IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

SMARTSKY NETWORKS, LLC, Plaintiff, v. GOGO BUSINESS AVIATION, LLC and GOGO INC., Defendants.	))))))))))	C.A. No. _____ **DEMAND FOR JURY TRIAL**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff SmartSky Networks, LLC ("SmartSky" or "Plaintiff"), by and through its undersigned attorneys, files this Complaint against Defendants Gogo Business Aviation, LLC ("Gogo BA") and Gogo Inc. ("GI") (collectively, "Gogo"), 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*.

THE PARTIES

2. Plaintiff SmartSky Networks, LLC is a limited liability company organized and existing under the laws of the State of Delaware, with its principal place of business located at 430 Davis Dr. #350, Morrisville, NC 27560.

3. On information and belief, Defendant Gogo Business Aviation, LLC is a limited liability company organized and existing under the laws of the State of Delaware, with its principal place of business located at 105 Edgeview Drive, Suite 300, Broomfield, Colorado 80021.

4. On information and belief, Defendant Gogo Inc. is a corporation incorporated and existing under the laws of the State of Delaware, with its principal place of business located at 111 N. Canal St., Suite 1500, Chicago, Illinois 60606.

5. On information and belief, Gogo BA is a subsidiary of GI, which directs or authorizes the activities of Gogo BA. For example, in its Form 10-K for the fiscal year ended December 31, 2020, GI states that "Gogo Inc. is a holding company that does business through its subsidiaries. Our principal subsidiary is Gogo Business Aviation LLC." GI's Form 10-K states that "references to 'we,' 'us,' 'our,' 'Gogo,' or the 'Company" refer to Gogo Inc. and its directly and indirectly owned subsidiaries as a combined entity." As it relates to the Gogo 5G network accused of infringement in this Complaint, GI represents to the public that it is developing and intends to operate the Gogo 5G network. For example, in its latest Form 10-K, GI stated "[w]e are currently building our Gogo 5G network, which we expect to be deployed on a nationwide basis in 2022." During its November 2021 quarterly earnings call, GI corporate officers stated that in the preceding quarter, GI "announced Jet Edge . . . as our launch customer." During the same call, GI corporate officers stated "we remain on track to deploy the world's first 5G ATG network with nationwide coverage from 150 sites in the second half of 2022." Therefore, GI directs and authorizes the activities of Gogo BA with respect to the Gogo 5G network that is the subject of this action.

JURISDICTION AND VENUE

6. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a) because this action arises under the patent laws of the United States, Title 35, United States Code, specifically §§ 271 and 281-285.

7. The Court has personal jurisdiction over Gogo Inc. and Gogo Business Aviation, LLC because Gogo Inc. is a Delaware Corporation, Gogo BA is a limited liability company organized in the State of Delaware, and both Defendants have committed and continue to commit acts of infringement giving rise to this action in the State of Delaware in violation of at least 35 U.S.C. § 271(a). In particular, on information and belief, Gogo has made, used, offered to sell and/or sold products, services and/or systems in the State of Delaware that infringe one or more claims of United States Patent Nos. 9,312,947 ("the '947 Patent"), 11,223,417 ("the '417 Patent"), 10,257,717 ("the '717 Patent"), and 9,730,077 ("the '077 Patent") (collectively, "the Asserted Patents"). For example, on information and belief, Gogo has offered for sale, and sold, equipment and subscriptions to customers to use Gogo's impending "Gogo 5G" air-to-ground network.

8. Venue is properly within the District under 28 U.S.C. §§ 1391(b), (c), (d), and/or 1400(b), at least because Gogo BA is a Delaware limited liability company and Gogo Inc. is a Delaware corporation, and therefore both Defendants reside in this District.

BACKGROUND

A. Technology Overview

9. The Asserted Patents generally relate to air-to-ground (ATG) networks for enabling communication between aircraft in-flight nodes and base stations on the ground. Internet access has become ubiquitous, as users have become accustomed to constant connectivity via laptop computers, tablets, mobile phones, smartwatches, etc. In recent years, the desire for connectivity has extended to the air, during flights aboard commercial, business and general aviation aircraft.

10. Prior to the use of ATG networks for providing in-flight connectivity, satellites were used to relay signals between the aircraft and hardware on the ground. However, because of extended distances to the satellites, satellite systems suffer from high latency, which makes such systems impractical for real-time applications, such as videoconferencing. Satellite systems also suffered from limited bandwidth, with systems in the early 2000s providing less than 5 Kbps. In addition, the size and weight of the hardware needed to support a satellite system makes installation on smaller aircraft more costly and relatively impractical.

11. In view of the limitations associated with satellite-based systems, development of ATG systems accelerated. Contrary to satellite-based systems, ATG systems use antennas on the aircraft to communicate directly with hardware on the ground, as opposed to going through a satellite in outer space. While ATG networks may not suffer from some of the drawbacks faced by satellite-based systems, ATG networks face their own challenges. For example, ATG transmissions must contend with various other terrestrial-based radio transmissions that occur at various frequencies across the radio frequency (RF) spectrum. The Federal Communications Commission (FCC) governs the use of RF spectrum in the United States, which is allocated for various uses, such as cellular telephone networks, AM and FM radio, and Wi-Fi. The FCC has dedicated some portions of the spectrum for public use ("unlicensed spectrum"), which may be used by the public subject to specific FCC rules. For example, Wi-Fi operates in the 2.4 GHz unlicensed band, and is available for public use. Other portions of the spectrum are licensed by the FCC to private entities, such as cellular carriers, which are entitled to exclusive use of their licensed bands.

12. Using licensed and unlicensed bands present several technical trade-offs. For instance, as the exclusive user of a licensed band, interference from other users is not a

significant concern because third parties are not legally permitted to use the licensed band. However, due to spectrum scarcity, the FCC has only authorized a very small amount of spectrum for ATG use, which makes an exclusive license to ATG-dedicated spectrum very expensive. In addition to the high cost, the limited licensed spectrum limits the amount of data that can be transmitted via an ATG system using the limited licensed spectrum. By contrast, use of the unlicensed band may allow for greater bandwidth and transmission capacity, but is also subject to interference from many other users who are free to transmit within the same unlicensed frequency band. For years, because spectrum is so limited, and the challenges associated with using unlicensed spectrum proved to be so great, only licensed spectrum was used for ATG networks. When bandwidth became a problem due to the limited amount of licensed spectrum, others in industry merely sought to purchase more licensed spectrum. But over the course of many years and millions of dollars, SmartSky developed its patented technology that enabled the launch of an ATG network using the unlicensed band.

B. Development of Gogo's Current Licensed-Band ATG Network

13. Gogo BA's predecessor, Aircell, Inc., was founded in 1991, and initially offered in-flight phone services. In 2006, as Internet usage was becoming more and more common, the FCC auctioned off 4 MHz of spectrum in the 850 MHz band, which had previously been used by a different in-flight phone service. Through that FCC auction, Aircell purchased an exclusive license to 3 MHz of the auctioned spectrum for more than 30 million dollars. In 2008, Aircell launched its first broadband ATG network, which utilized its 3 MHz of licensed spectrum. Gogo's initial network became widely used by commercial airlines and business aircraft, so much so that the 3 MHz of licensed spectrum quickly became insufficient to satisfy demand and provide quality transmission service.

14. Despite facing a bandwidth shortage, Gogo did not turn to the unlicensed spectrum, which would have provided a substantial amount of additional capacity. Rather, in September 2011, Gogo began urging the FCC to move forward with a proposed auctioning of an additional 500 MHz of spectrum in the 14-14.5 GHz range for ATG communications.[1] In its FCC filings, Gogo noted its "technologically agnostic" approach in utilizing a combination of unused spectrum from rural cellular carriers, Ka-band satellite capability, and its 3 MHz of licensed spectrum to provide in-flight connectivity (IFC) to customers.[2] Despite its openness to providing IFC via any possible technology, Gogo's FCC submissions completely ignore the possibility of using unlicensed spectrum, and instead push for the auctioning of additional licensed spectrum in the 14 GHz band.[3] In fact, Gogo claimed that "allocated spectrum is probably one of the most valuable commodities owned by a wireless company," without which "[Gogo] would not have [its] ATG and ATG-4 networks."[4]

15. In April 2013, while the FCC's proposed auctioning of additional spectrum in the 14 GHz band was still pending, Gogo purchased the remaining 1 MHz of spectrum in the 850 MHz band initially auctioned in 2006, from LiveTV, LLC, for approximately $10 million.[5] In May 2013, Gogo resorted to adding satellite-based connectivity, acquiring a license to operate up to 1,000 aircraft using Ku-band satellite coverage, rather than attempting to use unlicensed spectrum for additional ATG capacity.[6]

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1 *See, e.g.*, Ex. 9 to Declaration of Ryan Corbett In Support Of Plaintiff SmartSky Network, LLC's Motion For Preliminary Injunction ("Corbett Decl.") at 1.

2 *See id*. at 2.

3 *See e.g.*, *id*. at 5.

4 *See* Corbett Decl. Ex. 10.

5 *See* Corbett Decl. Ex. 11.

6 *See* Corbett Decl. Ex. 12.

16. In August 2013, Gogo submitted additional comments to the FCC, again urging the FCC to move forward with auctioning the additional 500 MHz of spectrum in the 14-14.5 GHz range for ATG communications.[7] In its FCC filings, Gogo reiterated its "adaptability in using various spectrum options and technology solutions," though omitted any mention of unlicensed spectrum in its list of spectrum solutions it has pursued.[8] Acknowledging the high cost of acquiring licensed spectrum, Gogo also proposed splitting the 500 MHz band into four 125 MHz licenses (as opposed to the two 250 MHz licenses it previously proposed), in order to lower the cost of obtaining licensed spectrum.[9]

17. In 2015, still unable to develop the technology needed to use unlicensed spectrum for an ATG network, Gogo sold $340 million in convertible notes so it would be in position to potentially purchase at least a portion of the 500 MHz in the 14 GHz band that the FCC was considering auctioning.[10] In January 2016, counsel for Gogo submitted a letter to FCC Secretary Marlene Dortch, again reiterating that "Gogo needs additional spectrum capacity to reliably provide the in-fight broadband and other communications services that consumers expect and demand," and urging the auction of the additional spectrum in the 14 GHz band.[11] Gogo's limited spectrum hindered its network performance to such a degree that one of its largest customers, American Airlines, filed a lawsuit in February 2016 attempting to terminate its contract

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7 *See, e.g.*, Corbett Decl. Ex. 13.

8 *See id.* at 3.

9 *See id.* at 6.

10 *See, e.g.*, Corbett Decl. Ex. 14.

11 *See* Corbett Decl. Ex. 15.

with Gogo, noting that Gogo's air-to-ground system was "limited," slower, and offered less bandwidth than competitors.[12]

18. Gogo's current ATG network still relies on the same limited amount of licensed spectrum that even Gogo acknowledged was insufficient in 2016. With data usage rates on business aircraft increasing 38% per year since then,[13] Gogo's limited ATG spectrum is even less capable of keeping up with demand and providing a reasonable quality of transmission service than it was in 2016.[14]

C. SmartSky's Advancement in Technology and Performance for In-Flight Communication

19. In 2004, well before Gogo launched its first ATG network, the President and co-founder of SmartSky, Ryan Stone, started a private jet management and charter company called Jetpool, L.L.C. ("Jetpool"). In 2006, Jetpool's first client became interested in having in-flight Internet connectivity, but the options were limited. At that time, Gogo's predecessor, Aircell, offered a service that used the Iridium narrowband satellite system. In 2008, Aircell launched an ATG system based on Aircell's licensed spectrum, as described above. However, neither Jetpool nor its customers believed that the available options were sufficient to meet their connectivity needs.

20. Jetpool began investigating other connectivity options to better meet the needs of its customers and learned of a then-pending patent application filed by Donald Alcorn in 2005 relating to ATG networks. In 2011, Mr. Stone co-founded a new entity called Jetpool

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12 *See* Corbett Decl. Ex. 16 at ¶¶ 14, 23.

13 *See* Corbett Decl. Ex. 17.

14 *See, e.g.*, Corbett Decl. Ex. 18 (noting "load speeds can become frustratingly slow" and "it is not possible to stream video").

Ventures, LLC, which acquired a pending patent application that claimed priority to Mr. Alcorn's 2005 patent application. In 2012, Jetpool Ventures, LLC was renamed as SmartSky Networks, LLC, the Plaintiff in this action. The patent application acquired by Jetpool Ventures, LLC in 2011 is a parent application to the '947 Patent presently asserted by SmartSky.

21. Since its founding, SmartSky has been a leading innovator in the field of ATG networks, and now holds over 238 patents worldwide on various aspects of its ATG network and related service offerings, including more than 100 U.S. patents. Unlike others in the industry, including Gogo, SmartSky focused its efforts on building an ATG network that uses unlicensed spectrum in compliance with the existing FCC regulations. Many in the industry criticized the use of unlicensed spectrum, and were skeptical that an ATG network utilizing unlicensed spectrum could ever be successfully deployed. For instance, before SmartSky publicly announced its intent to use unlicensed spectrum for its ATG network (on Sep 28, 2016, upon receipt of the first FCC certification for its system), many in the aviation industry were skeptical that an ATG network could be deployed using "noisy unlicensed spectrum."[15] In October 2014, respected in-flight connectivity commentator, Peter Lemme, speculated that if SmartSky intends to use unlicensed spectrum, there would be "inherent issues" having "no protection from interference from other unlicensed users."[16] Gogo was specifically skeptical that an unlicensed ATG network would be feasible, with its then-CEO, Michael Small, noting that SmartSky's use of unlicensed spectrum is "an extraordinarily risky way if that's your sole spectrum position."[17] In a November 4, 2016 article, Gogo's then-CFO, Norman Smagley, was quoted as saying that "If you're flying over New

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15 *See, e.g.*, Corbett Decl. Ex. 19.

16 *See* Corbett Decl. Ex. 20.

17 *See* Corbett Decl. Ex. 21.

York City with a high noise floor on the unlicensed spectrum, there is a reasonable probability that the quality of the connectivity goes dramatically down."[18]

22. Despite the skepticism of Gogo and others in the ATG industry, SmartSky developed multiple game-changing innovations in its ATG network that improved the typical performance over Gogo's system by up to a factor of approximately ten. Importantly, the greatly improved performance of SmartSky's ATG network allows passengers to live-stream data without interruption. This means that multiple aircraft passengers are able to participate in real-time, two-way communications so they can, for example, participate in video teleconferences with almost no discernable delay in the communications.

23. SmartSky's ATG network implements a phased array beamforming antenna that generates multiple beams and directs the beams to a small area, as opposed to an omnidirectional signal or shared sector-wide signal like that typical of 3G cellular systems. Because these beams are directed to a small area, multiple beams can be generated at the same frequency without interfering with each other, or with other transmissions using the unlicensed band. Another benefit of beamforming is increased and more efficient power usage. In the unlicensed band, the FCC has set certain rules limiting the amount of power that can be used to transmit a signal in order to limit the amount of interference created by multiple devices simultaneously transmitting omnidirectional signals. But by generating narrow beams, the FCC has allowed higher powers to be used, meaning a beam can be transmitted over a greater distance to a focused area without causing harmful interference with other transmissions using the same unlicensed band.

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[18] *See* Corbett Decl. Ex. 22.

24. SmartSky also developed a ground antenna system that balances the tradeoff between long range, minimal sensitivity to ground-generated interference, and not causing harmful interference to terrestrial unlicensed band users, e.g., Wi-Fi. These antennas generate respective radiation patterns that are oriented toward the horizon and overlap to create a "wedge" architecture. Because these antennas direct their radiation patterns towards the horizon, interference with and from ground-based Wi-Fi noise can be greatly reduced. This wedge architecture is the subject of the presently asserted '717 patent.

25. SmartSky's network also relies on seamless handoffs of an active communications link as an aircraft moves from the antenna beam originating from one ATG base station to an adjacent or geographically separated one. This system of seamless handoffs was the subject of the patent application SmartSky acquired from inventor Don Alcorn's company, Wi-Sky Networks, LLC, and is claimed in the presently asserted '947 patent.

26. SmartSky further implemented a software-defined radio (SDR) that included the beamforming function. The SDR, which is also recited in the claims of the '947 patent, implements radio components that are typically implemented using hardware, by using software instead, which lowers cost and simplifies updates and other modifications to, among other radio functions, the antenna beamforming.

27. Based on these innovations, in 2014 SmartSky announced that it would be launching an ATG network using 60 MHz of spectrum. At the time, although SmartSky did not publicly announce that it intended to use unlicensed spectrum, SmartSky did not have an FCC license to any spectrum, and by 2015, the industry had begun to suspect that SmartSky intended to use unlicensed spectrum in the 2.4 GHz band.[19] On September 28, 2016, the FCC certified

[19] *See* Corbett Decl. Ex. 23.

SmartSky's radio system, at which point SmartSky first formally announced that its ATG network would use 60 MHz of unlicensed spectrum, and made multiple references to the patent protection it was relying upon.[20]

28. In late 2021, SmartSky launched the first ATG network available to customers in the U.S. that uses unlicensed spectrum. At the National Business Aviation Association (NBAA) Business Aviation Convention & Exhibition (BACE) in October 2021 in Las Vegas, Nevada, SmartSky operated numerous flights demonstrating its new unlicensed ATG network to multiple passengers on the same aircraft. SmartSky's new ATG network, with its quantum leap in performance, received strong reviews. For example, respected aviation publication *Runway Girl Network*, remarked that even with five FaceTime video calls occurring simultaneously, the "videos never buffered, not even once," and that "the clarity of the picture was pretty striking."[21] A writer for *Aviation Today* had a similar experience on a different demo flight, noting that despite 14 devices simultaneously connected to the ATG network, "web surfing . . . was seamless with loading times similar to those I'm used to on the ground," Slack and FaceTime video calls were "crystal clear," and a Twitter live-stream was "flawless and consistent."[22] Another passenger, Dr. Aaron Levy, remarked that "the connection felt as good as it does on a functional system on the ground," with "multiple video calls in progress," "cloud-based apps," and "sending and receiving large 10-20MB files."[23] By the end of December 2021, SmartSky built its ATG network to cover approximately 80% of all flight hours in the continental U.S., and expects to have full CONUS geographic coverage by the end of June 2022. Thus, despite the long-skepticism of

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20 *See* Corbett Decl. Ex. 24.

21 *See* Corbett Decl. Ex. 25.

22 *See* Corbett Decl. Ex. 26.

23 *See* Corbett Decl. Ex. 27.

the industry, SmartSky has successfully deployed an ATG network using unlicensed spectrum that can achieve speeds typically ten times the speed of Gogo's current licensed-band network.

D. Gogo's New And Infringing ATG Network

29. After years of desperately trying to acquire more licensed spectrum, Gogo abruptly changed course and copied SmartSky's approach of using unlicensed spectrum. In fact, on the very same day in 2016 that SmartSky received FCC certification for its ATG network using 60 MHz of unlicensed spectrum, Gogo announced that it also intended to use unlicensed spectrum for its next generation ATG network, which it then evolved in 2019 to saying it would use for its "5G" network.[24]

30. Although initially intended for launch in 2018,[25] Gogo has announced that it now intends to launch its Gogo 5G network in mid-2022. Although its official launch is yet to occur, Gogo has recently disclosed numerous features of its 5G network that unlawfully incorporate SmartSky's patented technology. For example, and as explained in more detail below, on information and belief, Gogo's 5G network includes a network of base stations having software-defined radios that use beamforming to generate multiple steerable beams. By generating multiple steerable beams, the same frequency can be re-used to communicate with different in-flight nodes of the network. In addition, on information and belief, the Gogo 5G network conducts "make before break" handoffs, in which an in-flight node transitions from a beam associated with one base station to another beam associated with another base station to maintain a continuous and uninterrupted connection. On information and belief, the Gogo 5G base stations use unlicensed

[24] *See* Corbett Decl. Ex. 28.

[25] Gogo's "Nextgen" network was initially intended to use unlicensed spectrum and was to launch in 2018, but on information and belief, never actually launched. Gogo now intends for its 5G network to use unlicensed spectrum, and its initial 2020 launch date has now been pushed back twice, to 2021 and now to mid-2022.

spectrum, and include antenna arrays having a directional radiation pattern oriented toward the horizon, which reduces interference with terrestrial use of unlicensed spectrum. On information and belief, the Gogo 5G base stations work in coordination with their existing base stations that use licensed spectrum, and in many cases are intended to be collocated, such that communication handover may occur between base stations using licensed and unlicensed spectrum.

31. On information and belief, Gogo has made components of its 5G network, used (via testing) its 5G network, and offered for sale and sold components of, and subscriptions to, its 5G network, in violation of the Asserted Patents. For example, on information and belief, in October 2021, Gogo announced that it had reached an agreement with Jet Edge International to become Gogo 5G's launch customer.[26] In addition, on January 4, 2022, Gogo announced that it has completed construction of a seven-tower 5G testbed, and on information and belief, has begun or is soon to begin using its 5G network for testing purposes.[27]

E. Gogo Is Willfully Infringing SmartSky's Patents

32. Gogo has known of SmartSky's patents for years, and knew that its 5G network infringes SmartSky's patents. For example, on March 12, 2020, Gogo preemptively attempted to invalidate the '947 Patent by filing a Petition for *Inter Partes* Review ("IPR Petition") with the United States Patent and Trademark Office's (USPTO) Patent Trial and Appeal Board (PTAB).[28] On information and belief, Gogo filed its IPR Petition because it knew that its 5G network would infringe the '947 Patent, which SmartSky had not yet asserted against Gogo.

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26 *See, e.g.*, Corbett Decl. Ex. 29.

27 *See* Corbett Decl. Ex. 30.

28 *See* Corbett Decl. Ex. 31.

33. In its Petition, Defendant alleged that claims 1-20 of the '947 Patent are invalid for being either anticipated or rendered obvious by various prior art references.[29] On September 16, 2020, the PTAB denied Defendant's Petition, finding that Defendant failed to show a reasonable likelihood of prevailing in demonstrating that even one of the claims of the '947 Patent is unpatentable over the prior art of record.[30] Gogo did not appeal the PTAB's Decision, which is now final and unappealable.

34. SmartSky and Gogo are direct competitors in the field of ATG networks, and are currently the only two ATG network providers. As a direct competitor of SmartSky, on information and belief, Gogo is familiar with SmartSky's patent portfolio, and had knowledge of the Asserted Patents prior to the filing of this action. For example, in response to the PTAB's denial of Gogo's IPR Petition, Gogo's President, Mr. Sergio Aguirre, stated that "Gogo reiterates our strong belief that we are not infringing any valid patent held by SmartSky."[31] More specifically, during a quarterly earnings call on August 5, 2021, Mr. Oakleigh Thorne, Chairman and Chief Executive Officer of Gogo, Inc., stated that Gogo's "attorneys and engineers have reviewed all 144 of [SmartSky's] United States patents in detail."[32] SmartSky maintains and regularly updates a website containing a listing of SmartSky's patents at https://ssnpatents.com/, including the four Asserted Patents. In addition, because Gogo closely monitors SmartSky's patent portfolio, and Gogo BA previously challenged the validity of the '947 Patent, on information and belief, Gogo was aware of the '417 Patent, which claims priority to the '947 Patent, prior to the filing of this action.

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29 *See id.* at 5-17.

30 *See* Corbett Decl. Ex. 5 at 1-13.

31 *See* Corbett Decl. Ex. 32.

32 *See* Corbett Decl. Ex. 33.

35. Not only has Gogo knowingly and willfully copied SmartSky's patented technology, Gogo has also touted several of SmartSky's patented features in promoting its 5G network. For example, despite criticizing SmartSky's approach of using unlicensed spectrum Gogo now notes that "[u]tilizing unlicensed spectrum in the 2.4GHz range allows Gogo's signal to travel greater distances than the spectrum the wireless carriers can enable."[33] Gogo also touts that its 5G network "will use beamforming and beamsteering techniques that deliver a more direct signal to the aircraft, as opposed to a wide signal that loses strength over distance. This creates a better connection with less interference."[34]

36. Gogo's use of SmartSky's patented technology to enable the development of its 5G network violates SmartSky's rights and constitutes infringement of multiple SmartSky patents.

THE ASSERTED PATENTS

A. The '947 Patent

37. United States Patent No. 9,312,947 ("the '947 Patent"), entitled "Terrestrial Based High Speed Data Communications Mesh Network," was duly and legally issued on April 12, 2016, and names Donald L. Alcorn as the inventor. The earliest application related to the '947 Patent was filed on August 18, 2005. Attached as Exhibit 1 is a true and correct copy of the '947 Patent.

38. SmartSky is the owner, by valid assignment, of all right, title, and interest in and to the '947 Patent, including the right to seek remedies and relief for past infringement thereof.

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33 Corbett Decl. Ex. 34 at 9.

34 *Id.*

39. The '947 Patent is directed to technological solutions that address problems with providing high speed data communications to in-flight aircraft. For example, the '947 Patent explains that "cellular high speed wireless data links have a range which i[s] not practical for in-flight use due to throughput limitations." Ex. 1 at 1:33-35. The '947 Patent further notes that a satellite-based system "is costly since it requires a satellite link as well as specialized antennae and other equipment for the aircraft and also consists of throughput limitations which impact usefulness. Consequently, there is a need for a system that provides [a] high speed data communications link to an in-flight aircraft at a reasonable cost." *Id*. at 1:37-42.

40. The '947 Patent addresses these technological problems not by merely applying a generic computer to implement a previously known manual process, but by configuring a network of base stations to provide aircraft passengers with a "high speed data communications link between the passenger and the ground [that] allows for a direct link that is continuous and uninterrupted in time." *Id*. at 2:40-46. Specifically, the '947 Patent explains that the base stations employ a software definable radio (SDR) configured for beamforming of the signal into a "narrow beam [so] that interference with nearby signals on the same or very close frequencies is minimized. By using a buffer range between beams of the signals, the same frequencies may be recycled or re-used for different communications links between nodes." *Id*. at 6:6-14. "This has the great advantage of minimiz[ing] the necessary frequency spectrum required to operate the network." *Id.* at 6:15-17. The '947 Patent notes that "[a]nother advantage of the use of SDR involves a more stable and manageable system of transitioning between communications links among moving nodes. With a narrow beam, a high quality communication link may be established with a more distant node rather than the closest node. This link will conceivably last longer as the distant node moves through the transmission range towards the base station." *Id.* at 6:18-24. Accordingly, the

network of base stations described in the '947 Patent provides a specific improvement over prior systems that was not well-known or conventional, resulting in improved connectivity for aircraft passengers.

41. Claim 1 of the '947 Patent recites a network base station within a network that includes at least one in-flight communication node, and a network of base stations configured to communicate with at least one in-flight node. *See* Ex. 1 at 10:2-19, 10:51-11:5. The network base station includes a radio configured via software defined radio to utilize beamforming to generate a plurality of steerable beams. *Id*. This configuration enables multiple reuses of the same frequency range to communicate with respective different in-flight communication nodes via respective different communication links. *Id*. The respective different communication links are high speed data communication links that are enabled to be maintained continuous and uninterrupted in time while one of the in-flight nodes transitions between a first steerable beam associated with a first coverage area defined by the network base station and a second steerable beam associated with a second coverage area defined by another network base station. *Id*. The first and second coverage areas are at least partially overlapping. *Id*.

B. <u>The '417 Patent</u>

42. United States Patent No. 11,223,417 ("the '417 Patent"), entitled "Terrestrial Based High Speed Data Communications Mesh Network," was duly and legally issued on January 11, 2022, and names Donald L. Alcorn as the inventor. The earliest application related to the '417 Patent was filed on August 18, 2005. Attached as Exhibit 2 is a true and correct copy of the '417 Patent.

43. SmartSky is the owner, by valid assignment, of all right, title, and interest in and to the '417 Patent, including the right to seek remedies and relief for past infringement thereof.

44. The '417 Patent is part of the same patent family, and shares the same specification, as the '947 Patent. Therefore, the '417 Patent is likewise directed to technological solutions that address problems with providing high speed data communications to in-flight aircraft. The description of the technological solutions addressed by the '947 Patent described in preceding paragraphs 23-24 also apply to the '417 Patent, and are incorporated by reference as if fully set forth herein.

45. Claim 1 of the '417 Patent recites a ground station among a network of ground stations configured to provide a wirelessly transmitted high speed data communication link to a receiver station on an in-flight aircraft. *See* Ex. 2 at 10:28-48. The ground station includes an antenna and a software defined radio operably coupled to the antenna. The software defined radio configures the ground station to conduct a handover of the in-flight aircraft to another ground station within the network of ground stations to maintain the high-speed data communication link continuous and uninterrupted in time. The software defined radio is configured to employ a wireless radio access network protocol operating in a communication band from about 2 GHz to about 6 GHz. The ground station is configured to utilize beamforming to generate one or more steerable beams used to form the high-speed data communication link. The ground station is configured to reuse a same frequency to communicate with the receiver station and another receiver station on another in-flight aircraft.

C. The '717 Patent

46. United States Patent No. 10,257,717 ("the '717 Patent"), entitled "Wedge Shaped Cells In A Wireless Communication System," was duly and legally issued on April 9, 2019, and names Douglas Hyslop as the inventor. The earliest application related to the '717 Patent was filed on March 15, 2013. Attached as Exhibit 3 is a true and correct copy of the '717 Patent.

47. SmartSky is the owner, by valid assignment, of all right, title, and interest in and to the '717 Patent, including the right to seek remedies and relief for past infringement thereof.

48. The '717 Patent is directed to technological solutions that address problems with providing continuous wireless communication to aircraft at various distances and altitudes. *See* Ex. 3 at 1:21-24. For example, the '717 Patent explains that "[c]onventional ground based wireless communications systems use vertical antennas to provide coverage for device connectivity[,] . . . and typically provide coverage in the azimuthal, or horizontal, plane with a width of 65 to 90 degrees." *Id*. at 1:51-55. "The elevation, or vertical, pattern is typically more narrow in order to maximize the antenna performance in the horizontal plane, which can result in a larger coverage area, increased signal strength or clarity in the coverage area, etc. With focus on the horizontal plane, however, these existing antennas may be unable to support connectivity for aircraft traveling above an elevation of the coverage area." *Id*. at 1:55-62.

49. The '717 Patent addresses these technological problems not by merely automating known processes using a general purpose computer, but by creating a network of base stations having specific antenna configurations in order to provide wireless coverage for aircraft at varying elevations. *See id*. at 1:66-2:2. Specifically, the '717 Patent explains that a plurality of

antennas can "each transmit signals having a radiation pattern defined between two elevation angles resulting in an increasing vertical beam width and smaller azimuth to form a wedge shaped sector. These wedge shaped sectors may then be overlapped with each other to progressively build in altitude for providing communications with continuous coverage at high altitudes." *Id*. at 2:2-9. The '717 Patent further explains that the network can implement "frequency reuse" so that "adjacent base stations can use alternating channels in providing the cell coverage areas." *Id.* at 6:34-36. More specifically, frequency reuse patterns may be used "to provide frequency diversity between adjacent cell coverage areas." *Id*. at 6:42-45. For example, the '717 Patent explains that the base stations include radios that can communicate using licensed spectrum or unlicensed spectrum. *See id*. at 9:40-46. Therefore, the network of base stations described in the '717 Patent provides a specific improvement over prior networks that was not well-known or conventional, resulting in improved connectivity for aircrafts at various altitudes.

50. Claim 1 of the '717 Patent recites a network for providing air-to-ground wireless communication in various cells. *See* Ex. 3 at 12:5-24. The network includes a first base station that includes a first antenna array defining a first directional radiation pattern oriented toward a horizon. *Id.* The network also includes a second base station that includes a second antenna array defining a second direction radiation pattern that at least partially overlaps the with the first base station. *Id*. The first base station employs unlicensed spectrum, and the second base station employs licensed spectrum. *Id*. The first and second base stations are each configured to wirelessly communicate with a radio disposed on an aircraft flying through respective cell coverage areas of the first and second base stations. *Id*. The first and second base stations are each configured to handover communication with the radio as the aircraft moves between the respective cell coverage areas of the first and second base stations. *Id*.

D. The '077 Patent

51. United States Patent No. 9,730,077 ("the '077 Patent), entitled "Architecture For Simultaneous Spectrum Usage By Air-To-Ground And Terrestrial Networks," was duly and legally issued on August 8, 2017, and names Ryan M. Stone and Douglas Hyslop as inventors. The earliest application related to the '077 Patent was filed on January 13, 2015. Attached as Exhibit 4 is a true and correct copy of the '077 Patent.

52. SmartSky is the owner, by valid assignment, of all right, title, and interest in and to the '077 Patent, including the right to seek remedies and relief for past infringement thereof.

53. The '077 Patent is directed to technical solutions that address problems with providing sufficient radio frequency (RF) spectrum for air-to-ground (ATG) networks. *See, e.g.*, Ex. 4 at 1:15-19. For example, the '077 Patent notes the possibility of dedicating a certain amount of RF spectrum to in-flight communication, but explains that "RF spectrum is extremely expensive due to the massive demands on this relatively limited resource." *Id*. at 1:46-52.

54. The '077 Patent addresses this problem by providing example embodiments that "may provide interference mitigation techniques that may allow spectrum reuse within a given area so that both terrestrial networks and air-to-ground (ATG) networks can coexist in the same geographical area and employ the same spectrum." *Id*. at 1:63-67. For example, the '077 Patent explains that multiple ATG base stations define a first radiation patter focusing energy toward the horizon. *See, e.g.*, *id*. at 22:10-16. The ATG base stations may be spaced apart from each other so that they create partially overlapping coverage areas to communicate with an in-flight aircraft in an ATG communication layer defined between two altitudes. *See id*. at 22:17-22. By focusing energy toward the horizon, the ATG base stations generate wedge-shaped cells (e.g., 212, 214, 216

below) that form overlapping wedges that extend out toward the horizon, as shown in Fig. 2 of the '077 Patent, reproduced below. *See e.g.*, *id.* at 3:40-42, Fig. 2.

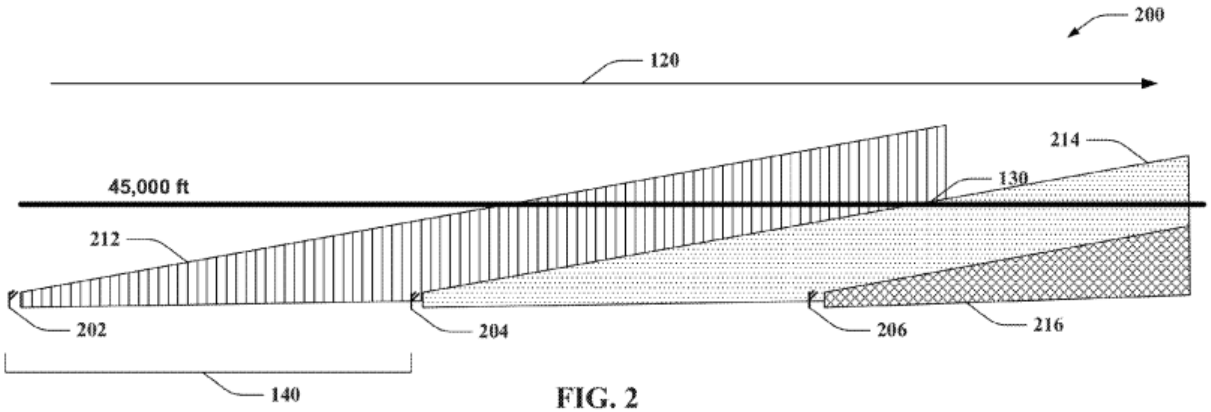


FIG. 2

55. In-flight aircraft may also employ antennas that are capable of focusing toward the horizon, such that the aircraft communicates with distant ATG base stations, rather than the ATG base stations immediately below the aircraft. *See, e.g.*, *id.* at 3:45-50. Because the aircraft is communicating with a distant ATG base station that focuses energy toward the horizon, the aircraft may re-use RF spectrum used by terrestrial networks below the aircraft, without significant interference. *See, e.g., id.* at 3:54-63. Therefore, the network of ATG base stations and the configuration of their respective radiation patterns described in the '077 Patent provides a specific improvement over prior ATG networks that was not well-known or conventional, resulting in more efficient RF spectrum usage.

COUNT I

INFRINGEMENT OF THE '947 PATENT

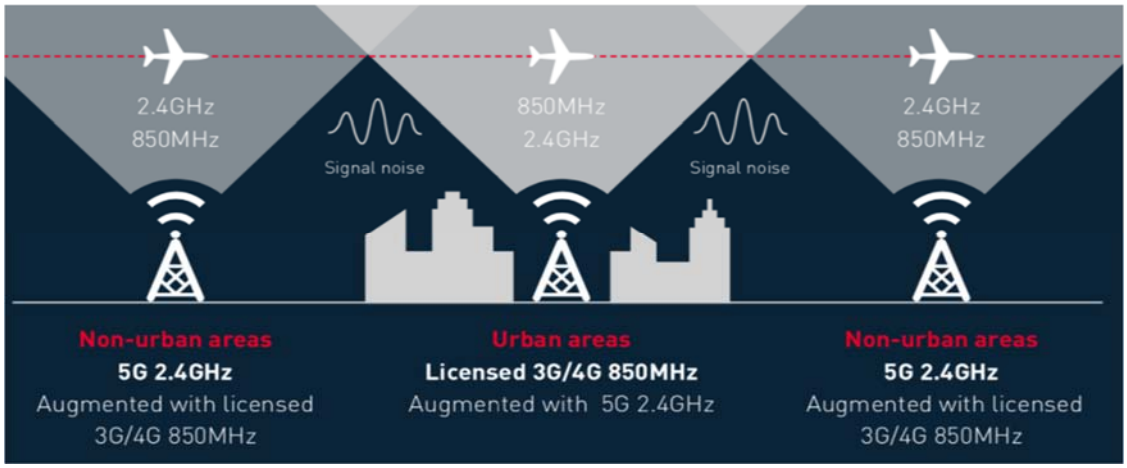
56. SmartSky incorporates each of the preceding paragraphs 1-55 as if fully set forth herein.

57. On information and belief, Defendant has infringed and continues to infringe the '947 Patent under 35 U.S.C. § 271(a) by making, using, selling, or offering for sale in

this District and in the United States products or systems covered by one or more claims of the '947 Patent, including, but not limited to, its "Gogo 5G" network ("the Accused System"). For example, as explained above, Gogo has announced that it has reached an agreement with Jet Edge International to become Gogo 5G's launch customer, and that Gogo has completed construction of a seven-tower 5G testbed. The Accused System infringes at least claims 1 and 11 of the '947 Patent ("the Asserted '947 Patent Claims").

58. As explained above, Defendant has known of the '947 Patent at least since March 12, 2020, when Defendant filed its IPR Petition attempting to invalidate the '947 Patent. *See supra* ¶¶ 32-36.

59. Claim 1 of the '947 Patent recites "a network base station within a network including at least one in-flight communication node." Ex. 1 at 10:2-3. Gogo's 5G network uses its existing tower infrastructure, which includes multiple base stations (towers below) within a network that includes at least one in-flight communication node (represented as airplanes below).[35]



60. Claim 1 of the '947 Patent recites that the network base station comprises "a radio configured via software defined radio to utilize beamforming to generate a plurality of

[35] *See, e.g.*, Corbett Decl. Ex. 34 at 4, 20.

steerable beams, to enable multiple reuses of a same frequency to communicate with respective different in-flight communication nodes via respective different communication links." Ex. 1 at 10:5-9.

61. During a Gogo presentation on October 13, 2021 at the NBAA-BACE in Las Vegas, Nevada, Gogo's Director of Network Engineering, Mike Schnepf, explained that Gogo 5G base stations or cell sites include a "software defined radio," which replaces hardware components using software running on a server.[36] On information and belief, Gogo has partnered with Airspan Networks Inc. ("Airspan") and First RF Corporation ("First RF") to respectively develop the base stations and aircraft antennas for the Gogo 5G network. During a panel discussion at an earlier NBAA-BACE in 2019, Mike Livingstone, then Senior Vice President of Engineering for Airspan, and Jason Shin, then Vice President and Communications Market Segment Lead for First RF Corporation, explained that the Gogo software defined radio uses beamforming and a phased array to steer beams in a particular direction without using mechanical devices.[37] In particular, the Gogo 5G base stations use beamforming to send six signals simultaneously to aircraft using the same bandwidth and spectrum without interference.[38]

62. On information and belief, Gogo has partnered with Airspan Networks Inc. ("Airspan") to build the base stations for the Gogo 5G system, which is "based on Airspan's carrier grade radio access network (RAN) platform, Air5G OpenRANGE," and includes "advanced beamforming and tracking techniques."[39] The Gogo 5G base stations "will use beamforming and beamsteering techniques that deliver a more direct signal to the aircraft, as opposed to a wide signal

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36 *See, e.g.*, Corbett Decl. Ex. 35 at 20:50-21:55.

37 *See, e.g.*, Corbett Decl. Ex. 36 at 16:30-17:10.

38 *See id.* at 24:30-25:57.

39 *See, e.g.*, Corbett Decl. Ex. 34 at 16.

that loses strength over distance."[40] The Gogo 5G base stations "consist[] of 5G vRAN base stations with 16-antenna digital port beamforming antennas using massive MIMO technology."[41]

63. Claim 1 of the '947 Patent further recites that "the respective different communication links are high speed data communication links that are enabled to be maintained continuous and uninterrupted in time while one of the in-flight nodes transitions between a first steerable beam associated with a first coverage area defined by the network base station and a second steerable beam associated with a second coverage area defined by another network base station." Ex. 1 at 10:10-18. Claim 1 of the '947 Patent further specifies that "the first and second coverage areas are at least partially overlapping." *Id* at 10:18-19.

64. The Gogo 5G network establishes high-speed data communications links that are enabled to be maintained continuous and uninterrupted in time while one of the in-flight communication nodes transitions between a first steerable beam associated with a first coverage area defined by a network base station and a second steerable beam associated with a second coverage area defined by another network base station. More specifically, during the panel discussion at NBAA-BACE in 2019, Gogo and its partners explained that the Gogo 5G network will conduct "make before break" handoffs, in which multiple beams are steered to establish communication links with different base stations having overlapping coverage areas so that the communication link is handed off without interrupting the connection.[42] Gogo claims that its 5G network will provide high-speed data communication links with "connection speeds similar to

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40 *Id*. at 9.

41 *See, e.g.*, Corbett Decl. Ex. 37 at 4-5.

42 *See, e.g.*, Corbett Decl. Ex. 36 at 36:00-38:00.

what [passengers] experience on the ground, including streaming video," and that its network will provide "uninterrupted connectivity."[43]

65. Claim 11 of the '947 Patent is directed to a network comprising a plurality of network base stations, rather than the single network base station of Claim 1 of the '947 Patent, but is otherwise nearly identical to Claim 1. Therefore, the Gogo 5G network infringes Claim 11 of the '947 Patent for the same reasons it infringes Claim 1 of the '947 Patent.

66. In particular, the Gogo 5G network includes "a network comprising a plurality of network base stations configured to communicate with at least one in-flight node, the network base stations including at least two base stations having coverage areas that at least partially overlap with each other," as recited in Claim 11.[44]

67. Each of the at least two base stations in the Gogo 5G network includes "a radio configured via software defined radio to utilize beamforming to generate a plurality of steerable beams, to enable multiple reuses of a same frequency to communicate with respective different in-flight communication nodes via respective difference communication links," as recited in claim 11.[45]

68. In the Gogo 5G network, "the respective links are high speed data communications links that are enabled to be maintained continuous and uninterrupted in time while one of the respective different in-flight communication nodes transitions between corresponding steerable beams associated with respective ones of the coverage areas defined by the at least two base stations," as recited in claim 11.[46]

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43 *See, e.g.*, Corbett Decl. Ex. 38 at 1, 4.

44 *See, e.g.*, Corbett Decl. Ex. 34 at 4, 20; Ex. 36 at 36:00-38:00.

45 *See, e.g.*, *supra* ¶¶ 61-62.

46 *See, e.g.*, *supra* ¶ 64.

69. Based on the above, the Gogo 5G network directly and literally infringes at least claims 1 and 11 of the '947 patent. To the extent the Gogo 5G network does not literally meet any of the elements of claim 1 or claim 11, any differences between the Gogo 5G network and the Asserted '947 Patent Claims are insubstantial, and the Gogo 5G network therefore infringes such claims under the doctrine of equivalents.

70. SmartSky has no adequate remedy at law against Gogo's acts of infringement. By its wrongful acts, Gogo has caused, and unless restrained by the Court, will continue to cause serious irreparable injury and damage to SmartSky.

71. Gogo, by way of its infringing activities has caused and continues to cause SmartSky to suffer damages, the exact amount to be determined at trial. The damages include lost profits and/or reasonable royalty damages based on Gogo's infringement. SmartSky has provided notice of its patents, including the '947 Patent, via SmartSky's website, https://ssnpatents.com/, at least since August 6, 2018.

72. Gogo's infringement of the '947 Patent has been and continues to be deliberate and willful, and, therefore, this is an exceptional case warranting an award of enhanced damages for up to three times the actual damages awarded and attorney's fees to SmartSky pursuant to 35 U.S.C. §§ 284-285. As noted above, Gogo has had knowledge of the '947 Patent, and even preemptively and unsuccessfully attempted to invalidate it at the PTAB, and yet has deliberately continued to infringe in a wanton, malicious, and egregious manner, in complete disregard for SmartSky's patent rights.

COUNT II

INFRINGEMENT OF THE '417 PATENT

73. SmartSky incorporates each of the preceding paragraphs 1-55 as if fully set forth herein.

74. On information and belief, Defendant has infringed and continues to infringe the '417 Patent under 35 U.S.C. § 271(a) by making, using, selling, or offering for sale in this District and in the United States products or systems covered by one or more claims of the '417 Patent, including, but not limited to, its Gogo 5G network. For example, as explained above, Gogo has announced that it has reached an agreement with Jet Edge International to become Gogo 5G's launch customer, and that Gogo has completed construction of a seven-tower 5G testbed. The Accused System infringes at least claims 1, 2, 5, 8, 11, 12, 15, and 18 of the '417 Patent ("the Asserted '417 Patent Claims").

75. As discussed above, on information and belief, Gogo has known of the '417 Patent prior to the filing of this action, and at least since approximately January 31, 2022, shortly after SmartSky updated its website to include the '417 Patent. *See supra* ¶¶ 32-36.

76. Claim 1 of the '417 Patent recites "[a] ground station among a network of ground stations configured to provide a wirelessly transmitted high speed data communication link to a receiver station on an in-flight aircraft." Ex. 2 at 10:28-31. Gogo's 5G network includes a network of towers ("ground stations") configured to provide a wirelessly transmitted high speed data communication link to a receiver station on an in-flight aircraft.[47]

77. Claim 1 of the '417 Patent recites that the ground station comprises "an antenna" and "a software defined radio operably coupled to the antenna." Ex. 2 at 10:32-33. The

[47] *See, e.g.*, Corbett Decl. Ex. 34 at 4, 20.

software defined radio configures "the ground station to conduct a handover of the in-flight aircraft to another ground station within the network of ground stations to maintain the high-speed data communication link continuous and uninterrupted in time." *Id*. at 10:34-38. As explained above, the Gogo 5G base stations include 16-antenna digital port beamforming antennas using massive MIMO technology, as well as a software defined radio.[48]

78. Claim 1 of the '417 Patent recites that the "software defined radio is configured to employ a wireless radio access network protocol operating in a communication band from about 2 GHz to about 6 GHz." Ex. 2 at 10:39-42. As shown above, the Gogo 5G network utilizes a software defined radio that is configured to employ a wireless radio access network protocol operating in the unlicensed 2.4 GHz band.[49]

79. Claim 1 of the '417 Patent further specifies that "the ground station is configured to utilize beamforming to generate one or more steerable beams used to form the high speed data communication link," and "to reuse a same frequency to communicate with the receiver station and another receiver station on another in-flight aircraft." Ex. 2 at 10:43-38. The Gogo 5G network uses beamforming and a phased array to steer beams, and generates multiple beams to communicate with multiple in-flight receiver stations using the same bandwidth and spectrum without interference.[50]

80. Claim 11 of the '417 Patent is directed to a wireless communication network comprising a plurality of ground stations, rather than the single ground station of Claim 1 of the '417 Patent, but is otherwise nearly identical to Claim 1. *See* Ex. 2 at 11:16-37. Therefore, the

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48 *See, e.g.*, *supra* ¶¶ 61-62.

49 *See, e.g.*, Corbett Decl. Ex. 34 at 4, 20.

50 *See, e.g.*, *supra* ¶¶ 61-64.

Gogo 5G network infringes Claim 11 of the '417 Patent for the same reasons it infringes Claim 1 of the '417 Patent.

81. In particular, the Gogo 5G network includes "a wireless communication network configured to provide high speed wirelessly transmitted data communication to an in-flight aircraft," as recited in claim 11 of the '417 Patent.[51]

82. The Gogo 5G ground stations are located "such that at least some of the ground stations are within overlapping communication range of respective other ones of the ground stations," as recited in claim 11 of the '417 Patent.[52] As explained above, the Gogo 5G ground stations are "configured via software defined radio to communicate with a receiver station located onboard the in-flight aircraft to provide a high speed communication link continuous and uninterrupted in time with the receiving station employing a wireless radio access network protocol operating in a communication band from about 2 GHz to about 6 GHz," as recited in claim 11 of the '417 Patent.[53] In particular, the Gogo 5G ground stations employ a wireless radio access network protocol operating in the unlicensed 2.4 GHz band.[54]

83. The Gogo 5G ground stations are also configured via software defined radio to "utilize beamforming to generate a plurality of steerable beams used to form the high speed data communication link, and reuse the same frequency to communicate with the receiver station and another receiver station on another in-flight aircraft," as recited in claim 11 of the '417 Patent.[55]

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51 *See supra* ¶ 66.

52 *See supra* ¶ 64.

53 *See supra* ¶ 61-64.

54 *See, e.g.*, Corbett Decl. Ex. 34 at 20.

55 *See supra* ¶¶ 61-64.

84. As explained above, the Gogo 5G network conducts "make before break" handoffs so that "the high-speed data communication link is maintained continuous and uninterrupted in time while the in-flight aircraft moves from a coverage area provided by one of the plurality of ground stations to a coverage area provided by another of the plurality of ground stations," as recited in claim 11 of the '417 Patent.[56]

85. Claims 2 and 12 of the '417 Patent respectively depend from Claims 1 and 11 of the '417 Patent, and further specify that "the wireless radio access network protocol includes Long Term Evolution (LTE) terrestrial radio access network protocols." Ex. 2 at 10:49-51, 12:5-7. Gogo's publicly available literature notes that its 5G network will use a "[m]ulti-carrier LTE signal that enables more bandwidth."[57]

86. Claims 5 and 15 of the '417 Patent respectively depend from Claims 1 and 11 of the '417 Patent, and further specify that "the high speed communication link is configured to provide internet access, streaming video, or voice-over IP to the receiver station." Ex. 2 at 10:59-62, 12:15-17. Gogo claims that its 5G network will use beamforming and beamsteering to enable "seamless video streaming."[58]

87. Claims 8 and 18 of the '417 Patent respectively depend from Claims 1 and 11 of the '417 Patent, and further specify that "the high speed data communication link employs Orthogonal Frequency Division Multiplexing (OFDM)." Ex. 2 at 11:5-7, 12:26-28. On information and belief, the high speed data communication link provided by the Gogo 5G network employs orthogonal frequency division multiplexing (OFDM). For example, in a May 26, 2021

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56 *See supra* ¶ 64.

57 *See* Corbett Decl. Ex. 39.

58 Corbett Decl. Ex. 34 at 19.

filing with the FCC, Gogo's counsel stated that "Gogo BA's next-generation ATG system will deploy a new telecommunications standard using Orthogonal Frequency Division Multiplex technology ("OFDM") to improve throughput, coverage, and reliability for inflight connectivity to aircraft in the United States and Canada."[59]

88. Based on the above, the Gogo 5G network directly and literally infringes at least claims 1, 2, 5, 8, 11, 12, 15, and 18 of the '417 patent. To the extent the Gogo 5G network does not literally meet any of the elements of claims 1, 2, 5, 8, 11, 12, 15, or 18, any differences between the Gogo 5G network and the Asserted '417 Patent Claims are insubstantial, and the Gogo 5G network therefore infringes such claims under the doctrine of equivalents.

89. SmartSky has no adequate remedy at law against Gogo's acts of infringement. By its wrongful acts, Gogo has caused and unless restrained by the Court, will continue to cause serious irreparable injury and damage to SmartSky.

90. Gogo, by way of its infringing activities has caused and continues to cause SmartSky to suffer damages, the exact amount to be determined at trial. The damages include lost profits and/or reasonable royalty damages based on Gogo's infringement. SmartSky has provided notice of its patents, including the '417 Patent, via SmartSky's website, https://ssnpatents.com/, at least since January 15, 2022.

91. On information and belief, Gogo's infringement of the '417 Patent has been and continues to be deliberate and willful, and, therefore, this is an exceptional case warranting an award of enhanced damages for up to three times the actual damages awarded and attorney's fees to SmartSky pursuant to 35 U.S.C. §§ 284-285. As noted above, Gogo has had knowledge of the '947 Patent, the parent of the '417 patent, and even preemptively and unsuccessfully attempted to

[59] Corbett Decl. Ex. 40.

invalidate the '947 patent at the PTAB. In view of Gogo's close monitoring of SmartSky's patent portfolio, on information and belief Gogo has known of the '417 patent prior to the filing of this action, and yet has deliberately continued to infringe in a wanton, malicious, and egregious manner, in complete disregard for SmartSky's patent rights.

COUNT III

INFRINGEMENT OF THE '717 PATENT

92. SmartSky incorporates each of the preceding paragraphs 1-55 as if fully set forth herein.

93. On information and belief, Defendant has infringed and continues to infringe the '717 Patent under 35 U.S.C. § 271(a) by making, using, selling, or offering for sale in this District and in the United States products or systems covered by one or more claims of the '717 Patent, including, but not limited to, its Gogo 5G network. For example, as explained above, Gogo has announced that it has reached an agreement with Jet Edge International to become Gogo 5G's launch customer, and that Gogo has completed construction of a seven-tower 5G testbed. The Accused System infringes at least claims 1 and 12 of the '717 Patent ("the Asserted '717 Patent Claims").

94. As discussed above, Gogo has had knowledge of the '717 Patent prior to the filing of this action, and at least since August 5, 2021. *See supra* ¶¶ 32-36.

95. Claim 1 of the '717 Patent recites "a network for providing air-to-ground wireless communication in various cells." *See* Ex. 3 at 12:5-6. Gogo's 5G network uses Gogo's existing network of towers to provide ATG wireless communication in various cells, each including a tower having an antenna array.[60]

[60] *See* Corbett Decl. Ex. 34 at 20.

96. Claim 1 of the '717 Patent recites that the network comprises "a first base station including a first antenna array defining a first directional radiation pattern oriented toward a horizon." Ex. 3 at 12:7-9. The Gogo 5G network includes multiple nodes, including a "first base station," each of which is a 5G vRAN base station with 16-antenna digital port beamforming antennas ("first antenna array") using massive MIMO technology to communicate with aircraft.[61] During the Gogo presentation on October 13, 2021 at the NBAA-BACE conference, Gogo's Vice President of Network Operations, Mike Rupert, indicated that Gogo base stations or cell sites are located at elevated positions so that the base stations can "see the horizon."[62] During the same presentation, a video was played in which Gogo's Director of Network Operations, Alex Uribes, explained that in certain areas Gogo locates its base stations "away from an urban environment that can transmit back over the urban environment."[63] In addition, Gogo's January 4, 2022 press release announcing the completion of its seven-tower testbed included a photograph of a tower having multiple antenna array panels that are oriented toward the horizon, as shown below.[64]

61 *See* Corbett Decl. Ex. 37 at 4.

62 *See* Corbett Decl. Ex. 35 at 23:45-24:00.

63 *See id.* at 41:38-41:47.

64 *See* Corbett Decl. Ex. 30.

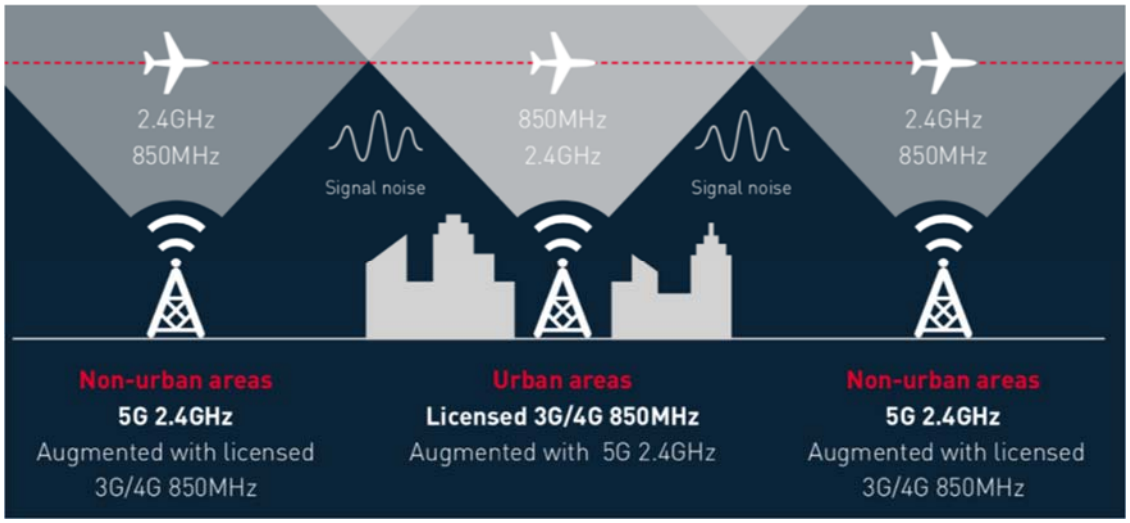
97. On information and belief, by locating the base station away from an area, and then transmitting the signal horizontally toward the area using antenna array panels facing the horizon, the Gogo 5G base station antenna array defines "a first directional radiation pattern that is oriented toward a horizon," as recited in claim 1 of the '717 Patent.

98. Claim 1 of the '717 Patent further recites that the network includes "a second base station including a second antenna array defining a second directional radiation pattern that at least partially overlaps the with the first base station." Ex. 3 at 12:10-12. As discussed above, the Gogo 5G network includes multiple base stations, including a "second base station," that includes a second antenna array defining a second directional radiation pattern that at least partially overlaps with the first base station.[65]

99. Claim 1 of the '717 Patent further recites that "the first base station employs unlicensed spectrum," and "the second base station employs licensed spectrum." Ex. 3 at 12:13-16. The Gogo 5G network includes base stations, including a first base station having a first directional radiation pattern oriented toward the horizon, that use unlicensed spectrum at 2.4

[65] *See, e.g.*, Corbett Decl. Ex. 36 at 36:00-38:00; Ex. 34 at 20.

GHz.[66] The Gogo 5G network also includes base stations, including a second base station, that use Gogo's 4 MHz of licensed spectrum in the 850 MHz band. For example, as shown below in a figure from Gogo's public documentation, the left (*i.e.*, "second") base station employs unlicensed spectrum at 2.4 GHz, and the middle (*i.e.*, "first") base station employs licensed spectrum at 850 MHz.[67]



100. Claim 1 of the '717 Patent further recites that "the first and second base stations are each configured to wirelessly communicate with a radio disposed on an aircraft flying through respective cell coverage areas of the first and second base stations," and "to handover communication with the radio as the aircraft moves between the respective cell coverage areas of the first and second base stations." Ex. 3 at 12:17-24. Each of the Gogo 5G base stations includes 16-antenna digital port beamforming antennas that are configured to wirelessly communicate with a radio disposed on an aircraft flying through respective cell coverage areas of the first and second base stations.[68] The Gogo 5G network also includes a radio disposed on the aircraft, which is used

66 *See, e.g.*, Corbett Decl. Ex. 37 at 2.

67 *See* Corbett Decl. Ex. 34 at 20.

68 *See, e.g.*, Corbett Decl. Ex. 37 at 4-5.

to communicate with the first and second base stations. The radio includes a 13-inch, blade-style multiband phased array antenna mounted on the belly of the aircraft, as shown below.[69]

101. As explained above, the Gogo 5G network conducts "make before break" handoffs, in which multiple beams are steered to establish communication links with different base stations having overlapping coverage areas so that the communication link are handed off without interrupting the connection.[70]

102. Claim 12 of the '717 Patent is directed to "a network for providing air-to-ground (ATG) wireless communication in various cells." Ex. 3 at 12:56-57. Gogo's 5G network includes a network of towers to provide ATG wireless communications in various cells, with each celling including a tower having an antenna array.[71]

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69 *See, e.g.*, Corbett Decl. Ex. 34 at 17.

70 *See, e.g.*, Corbett Decl. Ex. 36 at 36:00-38:00.

71 *See, e.g.*, Corbett Decl. Ex. 34 at 4, 20.

103. Claim 12 of the '717 Patent recites that the network comprises "a first base station including a first antenna array defining a first directional radiation pattern that is oriented toward a horizon." As explained above, the Gogo 5G network includes a 5G vRAN "first base station" that can "see the horizon," and that uses 16-antenna digital port beamforming antennas to transmit a radiation pattern toward the horizon.[72]

104. Claim 12 of the '717 Patent further recites that the network includes "a second base station including [a] second antenna array defining a second directional radiation pattern that at least partially overlaps with the first base station." As explained above, the Gogo 5G network includes a second base station that includes a second antenna array defining a second directional radiation pattern that overlaps the first base station, in order to enable "make before break" handoffs between the first and second base stations.[73]

105. Claim 12 of the '717 Patent further recites that "one of the first base station or the second base station employs unlicensed spectrum, and the other of the first base station and the second base station employs licensed spectrum." Ex. 3 at 12:64-67. As shown above, the Gogo 5G network includes base stations that use unlicensed spectrum at 2.4 GHz, and base stations that use Gogo's 4 MHz of licensed spectrum in the 850 MHz band.[74]

106. Claim 12 of the '717 Patent recites that "the first and second base stations are each configured to wirelessly communicate with a radio disposed on an aircraft flying through respective cell coverage areas of the first and second base stations," and "to handover communication with the radio as the aircraft moves between the respective cell coverage areas of

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72 *See supra* ¶¶ 96-97.

73 *See supra* ¶¶ 64, 98.

74 *See supra* ¶ 99.

the first and second base stations." Ex. 3 at 13:1-8. As explained above, each of the Gogo 5G base stations includes 16-antenna digital port beamforming antennas that are configured to wirelessly communicate with a radio, which is coupled to a 13-inch, blade-style multiband phased array antenna mounted on the belly of the aircraft.[75] The Gogo 5G network conducts "make before break" handoffs as the aircraft moves between overlapping cell coverage areas of the first and second base stations.[76]

107. Based on the above, the Gogo 5G network directly and literally infringes at least claims 1 and 12 of the '717 patent. To the extent the Gogo 5G network does not literally meet any of the elements of claim 1 or claim 12, any differences between the Gogo 5G network and the Asserted '717 Patent Claims are insubstantial, and the Gogo 5G network therefore infringes such claims under the doctrine of equivalents.

108. SmartSky has no adequate remedy at law against Gogo's acts of infringement. By its wrongful acts, Gogo has caused and unless restrained by the Court, will continue to cause serious irreparable injury and damage to SmartSky.

109. Gogo, by way of its infringing activities, has caused and continues to cause SmartSky to suffer damages, the exact amount to be determined at trial. The damages include lost profits and/or reasonable royalty damages based on Gogo's infringement. SmartSky has provided notice of its patents, including the '717 Patent, via SmartSky's website, https://ssnpatents.com/, at least since August 2021.

110. On information and belief, Gogo's infringement of the '717 Patent has been and continues to be deliberate and willful, and, therefore, this is an exceptional case warranting an

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75 *See supra* ¶¶ 100, 101.

76 *See, e.g.*, Corbett Decl. Ex. 36 at 36:00-38:00.

award of enhanced damages for up to three times the actual damages awarded and attorney's fees to SmartSky pursuant to 35 U.S.C. §§ 284-285.

COUNT IV

INFRINGEMENT OF THE '077 PATENT

111. SmartSky incorporates each of the preceding paragraphs 1-55 as if fully set forth herein.

112. On information and belief, Defendant has infringed and continues to infringe the '077 Patent under 35 U.S.C. § 271(a) by making, using, selling, or offering for sale in this District and in the United States products or systems covered by one or more claims of the '077 Patent, including, but not limited to, its Gogo 5G network. For example, as explained above, Gogo has announced that it has reached an agreement with Jet Edge International to become Gogo 5G's launch customer, and that Gogo has completed construction of a seven-tower 5G testbed. The Accused System infringes at least claims 1 and 2 of the '077 Patent ("the Asserted '717 Patent Claims").

113. As discussed above, Gogo has had knowledge of the '077 Patent at least since August 5, 2021. *See supra* ¶¶ 32-36.

114. Claim 1 of the '077 Patent recites "An air-to-ground (ATG) network providing wireless communications to an in-flight aircraft capable of passing through various cells of the ATG network." Ex. 4 at 22:6-8. Gogo's 5G network uses Gogo's existing network of towers to provide ATG wireless communication in various cells, each including a tower having an antenna array.[77]

[77] *See, e.g.*, Corbett Decl. Ex. 34 at 20.

115. Claim 1 of the '077 Patent recites that the ATG network comprises "a first ATG base station defining a first radiation pattern focusing energy toward the horizon." Ex. 4 at 22:10-11. The Gogo 5G network includes multiple nodes, including a "first ATG base station," each of which is a 5G vRAN base station with 16-antenna digital port beamforming antennas ("first antenna array") using massive MIMO technology to communicate with aircraft.[78] During the Gogo presentation on October 13, 2021 at the NBAA-BACE conference, Gogo's Vice President of Network Operations, Mike Rupert, indicated that Gogo base stations or cell sites are located at elevated positions so that the base stations can "see the horizon."[79] During the same presentation, a video was played in which Gogo's Director of Network Operations, Alex Uribes, explained that in certain areas Gogo locates its base stations "away from an urban environment that can transmit back over the urban environment."[80] In addition, Gogo's January 4, 2022 press release announcing the completion of its seven-tower testbed included a photograph of a tower having multiple antenna array panels that are oriented toward the horizon, as shown below.[81]

78 *See* Corbett Decl. Ex. 37 at 4.

79 *See* Corbett Decl. Ex. 35 at 23:45-24:00.

80 *See id.* at 41:38-41:47.

81 *See* Corbett Dec. Ex. 30.

116. On information and belief, by locating the base station away from an area, and then transmitting the signal horizontally toward the area using antenna array panels facing the horizon, the Gogo 5G base station antenna array defines "a first radiation pattern focusing energy toward the horizon," as recited in claim 1 of the '077 Patent.

117. Claim 1 of the '077 Patent further recites "a second ATG base station defining a second radiation pattern focusing energy toward the horizon; and a plurality of additional ATG base stations, each of which defines a corresponding radiation pattern focusing energy toward the horizon." Ex. 4 at 22:12-16. According to Gogo's publicly available literature, its 5G network will use Gogo's existing tower infrastructure of more than 250 towers, including "a second ATG base station" and "a plurality of additional ATG base stations," as recited in claim 1 of the '077 Patent.[82] As explained above, the Gogo base stations are located away from certain areas, and transmit signals substantially horizontally back over those areas.[83] Accordingly, the Gogo 5G network includes "a second ATG base station" and "a plurality of additional ATG base

[82] *See, e.g.*, Corbett Decl. Ex. 34 at 4.

[83] *See* Corbett Decl. Ex. 35 at 41:38-41:47.

stations," each of which "defines a corresponding radiation pattern focusing energy toward the horizon."

118. Claim 1 of the '077 Patent further specifies that "the first, second, and additional ATG base stations are spaced apart from each other to define at least partially overlapping coverage areas to communicate with an antenna assembly on the in-flight aircraft in an ATG communication layer defined between a first altitude and a second altitude via the ATG network." Ex. 4 at 22:17-22. As explained above, each of the Gogo 5G base stations includes 16-antenna digital port beamforming antennas that are configured to wirelessly communicate with a radio, which is coupled to a 13-inch, blade-style multiband phased array antenna mounted on the belly of the aircraft.[84] The Gogo 5G network conducts "make before break" handoffs as the aircraft moves between overlapping cell coverage areas of the first and second base stations.[85] On information and belief, the Gogo 5G network defines "an ATG communication layer" that permits communication with the antenna assembly on the in-flight aircraft between 10,000 feet ("a first altitude")[86] and at least 35,000 feet ("a second altitude").[87]

119. Claim 1 of the '077 Patent further recites "wherein a plurality of terrestrial base stations are configured to communicate primarily in a ground communication layer below the first altitude via a terrestrial communication network." Ex. 4 at 22:23-26. As explained above, Gogo's 5G network includes ATG base stations that are located away from urban environments,

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84 *See supra* ¶ 100.

85 *See, e.g.*, Corbett Decl. Ex. 36 at 36:00-38:00.

86 *See, e.g.*, Corbett Decl. Ex. 41 ("Gogo's 5G systems will support service below 10,000 feet AGL using the licensed portion of our spectrum via 4G. The system will seamlessly transition to the full Gogo 5G experience once available above 10,000 feet AGL.").

87 *See, e.g.*, Corbett Decl. Ex. 42.

and transmit signals back over the urban environment.[88] On information and belief, the Gogo 5G network establishes "an ATG communication layer" above a plurality of terrestrial base stations that are configured to communicate in a ground communication layer (e.g., Wi-Fi) below 10,000 feet ("the first altitude").

120. Claim 1 of the '077 Patent recites that "the first, second, and additional ATG base stations are each configured to communicate in the ATG communication layer using the same radio frequency (RF) spectrum used by the terrestrial base stations in the ground communication layer." Ex. 4 at 22:27-31. Gogo's ATG base stations use the same 2.4 GHz spectrum that is used by terrestrial Wi-Fi base stations in the ground communication layer.[89]

121. Claim 2 of the '077 Patent depends from claim 1 of the '077 Patent, and further specifies that "a serving ATG base station from among the first, second and additional ATG base stations is in communication with the in-flight aircraft while being geographically located outside a coverage area of each of the terrestrial base stations in a portion of the ground communication layer above which the in-flight aircraft is located." Ex. 4 at 22:32-38.

122. As explained above, the Gogo 5G base stations are located away from certain areas, and transmit signals substantially horizontally back over those areas.[90] By transmitting signals substantially horizontally, a Gogo 5G base station communicates with the in-flight aircraft while the in-flight aircraft is a substantial distance from the base station. On information and belief, terrestrial base stations configured to communicate primarily in a ground communication layer (e.g., Wi-Fi base stations) have a communication range that is substantially

88 *See, e.g.*, Corbett Decl. Ex. 35 at 41:38-41:47.

89 *See, e.g.*, Corbett Decl. Ex. 34 at 7, 9, 20.

90 *See, e.g.*, Corbett Decl. Ex. 35 at 41:38-41:47.

less than the distance between an-flight aircraft and the Gogo 5G base station with which it communicates. Therefore, on information belief, a Gogo 5G base station communicates "with the in-flight aircraft while being geographically located outside a coverage area of each of the terrestrial base stations in a portion of the ground communication layer above which the in-flight aircraft is located."

123. Based on the above, the Gogo 5G network directly and literally infringes at least claims 1 and 2 of the '077 patent. To the extent the Gogo 5G network does not literally meet any of the elements of claim 1 or claim 2, any differences between the Gogo 5G network and the Asserted '077 Patent Claims are insubstantial, and the Gogo 5G network therefore infringes such claims under the doctrine of equivalents.

124. SmartSky has no adequate remedy at law against Gogo's acts of infringement. By its wrongful acts, Gogo has caused and unless restrained by the Court, will continue to cause serious irreparable injury and damage to SmartSky.

125. Gogo, by way of its infringing activities has caused and continues to cause SmartSky to suffer damages, the exact amount to be determined at trial. The damages include lost profits and/or reasonable royalty damages based on Gogo's infringement. SmartSky has provided notice of its patents, including the '077 Patent, via SmartSky's website, https://ssnpatents.com/, at least since August 2018.

126. On information and belief, Gogo's infringement of the '077 Patent has been and continues to be deliberate and willful, and, therefore, this is an exceptional case warranting an award of enhanced damages for up to three times the actual damages awarded and attorney's fees to SmartSky pursuant to 35 U.S.C. §§ 284-285.

DEMAND FOR RELIEF

WHEREFORE, SmartSky respectfully requests that judgment be entered in its favor and against Defendants as follows:

a. That Defendants have directly infringed the Asserted Patents;

b. That Defendants and their respective agents, servants, officers, directors, employees, and all persons acting in concert with them, directly or indirectly, be temporarily and permanently enjoined from the infringement of the Asserted Patents;

c. That Defendants be ordered to account for and pay to SmartSky the damages to which SmartSky is entitled as a consequence of the infringement of the Asserted Patents, together with pre-judgment interest and costs;

d. That a post-judgment equitable accounting of damages be ordered for the period of infringement of the Asserted Patents;

e. That Defendants be adjudged willful infringers and ordered to pay treble damages pursuant to Title 35 United States Code § 284;

f. That this case be declared an "exceptional case" pursuant to 35 U.S.C § 285 and SmartSky be awarded its costs, disbursements and attorneys' fees; and

g. That SmartSky be awarded such other and further relief as the Court may deem just and equitable.

JURY DEMAND

SmartSky demands a jury trial on all issues triable to a jury in this matter.

MORRIS, NICHOLS, ARSHT & TUNNELL LLP

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