffalotech.com/partners/partner-program.

20. Buffalo Products can be purchased through retailers throughout the United States and this judicial district including, without limitation, Amazon, B& H, NewEgg, Staples, Best Buy and others. https://www.buffalotech.com/where-to-buy.

21. Upon information and belief, Buffalo Products including, but not limited to, the AirStation series and Wireless N-Media Bridge wireless networking products, include modules containing Wi-Fi chips including, without limitation, MediaTek MT7612 and MT7620 and Realtek RTL8192BU and RTL8188ER (each a "Buffalo Chip"; collectively, the "Buffalo Chips"). Buffalo Chips provide wireless connectivity for the Buffalo Products.

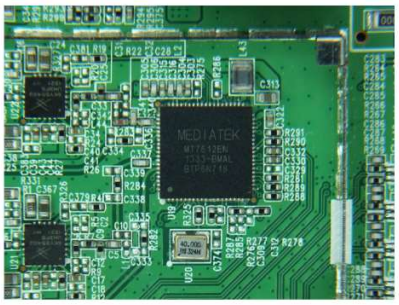
22. Below is an image from a Buffalo AirStation wireless router.

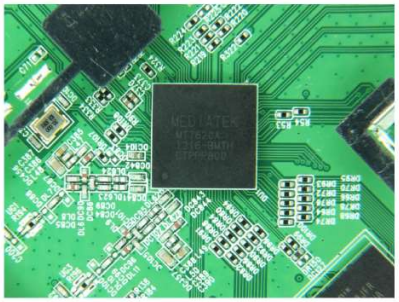


FCC ID: FDI000000020

IC: 6102A-055

23. The label on the Buffalo Product indicates the inclusion of a FDI000000020 module (shown above). On information and belief, the FDI000000020 module includes MediaTek MT7612 and MT7620 wi-fi chips.

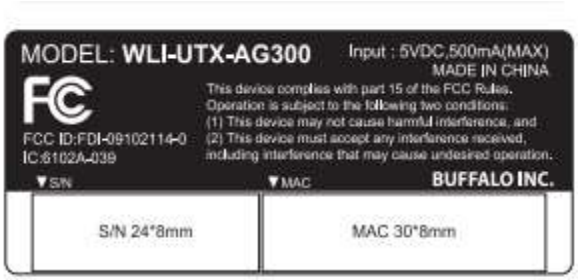




https://fccid.io/FDI000000020/Internal-Photos/Internal-photo-Type-B-2137605

24. Below is an image from a Buffalo AirStation Wireless-N Media Bridge wireless router, Model WLI-UTX-AG300.

US



25. The label on the Buffalo Product indicates the inclusion of an FDI-09102114-0 module (shown above). On information and belief, the FDI-09102114-0 module includes at least the Realtek RTL8196C wi-fi chip.

https://fccid.io/FDI-09102114-0/Internal-Photos/Internal-Photos-1648709

THE ASSERTED PATENTS

United States Patent No. 6,049,706

26. On April 11, 2000, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,049,706 ("the '706 patent") entitled "Integrated Frequency Translation and Selectivity" to inventor Robert W. Cook et al.

27. The '706 patent is presumed valid under 35 U.S.C. § 282.

28. ParkerVision owns all rights, title, and interest in the '706 patent.

United States Patent No. 6,266,518

29. On July 24, 2001, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,266,518 ("the '518 patent") entitled "Method and System for Down-Converting Electromagnetic Signals by Sampling and Integrating Over Apertures" to inventor David F. Sorrells et al.

30. The '518 patent is presumed valid under 35 U.S.C. § 282.

31. ParkerVision owns all rights, title, and interest in the '518 patent.

United States Patent No. 6,580,902

32. On June 17, 2003, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,580,902 ("the '902 patent") entitled "Frequency Translation Using Optimized Switch Structures" to inventor David F. Sorrells et al.

33. The '902 patent is presumed valid under 35 U.S.C. § 282.

34. ParkerVision owns all rights, title, and interest in the '902 patent.

United States Patent No. 7,110,444

35. On September 19, 2006, the United States Patent and Trademark Office duly and legally issued United States Patent No. 7,110,444 ("the '444 patent") entitled "Wireless Local Area Network (WLAN) Using Universal Frequency Translation Technology Including Multi-Phase Embodiments and Circuit Implementations" to inventor David F. Sorrells et al.

36. The '444 patent is presumed valid under 35 U.S.C. § 282.

37. ParkerVision owns all rights, title, and interest in the '444 patent.

United States Patent No. 7,292,835

38. On November 6, 2007, the United States Patent and Trademark Office duly and legally issued United States Patent No. 7,292,835 ("the '835 patent") entitled "Wireless and Wired Cable Modem Applications of Universal Frequency Translation Technology" to inventor David F. Sorrells et al.

39. The '835 patent is presumed valid under 35 U.S.C. § 282.

40. ParkerVision owns all rights, title, and interest in the '835 patent.

United States Patent No. 8,588,725

41. On November 19, 2013, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,588,725 ("the '725 patent") entitled "Apparatus, System, and Method For Down Converting and Up-Converting Electromagnetic Signals" to inventor David F. Sorrells et al.

42. The '725 patent is presumed valid under 35 U.S.C. § 282.

43. ParkerVision owns all rights, title, and interest in the '725 patent.

United States Patent No. 8,660,513

44. On February 25, 2014, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,660,513 ("the '513 patent") entitled "Method and System for Down-Converting an Electromagnetic Signal, and Transforms for Same, and Aperture Relationships" to inventor David F. Sorrells et al.

45. The '513 patent is presumed valid under 35 U.S.C. § 282.

46. ParkerVision owns all rights, title, and interest in the '513 patent.

United States Patent No. 9,118,528

47. On August 25, 2015, the United States Patent and Trademark Office duly and legally issued United States Patent No. 9,118,528 ("the '528 patent") entitled "Method and System for Down-Converting an Electromagnetic Signal, and Transforms for Same, and Aperture Relationships" to inventor David F. Sorrells et al.

48. The '528 patent is presumed valid under 35 U.S.C. § 282.

49. ParkerVision owns all rights, title, and interest in the '528 patent.

United States Patent No. 9,246,736

50. On January 26, 2016, the United States Patent and Trademark Office duly and legally issued United States Patent No. 9,246,736 ("the '736 patent") entitled "Method and System for Down-Converting an Electromagnetic Signal" to inventor David F. Sorrells et al.

51. The '736 patent is presumed valid under 35 U.S.C. § 282.

52. ParkerVision owns all rights, title, and interest in the '736 patent.

United States Patent No. 9,444,673

53. On September 13, 2016, the United States Patent and Trademark Office duly and legally issued United States Patent No. 9,444,673 ("the '673 patent") entitled "Methods and Systems for Down-Converting a Signal Using a Complementary Transistor Structure" to inventor David F. Sorrells et al.

54. The '673 patent is presumed valid under 35 U.S.C. § 282.

55. ParkerVision owns all rights, title, and interest in the '673 patent.

CLAIMS FOR RELIEF

COUNT I - Infringement of United States Patent No. 6,049,706

56. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

57. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '706 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 1 of the '706 patent.

58. Buffalo products that infringe one or more claims of the '706 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of filtering and down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '706 patent.

59. Each Buffalo Chip is/includes an apparatus for filtering and down-converting (e.g., a higher frequency RF signal to a lower frequency signal). Each Buffalo Chip includes a frequency translator, comprising a down-convert and delay module to

under-sample an input signal (e.g., high frequency RF signal) to produce an input sample of a down-converted image of said input signal, and to delay said input sample. Each Buffalo Chip also includes a filter, comprising at least a portion of said down-convert and delay module, at least one delay module to delay instances of an output signal, and an adder (e.g., operational amplifier with parallel resistor-capacitor feedback) to combine at least said delayed input sample with at least one of said delayed instances of said output signal to generate an instance of said output signal.

60. The down-convert and delay module under-samples (e.g., at a sample rate below the Nyquist rate) said input signal according to a control signal (e.g., local oscillator (LO) signal), wherein a frequency of said control signal is equal to a frequency of said input signal plus or minus a frequency of said down-converted image, divided by n, where n represents a harmonic or sub-harmonic of said input signal.

61. ParkerVision has been damaged by the direct infringement of Buffalo and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT II – Infringement of United States Patent No. 6,266,518

62. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

63. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '518 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 67 of the '518 patent.

64. Buffalo products that infringe one or more claims of the '518 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '518 patent.

65. Each Buffalo Chip is/includes an apparatus for down-converting a carrier signal (e.g., high frequency RF signal) to a lower frequency signal (e.g., baseband signal). Each Buffalo Chip has a universal frequency down-converter (UFD), including a switch (e.g., transistor), an integrator (e.g., capacitor) coupled to said switch, a pulse generator (e.g., LO and/or LO circuitry) coupled to said switch; and a reactive structure (e.g., filter(s)) coupled to said UFD.

66. The pulse generator (e.g., LO and/or LO circuitry) outputs pulses (e.g., LO signal) to said switch at an aliasing rate that is determined according to a frequency of the carrier signal +/− a frequency of the lower frequency signal) divided by N.

67. The pulses have apertures (e.g., 25% duty cycle) and cause said switch to close and sample said carrier signal (e.g., high frequency RF signal). Energy is transferred from said carrier signal and integrated using said integrator (e.g., capacitor) during apertures of said pulses, and said lower frequency signal (e.g., baseband signal) is generated from the transferred energy.

68. The energy is transferred to a load (e.g., resistor) during an off-time (e.g., when the switch is open).

69. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT III – Infringement of United States Patent No. 6,580,902

70. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

71. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '902 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 1 of the '902 patent.

72. Buffalo products that infringe one or more claims of the '902 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '902 patent.

73. Each Buffalo Chip is/includes a circuit for down-converting an electromagnetic signal (e.g., high frequency RF signal) to a lower frequency signal. Each Buffalo Chip includes an energy transfer module having a switch module (e.g., module with one or more transistors) and an energy storage module (e.g., module with one or more capacitors). The energy transfer module of the Buffalo Chip samples the electromagnetic signal at an energy transfer rate (e.g., LO rate with a 25% duty cycle), according to an energy transfer signal (e.g., LO signal), to obtain sampled energy. The sampled energy is stored by said energy storage module (e.g., module with one or more

capacitors). A down-converted signal (e.g., baseband signal) is generated from the sampled energy.

74. The energy transfer module of each Buffalo Chip has transistors coupled together. The transistors have a common first port, a common second port, and a common control port. The electromagnetic signal is accepted at the common first port and the sampled energy is present at the common second port.

75. The common control port accepts the energy transfer signal, which has a control frequency that is substantially equal to said energy transfer rate.

76. Each of the transistors of the Buffalo Chip has a drain, a source, and a gate. The common first port couples together drains of the transistors, the common second port couples together sources of the transistors, and the common control port couples together gates of the transistors.

77. ParkerVision has been damaged by the direct infringement of Buffalo and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT IV - Infringement of United States Patent No. 7,110,444

78. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

79. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the ’444 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 2 of the ‘444 patent.

80. Buffalo products that infringe one or more claims of the '444 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '444 patent.

81. Each Buffalo Chip is/includes a wireless modem apparatus (e.g., a modulation/demodulation device providing bi-directional, over-the-air data transmission) having a receiver for frequency down-converting an input signal (e.g., high frequency RF signal). The receiver for frequency down-converting an input signal includes a first frequency down-conversion module to down-convert the input signal, wherein said first frequency down-conversion module down-converts said input signal according to a first control signal (e.g., LO signal) and outputs a first down-converted signal (e.g., baseband signal); a second frequency down-conversion module to down-convert said input signal, wherein said second frequency down-conversion module down-converts said input signal according to a second control signal (e.g., LO signal) and outputs a second down-converted signal (e.g., baseband signal); and a subtractor module (e.g., module with differential amplifier) that subtracts said second down-converted signal from said first down-converted signal and outputs a down-converted signal.

82. The first frequency down-conversion module under-samples (e.g., at a sample rate below the Nyquist rate) the input signal according to the first control signal, and the second frequency down-conversion module under-samples samples (e.g., at a

sample rate below the Nyquist rate) the input signal according to said second control signal.

83. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT V - Infringement of United States Patent No. 7,292,835

84. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

85. Buffalo directly infringes the '835 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claims 1 and 17 of the '835 patent.

86. Buffalo products that infringe one or more claims of the '835 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '835 patent.

87. Buffalo Chips are configured to function/capable of functioning as wireless cable modems. For example, Buffalo Chips provide a wireless connection to cable services.

88. Each Buffalo Chip is/includes a cable modem (e.g., wireless modem for communicating with a cable television network) for down-converting an electromagnetic signal (e.g., a high frequency RF signal), having complex modulations

(e.g., QAM)), to a lower frequency signal. The electromagnetic signal is transmitted by a wireless method to the cable modem.

89. Each Buffalo Chip has (a) an oscillator (e.g., LO) to generate an in-phase oscillating signal (e.g., in-phase LO signal), (b) a phase shifter (e.g., a flip-flop) to receive the in-phase oscillating signal and to create a quadrature-phase oscillating signal (e.g., quadrature-phase LO signal), (c) a first frequency down-conversion module (e.g., a first module that includes at least one switch and at least one capacitor) to receive the electromagnetic signal and the in-phase oscillating signal and (d) a second frequency down-conversion module (e.g., a second module that includes at least one switch and at least one capacitor) to receive the electromagnetic signal and the quadrature-phase oscillating signal.

90. The first frequency down-conversion module includes a first frequency translation module (e.g., a module having one or more switches) and a first storage module (e.g., a module having one or more capacitors). The first frequency translation module samples the electromagnetic signal at a rate (e.g., LO rate with a 25% duty cycle) that is a function of the in-phase oscillating signal, thereby creating a first sampled signal.

91. The second frequency down-conversion module includes a second frequency translation module (e.g., a module having one or more switches) and a second storage module (e.g., a module having one or more capacitors). The second frequency translation module samples the electromagnetic signal at a rate (e.g., LO rate

with a 25% duty cycle) that is a function of the quadrature-phase oscillating signal, thereby creating a second sampled signal.

92. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VI - Infringement of United States Patent No. 8,588,725

93. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

94. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '725 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 1 of the '725 patent.

95. Buffalo products that infringe one or more claims of the '725 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '725 patent.

96. Each Buffalo Chip is/includes an apparatus for down-converting an electromagnetic signal (e.g., high frequency RF signal) to a lower frequency signal. Each Buffalo Chip has an aliasing module comprising a switching device (e.g., one or more transistors) and a storage module (e.g., one or more capacitors). The aliasing module receives as an input an RF information signal and provides as an output a down-converted signal. The switching device of the aliasing module receives as an input a

control signal (e.g., LO signal) that controls a charging and discharging cycle of the storage module by controlling the switching device so that a portion of energy is transferred from the RF information signal to the storage module during a charging part of the cycle and a portion of the transferred energy is discharged during a discharging part of the cycle.

97. The control signal operates at an aliasing rate (e.g., LO rate with a 25% duty cycle) selected so that energy of the RF information signal is sampled and applied to the storage module at a frequency that is equal to or less than twice the frequency of the RF information signal. The storage module generates the down-converted signal from the alternate charging and discharging applied to the storage module using the control signal.

98. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VII - Infringement of United States Patent No. 8,660,513

99. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

100. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '513 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 19 of the '513 patent.

101. Buffalo products that infringe one or more claims of the '513 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '513 patent.

102. Each Buffalo Chip is/includes a system for frequency down-converting a modulated carrier signal (e.g., a high frequency RF signal) to a lower frequency signal. Each Buffalo Chip has (a) a first switch (e.g., transistor), (b) a first control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, and (c) a first energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the first control signal and outputs a down-converted in-phase signal portion of the modulated carrier signal.

103. Each Buffalo Chip has (a) a second switch (e.g., transistor), (b) a second control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, and (c) a second energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the second control signal and outputs a down-converted inverted in-phase signal portion of the modulated carrier signal.

104. Each Buffalo Chip has a first differential amplifier circuit that combines the down-converted in-phase signal portion with the inverted in-phase signal portion and outputs a first channel down-converted differential in-phase signal.

105. Each Buffalo Chip has (a) a third switch (e.g., transistor), (b) a third control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty

cycle) with a specified frequency, and (c) a third energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the third control signal and outputs a down-converted quadrature-phase signal portion of the modulated carrier signal.

106. Each Buffalo Chip has (a) a fourth switch (e.g., transistor), (b) a fourth aperture signal (e.g., LO signal), and (c) a fourth energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the fourth control signal and outputs a down-converted inverted quadrature-phase signal portion of the modulated carrier signal.

107. Each Buffalo Chip has a second differential amplifier circuit that combines the down-converted quadrature-phase signal portion with the inverted quadrature-phase signal portion and outputs a second channel down-converted differential quadrature-phase signal.

108. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VIII – Infringement of United States Patent No. 9,118,528

109. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

110. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the ’528 patent by making, using, selling, offering for sale, and/or

importing in/into the United States products covered by at least claim 1 of the '528 patent.

111. Buffalo products that infringe one or more claims of the '528 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '528 patent.

112. Each Buffalo Chip is/includes a system for frequency down-converting a modulated carrier signal (e.g., high frequency RF signal) to a baseband signal. Each Buffalo Chip includes a first switch (e.g., transistor) coupled to a first control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, wherein the first switch is on and a portion of energy that is distinguishable from noise is transferred from the modulated carrier signal (e.g., high frequency RF signal) as an output of said first switch during the sampling aperture of the first control signal.

113. Each Buffalo Chip includes a first energy storage element (e.g., one or more capacitors) that stores the transferred energy from the modulated carrier signal and outputs a down-converted in-phase baseband signal portion of said modulated carrier signal.

114. Each Buffalo Chip includes a second switch (e.g., transistor) coupled to a second control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, wherein the second switch is on and a portion of energy that is distinguishable from noise is transferred from the modulated carrier

signal (e.g., high frequency RF signal) as an output of said second switch during the sampling aperture of the second control signal.

115. Each Buffalo Chip includes a second energy storage element (e.g., one or more capacitors) that stores the transferred energy from the modulated carrier signal and outputs a down-converted inverted in-phase baseband signal portion of said modulated carrier signal.

116. The portions of transferred energy from each of the first and second switch are integrated over time to accumulate said portions of transferred energy from which said down-converted in-phase baseband signal portion and said down-converted inverted in-phase baseband signal portion are derived.

117. Each Buffalo Chip includes a first differential amplifier circuit that combines said down-converted in-phase baseband signal portion with said down-converted inverted in-phase baseband signal portion and outputs a first channel down-converted differential in-phase baseband signal.

118. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT IX - Infringement of United States Patent No. 9,246,736

119. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

120. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '736 patent by making, using, selling, offering for sale, and/or

importing in/into the United States products covered by at least claim 1 of the '736 patent.

121. Buffalo products that infringe one or more claims of the '736 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '736 patent.

122. Each Buffalo Chip is/includes a system for frequency down-converting a modulated carrier signal (e.g., high frequency RF signal) to a demodulated baseband signal. Each Buffalo Chip has a first switch (e.g., transistor) coupled to a first control signal (e.g., LO signal) which comprises a first sampling aperture (e.g., 25% duty cycle) with a specified frequency, wherein the first switch is on during the first sampling aperture and wherein the first switch is off outside the first sampling aperture.

123. Each Buffalo Chip has a first energy storage element (e.g., one or more capacitors), coupled to said first switch, that outputs a down-converted in-phase baseband signal portion of the modulated carrier signal.

124. Each Buffalo Chip has a second switch (e.g., transistor) coupled to a second control signal (e.g., LO signal) which comprises a second sampling aperture (25% duty cycle) with a specified frequency, wherein the second switch is on during the second sampling aperture and wherein the first switch is off outside the second sampling aperture.

125. Each Buffalo Chip has a second energy storage element (e.g., one or more capacitors), coupled to the second switch, that outputs a down-converted inverted in-phase baseband signal portion of the modulated carrier signal.

126. The first and second control signals each control a charging and discharging cycle of their respective energy storage element so that for each switch a portion of energy from the modulated carrier signal is transferred to the respective energy storage element when the respective switch is on during the charging cycle, and a portion of previously transferred energy is discharged during the discharging cycle for each respective switch when the respective switch is off.

127. For each respective energy storage element, the energy discharged during any given discharge cycle is not completely discharged, with the remaining undischarged energy from the given discharge cycle becoming an initial condition for a next charging cycle that begins immediately following the given discharge cycle.

128. The down-converted in-phase baseband signal portion is derived from energy accumulated at the first energy storage element during both the charging and the discharging cycles for the first energy storage element. The down-converted inverted in-phase baseband signal portion is derived from energy accumulated at the second energy storage element during both the charging and the discharging cycles for the second energy storage element.

129. Each Buffalo Chip has a first differential amplifier circuit that combines the down-converted in-phase baseband signal portion with the down-converted

inverted in-phase baseband signal portion and outputs a first channel down-converted differential in-phase baseband signal.

130. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT X - Infringement of United States Patent No. 9,444,673

131. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

132. Buffalo directly infringes (literally and/or under the doctrine of equivalents) the '673 patent by making, using, selling, offering for sale, and/or importing in/into the United States products covered by at least claim 1 of the '673 patent.

133. Buffalo products that infringe one or more claims of the '673 patent include, but are not limited to, the Buffalo Products and any other Buffalo device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '673 patent.

134. Each Buffalo Chip is/includes an apparatus for down-converting an input modulated carrier signal (e.g., high frequency RF signal) to a demodulated baseband signal, wherein the modulated carrier signal has an amplitude variation, a phase variation, a frequency variation, or a combination thereof.

135. Each Buffalo Chip has a frequency down-conversion module that has a switch (e.g., transistor), a capacitor coupled to said switch, and a pulse generator (e.g.,

LO and/or LO circuitry) coupled to the switch. The pulse generator outputs pulses to the switch at a rate (e.g., LO rate with a 25% duty cycle) that is a function of a frequency of the modulated carrier signal and a frequency of the demodulated baseband signal determined according to: (the frequency of the modulated carrier signal +/− a frequency of the demodulated baseband signal) divided by N, where N is any integer including 1.

136. The pulses have apertures and the pulses cause the switch to open outside of the apertures and cause the switch to close and sample the modulated carrier signal during the apertures by transferring energy from the modulated carrier signal and accumulating the transferred energy in the capacitor each time the switch is closed.

137. Some of the previously accumulated energy is discharged from the capacitor into load circuitry (e.g., a resistor and/or differential amplifier) each time said switch is open. The demodulated baseband signal is generated from (a) the accumulating of the energy transferred to the capacitor each time the switch is closed and (b) the discharging of the some of the previously accumulated energy into the load circuitry each time the switch is opened.

138. ParkerVision has been damaged by the direct infringement of Buffalo, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

JURY DEMANDED

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, ParkerVision hereby requests a trial by jury on all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, ParkerVision respectfully requests that the Court enter judgment in its favor and against Buffalo as follows:

a. finding that Buffalo directly infringes one or more claims of each of the patents-in-suit;

b. awarding ParkerVision damages under 35 U.S.C. § 284, or otherwise permitted by law, including supplemental damages for any continued post-verdict infringement;

c. awarding ParkerVision pre-judgment and post-judgment interest on the damages award and costs;

d. awarding cost of this action (including all disbursements) and attorney fees pursuant to 35 U.S.C. § 285, or as otherwise permitted by the law; and

e. awarding such other costs and further relief that the Court determines to be just and equitable.

Dated: October 30, 2020

THE MORT LAW FIRM, PLLC

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**Pro hac vice to be filed*