Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 22 of the Commission's Rules	)	
To Benefit the Consumers of Air-Ground	)	WT Docket No. 03-103
Telecommunications Services	)	
	)	
Biennial Regulatory Review – Amendment of	)	
Parts 1, 22, and 90 of the Commission's Rules	)	

REPLY COMMENTS OF SPACE DATA CORPORATION

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SUMMARY

Space Data Corporation ("Space Data") supports the Commission's initiative re-examining its commercial air-ground telecommunications service rules. The Commission has been charged with the task of efficiently allocating spectrum in a manner that best serves the public interest. Although six carriers were initially granted licenses in the air-ground spectrum band, only one carrier today provides commercial air-ground service. Although market studies indicate that consumers are keen to use air-ground communications, usage has diminished because the service is too inconvenient and too costly. Moreover, carriers have been unable or unwilling to make the significant capital investment required to develop and deploy a dedicated commercial air-ground communications network. Thus, spectrum originally allocated for commercial air-ground services lies fallow and its use is not being maximized.

Despite the current lack of competition in the air-ground telecommunications market, unmet consumer demand is significant and given the proper regulatory incentives commercial air-ground services could thrive. The Commission's ultimate goal should be a regulatory environment that makes placing or receiving a wireless call from the seat of an airplane as easy, reliable, and cost effective as making a wireless call from a car. Space Data proposes a three-prong approach that would introduce competition into the air-ground communications market.

First, the Commission should continue to use the current air-ground spectrum allocation primarily for air-ground service, but allow terrestrial service to unserved areas on a secondary basis. The current spectrum allocated for air-ground service should retain its primary status because unmet consumer demand for such service exists. The Commission, however, should modify its service rules to encourage the development of competitive air-ground systems and use of these frequencies in rural areas on a secondary basis.

Second, new technologies that have developed since the initial allocation of air-ground spectrum in the early 1990s allow the more efficient use of cellular handsets and communications networks. In particular, these technologies have allowed CMRS and air-ground services to achieve compatibility with each other. Combined, there is an opportunity for carriers using new technologies, such as stratospheric high altitude platforms, to serve airplane passengers as well as consumers in unserved and underserved areas. In order to take advantage of these technologies, however, the Commission must adjust its rules to allow handset manufacturers to develop cellular telephones that operate across cellular and air-ground frequencies.

Third, the Commission should adopt a licensing scheme that would allow carriers to utilize new and developing technologies to increase competition in the commercial air-ground market, while addressing the interference concerns of terrestrial cellular operators. Specifically, the Commission should auction two exclusive licenses in the commercial air-ground frequency band. The amount of spectrum currently allocated to commercial air-ground services allows at most two licensees with exclusive use to the spectrum. One license would accommodate CDMA-based mobile phones, and the other would accommodate GSM-based phones. To ensure competition in the air-ground communications market, the Commission should require that the licensees be unaffiliated. To maximize use of this spectrum and to provide service to as many consumers as possible, the air-ground licensees also should be required to allow any cellular carriers to roam on their air-ground networks.

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REPLY COMMENTS OF SPACE DATA CORPORATION

Space Data Corporation ("Space Data") replies to comments filed in response to the Commission's notice of proposed rulemaking ("NPRM") that re-examines its commercial air-ground telecommunications service rules.[1] As noted by other parties in their comments and the Commission in the NPRM, the spectrum currently allocated to commercial air-ground services is woefully underutilized, and Space Data supports the Commission's initiative to make better use of the spectrum for U.S. consumers. The initial commenters, however, fail to address certain technological developments that could increase competition in the commercial air-ground market and make more efficient use of the spectrum. Accordingly, Space Data submits these reply comments to urge the Commission to allow new service providers and different advanced technologies to operate in the air-ground frequencies in order to enhance competition and increase consumer choice in the wireless telecommunications market.

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[1] *See Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services,* Notice of Proposed Rule Making, 18 FCC Rcd 8380 (2003) ("NPRM").

I. INTRODUCTION

Space Data is a start-up company that has developed an innovative balloon-based telecommunications system to provide advanced messaging and other advanced wireless telecommunications services across the United States on a nationwide basis. Space Data is primarily focused upon extending wireless services to rural and other underserved areas. The Space Data system utilizes inexpensive weather balloons to carry miniature radio repeaters (SkySites™) to an altitude of approximately 100,000 feet. Space Data's balloon-borne system is one type of stratospheric high altitude communications platform. These balloon-based platforms are positioned at altitudes far above that of commercial aircraft.[2] A constellation of seventy such balloons can provide ubiquitous wireless coverage in the continental United States. Space Data is licensed to provide Narrowband PCS services on eight paired nationwide channels, two paired Major Trading Area ("MTA") channels in all MTAs in the fifty states, and two additional MTA channels in regional areas. Space Data also has been named the high bidder on various Narrowband PCS licenses in Auctions 50 and 51 that will accommodate its operations.

Congress entrusted the Commission to efficiently allocate spectrum and in a manner that best serves the public interest.[3] The spectrum allocated for the commercial air-ground market, however, is not efficiently used, as evidenced by the solitary carrier that today provides commercial air-ground services. The proposals set forth in the initial round of comments vary in

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[2] The Commission has granted Space Data a waiver to operate its balloon-borne devices as terrestrial base stations. *See* Petition for a Declaratory Ruling, a Clarification or, in the Alternative, a Waiver of Certain Narrowband Personal Communications Services (PCS) Rules as they Apply to a High-Altitude Balloon-Based Communications System, 16 FCC Rcd 16421 (WTB 2001).

[3] 47 U.S.C. § 303.

scope, but none considers leveraging adjacent commercial mobile radio service ("CMRS") spectrum and new technologies such as stratospheric platforms to enhance air-ground service, and secondarily, rural service. As further explained below, it is possible for cellular handsets to communicate with stratospheric platforms or terrestrial towers to provide seamless air-ground services as well as service to rural and underserved areas. In order to take advantage of this opportunity, however, the Commission must adopt a different approach to licensing the commercial air-ground frequency band.

Space Data proposes a multi-prong approach to restructuring the commercial air-ground service. First, the Commission should continue to use the current air-ground spectrum allocation primarily for air-ground service, but allow service to unserved areas on a secondary basis. Second, new technological developments allow CMRS and air-ground services to achieve compatibility with each other, and the Commission should take advantage of these developments to make air-ground service more cost effective and competitive. Third, the Commission should adopt a licensing scheme that would allow carriers to utilize new and developing technologies to increase competition in the commercial air-ground market, while addressing the interference concerns of terrestrial cellular operators. The Commission's ultimate goal should be a regulatory environment that makes placing or receiving a wireless call from the seat of an airplane as easy, reliable, and cost effective as making a wireless call from a car.

II. AIR-GROUND SPECTRUM USE IS NOT BEING MAXIMIZED.

Historically, the Commission has required air ground licensees to build and develop separate wireless networks for the provision of commercial air-ground services. The Commission apparently believed that centralized control of equipment design, maintenance, operations and transmissions in the air-ground band would safeguard against interference with

aircraft navigation or communication systems. Moreover, terrestrial cellular users required protection from interference created by airline passengers using conventional cellular handsets. Over the past decade, however, technological advances have removed the need for the strict licensing regime now in place.

A. Commission Action Is Necessary To Promote Additional Competition In The Air-Ground Market.

As noted in the NPRM and by other commenters, only Verizon AirFone currently provides service in the commercial air-ground market. All other licenses in the air-ground spectrum band have been returned to the Commission for one reason or another, and the spectrum remains unused. Verizon AirFone, however, reported in its comments that a recent survey showed 74 percent of North American airline passengers considered using a telephone or laptop in-flight as "very important" or "quite important."[4] Furthermore, attempts by other companies to enter the commercial air-ground market using satellite and upward-directed cellular technology demonstrate a market perception that there is an unmet demand for air-ground telecommunications services.[5]

Despite the significant demand for commercial air-ground services, consumer interest in using such services has been dampened because it is too inconvenient and costly for airline passengers to utilize the existing service. For example, airline passengers are limited to special handsets available only in specific places on the airplanes and cannot use their own personal mobile phones. These special handsets are typically embedded in the seats of an airplane,

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[4] Verizon AirFone Comments at 4, *Amendment of Part 22 of the Commission's Rules to Benefit the Consumers of Air-Ground Telecommunications Services*, 18 FCC Rcd 8380 (2003). All comments filed on Sept. 23, 2003, in this proceeding will hereinafter be short cited.

[5] Boeing's Connexion is an air-ground service based on satellite technology while AirCell is using traditional cellular frequencies to provide air-ground service to general aviation aircraft. NPRM, 18 FCC Rcd at 8388-89.

offering no privacy to the user, and one handset must be shared by multiple passengers. Moreover, the cost of making air-ground calls is prohibitively expensive in comparison to terrestrial wireless calls.[6]

Similarly, carriers (with the exception of Verizon AirFone) have been unable or unwilling to make the significant investment required to develop and deploy dedicated air-ground networks. The economies of scale associated with providing commercial air-ground services have been insurmountable. Of the six companies initially licensed to provide air-ground service, three constructed networks, only one of which is still operating.[7] As noted above, however, there is a viable competitive market for commercial air-ground services if the proper incentives are in place.[8]

A comparison between the competitive landscapes of air-ground services and commercial mobile radio service ("CMRS") is particularly noteworthy. Competition has been a powerful force in making CMRS more accessible and affordable for consumers. For example, the wireless Consumer Price Index ("CPI") declined by 33 percent in the last five years whereas the Local Telephone CPI increased 18.5 percent during that same period.[9] As demonstrated in Table 1

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[6] The domestic calling rate under a Verizon Wireless standard monthly calling plan is less than $0.12 per minute, excluding unlimited night and weekend calls. Under Verizon's America's Choice 300 Plan, a subscriber can use 300 airtime minutes a month for $34.99. If unlimited night and weekend calls were taken into consideration, this rate would drop even lower. *See* Plan Section of the Verizon Wireless Website, http://www.verizonwireless.com/ics/plsql/customize.intro?p_section=PLANS_PRICING (visited Oct. 22, 2003). In contrast, Verizon AirFone charges a $3.99 connection fee and a $3.99 per-minute airtime fee for domestic calls placed from an airplane. *See* Verizon Airfone General Rates, *at* http://www22.verizon.com/airfone/service/af_service_genrates.html (visited Oct. 22, 2003).

[7] NPRM, 18 FCC Rcd at 8384 n.19.

[8] *See id.* at 8388-89.

[9] Table 8: Change in CPI, *Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, 18 FCC Rcd 14783, 14899 (2003) ("CMRS Report").

below, the success of CMRS is stunning when compared to the current status of the commercial air-ground service. The Commission's recent report on CMRS demonstrates that regulatory flexibility coupled with active competition has helped make CMRS an integral part of our society.[10] The domestic CMRS market accounts for more than $76.5 billion in annual revenues compared with the current domestic air-ground market that likely accounts for less than $42 million in annual revenues.[11]

Table 1: CMRS As Compared To Current Commercial Air-Ground Service.

Metric	CMRS	Commercial Air-Ground
Competition	95% of population serviced by more than 3 providers[12]	Only one provider exists[13]
Availability	Three different digital technologies each cover at least 87% of the population[14]	Less than 30 percent of airliners equipped for service[15]
Revenue per Minute	$0.11 / minute average[16]	$3.99 / minute[17] (36 times CMRS Average)

[10] *See* CMRS Report.

[11] *See* Table 1: CTIA's Semi Annual Mobile Telephone Industry Survey, CMRS Report, 18 FCC Rcd at 14891, and the commercial air-ground revenue is estimated from the ACTS total Domestic Revenue Aircraft Departures which was 7.7 million for 2002; the 29% of the aircraft fleet with air-ground service; the 3.11 minutes per average call; and the $3.99 per minute and 1.5 calls per flight stated in the NPRM at paragraph 13. *See infra* note 18 for source of percent of aircraft fleet with service and minutes per call. Thus, 7.7 million flights * 29% * 1.5 calls * 3.11 minutes/call * $3.99/min = $41.6 million in estimated annual revenue.

[12] Table 5: Estimated Mobile Telephone Rollouts by Number of Launches by County, CMRS Report, 18 FCC Rcd at 14898.

[13] NPRM, 18 FCC Rcd at 8384.

[14] Table 7: Mobile Telephone Digital Coverage, CMRS Report, 18 FCC Rcd at 14899.

[15] Verizon AirFone states that it provides service to 1500 commercial planes. Verizon AirFone Comments at 12. The FAA estimates there were 5,156 U.S. Large Carrier and Regional/ Commuters Passenger Jet Aircraft at the end of 2002. Table 20: U.S. Large Carrier and Regional/Commuters Passenger Jet Aircraft, FAA Aerospace Forecast Fiscall Years 2003-2014, *at* http://apo.faa.gov/foreca02/content_5.htm (visited Oct. 22, 2003) ("FAA Forecast"). Thus, 1500 divided by 5,156 is 29%.

[16] Table 9: Average Revenue Per Minute, CMRS Report, 18 FCC Rcd at 14900.

[17] NPRM, 18 FCC Rcd at 8387.

Traffic Intensity	At least 35 calls per equivalent flight, and likely more if a higher percentage of air travelers have CMRS phones than the general public and use them more often when confined to a airplane seat than on average in a day.[18]	1.5 calls per average flight ($1/24^{th}$ the traffic intensity of typical CMRS systems)[19]
Technology	Multiple, continuously improving digital technologies	Frozen with a single narrowband analog technology

Significant demand for commercial air-ground services is not being satisfied due in part to high prices and a lack of regulatory and technical flexibility. Space Data agrees with AirCell, Cingular Wireless, Motorola, Sita and Verizon AirFone that the Commission's rules regarding commercial air-ground service must be updated to achieve the true potential of this service. Space Data, however, has a different view about how to implement the necessary changes. As

[18] Calculation of this number is derived from several sources: 1) U.S. Large Air Carrier Forecast Assumptions Domestic Operations report shows that the average seats per aircraft is 147.9 for 2002, Table 7: U.S. Large Air Carrier Forecast Assumptions Domestic Operations, FAA Forecast; 2) Domestic Revenue Load Factors averaged 70.6% on a monthly basis according to data from U.S. Department of Transportation, Bureau of Transportation Statistics, Air Carrier Traffic Statistics Monthly (April 2003) *at* http://www.bts.gov/products/white_house_economic_statistics_briefing_room/second_quarter_2003/index.html; 3) the average flight length per ACTS Domestic Flight Availability and Distance Data was 700 miles for April 2003; 4) the average penetration of wireless subscribers among the general population is approximately 50% per the CMRS Report, 18 FCC Rcd at 14793; 5) as of December 2002, the average length of a roaming CMRS call is 3.11 minutes, CTIA's Semi-Annual Wireless Industry Survey, at 3 (2003), *at* http://www.wow-com.com/pdf/MidYear_2003_survey.pdf; 6) typical Erlangs / Subscriber for terrestrial networks is 0.025 Erlangs according to the Manual on Mobile Communications Development, which also states, "[t]raffic intensity values between 0.01 to 0.05 erlangs per subscriber are typical mobile/portable system calling rates" and uses 0.025 erl./sub. throughout the examples, Manual on Mobile Communications Development, International Telecommunications Union, Geneva, at 54 (1997); 7) Thus, 147.9 seats / aircraft * 70.6% loading = 104 average passengers per flight, Average flight length is 700 miles / 500 miles per hour = 1.4 hours, erlangs per flight is 104 passengers * 50% with CMRS devices * 1.4 hours * 0.025 erlangs / subcriber = 1.82 erlangs; Calls per equivalent flight is then 1.82 erlangs * 60 minutes per hour / 3.11 minutes per roaming call = 35 calls.

[19] NPRM, 18 FCC Rcd at 8387.

further discussed below, the Commission's best course of action is to allow carriers the flexibility to bring the technical advances being introduced into the CMRS market into the commercial air-ground market.

B. Competition Will Not Develop In The Commercial Air-Ground Market Unless Airline Passengers Have More Than One Wireless Carrier To Choose From When Making In-Flight Calls.

Under the current air-ground regime, a carrier must partner with an airline to have specialty communication equipment installed on selected aircraft. Space Data agrees with Verizon AirFone that such a requirement acts as a barrier to new entrants and thus limits competition. These carrier-airline partnerships limit competition by restricting consumer choice on airlines to the one carrier that has equipment installed on a particular airplane. While theoretically airlines could choose to install two separate air-ground communications systems, airlines have no incentive to do this. It would simply increase costs for airlines to buy, maintain, and consume the fuel necessary to carry the extra weight of the additional communications system. Accordingly, Space Data agrees with AirCell that "the ultimate leveraged airborne solution would involve the use of the same mobile handsets that most passengers are already carrying with them in aircraft cabin."[20]

Furthermore, the Commission should modify its rules to allow wireless handsets to place calls through different types of networks. If handsets are restricted to transmitting through a centralized access point, such as by using Bluetooth or 802.11, consumers' choice of service providers remains restricted to the air-ground carrier servicing that access point. The Commission should instead adopt a more flexible approach that would allow handsets to communicate directly with air-ground networks, thus avoiding some of the expense air-ground

[20] AirCell Comments at 9.

carriers would incur by installing special telephones and network equipment in the airplanes themselves. This approach also would negate the need for air-ground carriers to negotiate and enter into individual contracts with airlines.

C. New Technological Developments Can Increase Competition In The Air-Ground Market In An Accommodating Regulatory Environment.

As reports from cellular calls made by passengers on-board the aircraft hijacked on September 11, 2001 demonstrate, conventional cellular handsets can be used to make calls from aircraft. Interference issues, however, have prevented the general use of cellular handsets on airlines. Unlike terrestrial wireless networks where ground clutter prevents a wireless signal from propagating long distances, cellular signals originating from high altitudes travel significant distances.[21] This in turn creates interference with terrestrial wireless services. Thus, if airplane passengers were allowed to use conventional cellular and PCS phones, certain spectrum frequencies would have to be dedicated for these calls, reducing the availability of spectrum to terrestrial networks.

Major technical advances have occurred, however, since the Commission allocated spectrum for commercial air-ground services in the early 1990s that have minimized interference concerns and warrant re-examination of the current regulatory framework for the provision of air-ground service. One of the most significant changes that has occurred is that virtually all

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[21] Although it is possible to use conventional cellular handsets to make calls from aircraft, the emissions from the handset travel a very long distance. The signal from a handset freely propagates through space and is not significantly attenuated compared to a terrestrial environment until the signal intersects the Earth's horizon, which is a distance of over 350 km (220 miles) from an aircraft at an altitude of 10,000 meters (32,800 feet) if the Earth were perfectly smooth. The result is that every cellular tower within this radius receives a signal from the handset and must either dedicate that frequency to servicing that call or suffer some level of interference. Whether the level of interference is significant enough to cause any noticeable disruption of a terrestrial call using the same frequency will depend upon the terrestrial environment (*i.e.*, urban versus rural, distance from terrestrial user to the tower, etc.).

cellular telephones are now digital rather than analog. Analog electronics are much more susceptible to device-to-device variations and drift of components as the devices age or are damaged through use.

On the other hand, digital cellular telephones have much less variation from device to device and are generally much less likely to change performance over time. Technological advances also have improved the reliability of cellular handsets and thus have reduced the need to centrally control the maintenance and operation of these devices in order to prevent interference with navigational equipment.

In addition, navigation equipment aboard aircraft has undergone significant technical changes. In the early 1990s most planes navigated by the VOR (very high frequency omni range) network of ground beacons. Aircraft now are being converted to Global Positioning System ("GPS") navigation systems. The CDMA modulation used by GPS technology has a very different susceptibility to interference than the VOR system. Another technical and business development since the early 1990s is the use of rural cellular towers with upward-directed, horizontally polarized antenna to provide air-ground service to private pilots and commercial aircraft passengers.[22] These advances likely have significantly reduced harmful interference from cellular handsets used in-flight to aircraft operations or terrestrial wireless operations since the establishment of air-ground service.

Although on-going studies sponsored by the Federal Aviation Administration ("FAA") systematically evaluate the potential for harmful interference with aircraft systems, another trend occurring in CMRS handsets is making the enforcement of the ban on CMRS handset usage in

[22] As noted in the NPRM, AirCell has pioneered this type of technology and service. NPRM, 18 FCC Rcd at 8388.

aircraft more difficult. Specifically, CMRS handsets now have new functionalities such as Personal Digital Assistant functions and electronic games. Accordingly, handsets are increasingly likely to be used by airline passengers who do not realize that the handsets send out radio emissions even if they are not being used to place a call. This trend decreases the ability of flight attendants to recognize that a particular electronic device is actually a cellular or PCS handset. For this reason, elimination of harmful interference to aircraft systems and terrestrial networks from airborne CMRS handsets may be more effectively handled by technical means rather than regulation. Using the E911 location technology being embedded in handsets or simply using the handset's receiver to sense large Doppler shifts, the software in a handset could determine if the handset is high above the ground or moving at hundreds of miles per hour. Such a self-diagnosing handset could disable itself so not to interfere with airplane operations.

Space Data disagrees with those commenters who urged that the Commission's prohibition against using cellular telephones on airplanes, codified at Section 22.295 of the rules,[23] be extended to PCS devices. The Commission should look to technological solutions to minimize potential interference rather than by adopting blanket restrictions that could impact non-interfering devices. For example, Space Data has a nationwide Narrowband PCS network that could be used to provide service to airplane passengers without causing interference with terrestrial service and aircraft equipment. Extending Section 22.295 to PCS equipment would limit Space Data's ability to offer such service if the FAA were to relax its current restrictions regarding the operation of wireless devices on airplanes. As shown above, technological advancements have minimized the risk of interference in other cases. The Commission should

[23] 47 C.F.R. § 22.295.

encourage the development of additional advancements rather than adopt regulations that could negatively impact non-interfering devices.

D. High Altitude Platform Technology Can Provide A Competitive Solution For Air-Ground Services As Well As Service To Rural And Unserved Areas.

Another significant and unique developing technology is the use of stratospheric platforms at high altitudes to provide wireless services.[24] As previously noted, Space Data uses a balloon-based system to deploy high altitude platforms. These platforms are located in the stratosphere at altitudes two to three times higher than commercial aircraft. Thus, they have the ability to cover very large geographic areas with broad antenna beams. The extensive cell size and position of these platforms above aircraft would allow these systems to provide air-ground services directly to airborne user handsets without interference and without reducing available frequencies used by terrestrial cellular networks. Several companies are pursuing this technology including Space Data (www.spacedata.net), SkyStation International, AeroVironment, Inc. (www.skytowerglobal.com), Sanswire Technologies, Inc. (www.stratellite.com) and Lockhead-Martin / Stratcom.[25]

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[24] The use of high altitude platforms has been recognized as a legitimate business enterprise and viable way of providing wireless telecommunications service. The stratospheric platform industry has been active at the international level to gain regulatory authority for this technology. Technical studies at the International Telecommunications Union World Radio Conferences have concluded that airborne transmissions from stratospheric platforms can share frequencies with terrestrial networks if given the proper protections. *See, e.g.,* "Working Document Towards a Revision of Recommendations ITU-R M.1641: A Methodology for Cochannel Interference Evaluation to Determine Separation Distance from System using High Altitude Platform Stations to a Cellular System to provide IMT-2000 service within the Boundary of an Administration," Spectrum Working Group SWG1, ITU Radiocommunications Group, 11th Meeting of Working Party 8F, Edinburgh, Scotland October 8-16, 2003. Revision 1 to Document 8F/Temp/1-E, Dated 13 October, 2003 (studying the interference from transmitters in the stratosphere).

[25] C. Benjamin Ford, *Lockheed Martin expects 'Battle Blimp' Project to Fly*, The Business Gazette, Oct. 3, 2003, *available at* http://www.gazette.net/200340/business/news/181137-1.html.

High altitude platforms transmitting on air-ground spectrum also can be used to provide terrestrial service to rural and underserved areas. Cellular handset providers could readily design handsets that would allow the equipment to operate in the air-ground frequencies from airplanes and to sense via Doppler shifts or E911 technology when they are in aircraft in order to disable transmissions on terrestrial frequencies. As the circuitry in handsets can easily be modified and handsets have ever increasing levels of memory and processing power, this approach could likely be implemented with only a minimal impact on the cost of handsets.

III. THE COMMISSION SHOULD RETAIN ITS EXISTING PRIMARY SPECTRUM ALLOCATION FOR AIR-GROUND USE, AND ALLOW CMRS SERVICE TO RURAL AREAS ON A SECONDARY BASIS.

The Commission can take the opportunity afforded by its re-examination of the air-ground rules to assist consumers in rural and underserved areas. The modified cellular handsets described above could be used by rural service providers to send and receive transmissions to and from high altitude platforms using the air-ground frequencies. Such use would be on a secondary, non-interfering basis to commercial air-ground communications.

A. Air-Ground Spectrum Should Retain Its Primary Status In The 849-851/ 894-896 MHz Band.

Although available technology would permit the manufacture of handsets that can operate across both the cellular frequencies and air-ground frequencies, the Commission should retain the existing 4 MHz spectrum allocation for exclusive air-ground use on a primary basis. This will have the double advantage of encouraging more extensive and efficient use of air-ground spectrum and as well as not interfering with terrestrial cellular networks. As previously discussed, there is substantial consumer interest in such service, and there are carriers interested in competing in the air-ground market. In order to encourage more effective competition and

new technologies in the provision of air-ground services, however, the spectrum should continue to be separately licensed in the 849-851/ 894-896 MHz band.

B. Opening The Air-Ground Allocation To High Altitude Systems Could Enhance Air-Ground Services And Coverage To Unserved And Underserved Rural Areas.

In addition to using the nationwide commercial air-ground allocation to provide wireless services to airplane passengers, some air-ground licensees also could use the spectrum to provide terrestrial wireless service to unserved and underserved rural areas. As further explained below, the 849-851/ 894-896 MHz air-ground frequencies could be easily programmed into cellular handsets. Handsets also could be programmed to use these frequencies as a last resort if the handset failed to receive other cellular frequencies. This approach would limit the terrestrial use of the air-ground frequencies to areas in the United States that currently have little or no wireless coverage. The amount of terrestrial traffic using the air-ground frequencies would be low and unlikely to interfere with air-ground wireless traffic.

Through this approach, true CMRS ubiquity could be achieved in the United States using cellular handsets that have been easily modified to operate in the air-ground bands. In many rural areas CMRS providers have determined that the deployment of terrestrial infrastructure is not cost effective given the sparse population. The approach Space Data proposes would provide valuable telecommunications services, including communications for public safety purposes, to those consumers that currently lack such services.[26] Sratospheric technologies, like that employed by Space Data, are perfectly suited to deliver these services, but only if the Commission adopts a flexible licensing framework for the commercial air-ground spectrum.

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[26] The Commission also should consider that limiting commercial air-ground communications to one dedicated network, as it is now, has significant security implications for air travel.

C. The Current Commercial Air-Ground Spectrum Allocation Is Uniquely Positioned For CMRS Service On A Secondary Basis.

The Commission should consider the beneficial placement of spectrum currently allocated for commercial air-ground spectrum. Specifically, the air-ground spectrum at 849-851/ 894-896 MHz is immediately adjacent to the cellular Channel Block B 846.510-848.970/ 891.510-893.970 MHz upper frequencies.[27] These frequency allocations are illustrated in Figure 2 below.

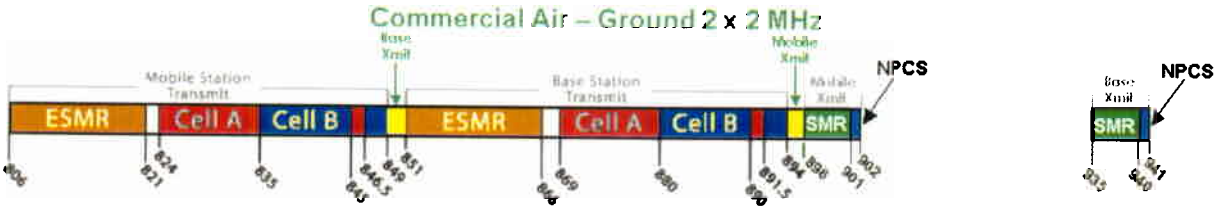

Figure 2: Proximity of Air-Ground Spectrum To The Cellular Band Makes It Possible To Inexpensively Enable Cellular Handsets To Operate On The Band.

The proximity of the air-ground spectrum to CMRS spectrum would allow cellular handset manufacturers to simply extend the frequency range of handset operations eight percent from the current 824-849/ 869-894 MHz to 824-851/ 869-896 MHz. By doing so, these extended range cellular/ air-ground handsets could communicate directly with stratospheric platforms or rural cellular towers, such as those used in AirCell's network. Providing this spectrum flexibility along with certain protocol flexibility could provide consumers with a wireless handset that is as simple, economical and reliable to use on a commercial airplane as in a car.

Centralizing all aircraft communications through one transceiver provides no means of contacting public safety officials should that one transceiver be disabled.

[27] See 47 C.F.R. § 22.905.

Another unique aspect of the commercial air-ground spectrum is that it provides nationwide coverage. New technologies such as the stratospheric platforms work best with nationwide licenses because an individual stratospheric platform may cover a footprint equivalent to several Cellular Market Areas ("CMAs"), Basic Trading Areas ("BTAs"), and even some MTAs. The Commission's current allocation of nationwide spectrum is limited to the Narrowband PCS licenses[28] and to the recently auctioned 1670-1675 MHz license.[29] Other widely used commercial wireless spectrum has been licensed in relatively small market areas such as the 495 BTAs or the 734 CMAs. This geographic fragmentation of spectrum among several licensees is a barrier to the deployment of technologies that cover wide geographic areas, such as stratospheric platforms.

With proper coordination between air-ground and terrestrial cellular carriers, the air-ground carrier may be able supplement terrestrial service using the networks of cellular carriers. Figure 3 shows the type of technology deployed by market area in cellular frequency blocks A and B as of April 2003. Note that CMA sizes are very small relative to the coverage circle of a stratospheric based communication platform or a wireless handset on an airplane. The maps show that different technologies – CDMA and TDMA primarily – are deployed in the western United States, where many unserved and underserved areas are located. Air-ground carriers could enter into agreements with terrestrial carriers in these wide areas to use unused cellular spectrum to provide wireless services to rural areas. Operation of such wide area systems would not cause harmful interference if all the licensees within the line-of-sight of an aircraft or stratospheric platform agreed that certain cellular frequencies would be used for such

[28] See 47 C.F.R. § 24.129.

[29] See 47 C.F.R.§ 27.5(f).

communications. In this case, the air-ground frequencies can act as control channels so that a handset can detect when the cellular frequencies can be utilized without causing interference. Such a system would expand the capacity of the air-ground network by using cellular spectrum and would make use of cellular spectrum in sparsely populated rural areas which otherwise lies fallow. Carriers should be given the flexibility to enter into such arrangements, under the auspices of the Commission's new spectrum leasing policy. [30]

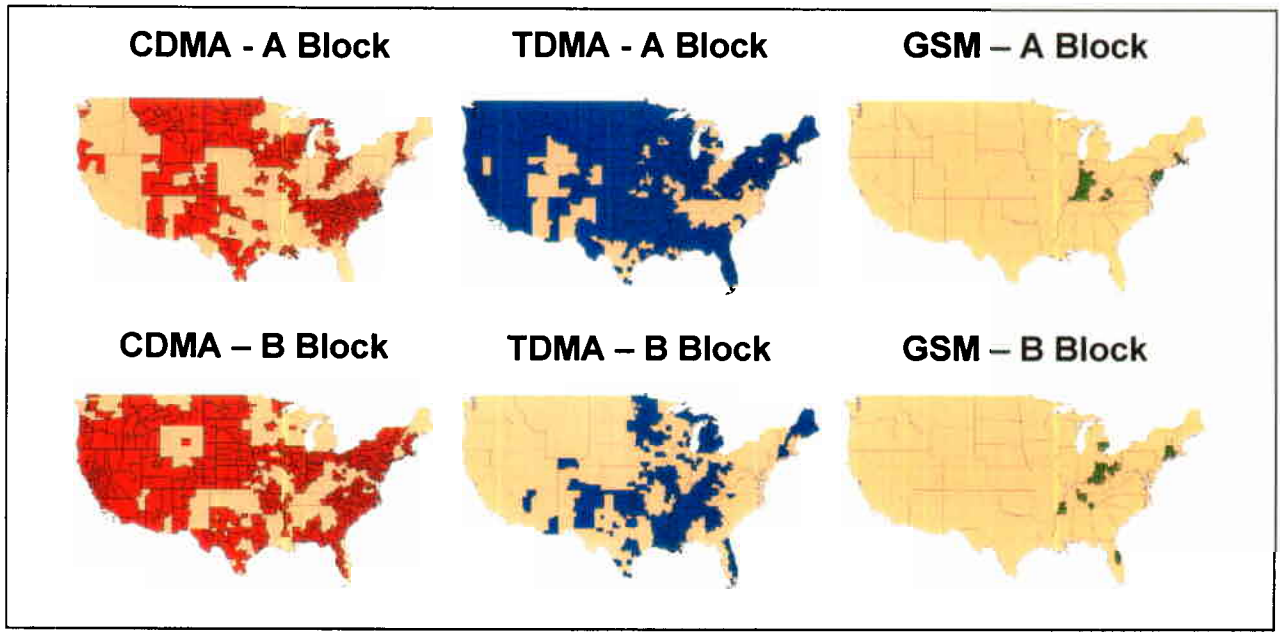

Figure 3: Although Current Terrestrial Cellular Frequencies Are Geographically Fragmented By Technology, Large Areas Do Exist Where These Frequencies Could Be Used By Air Travelers And Stratospheric Communication Systems If Nationwide Control Channels Existed To Limit Use To Appropriate Areas.

[30] For example, air-ground and terrestrial carriers could agree that one 200 KHz paired GSM channel that covers the area west of the Mississippi River be used for terrestrial or air-ground service. Although the air-ground carrier would be operating on cellular frequencies, a licensee on the east coast would not experience interference because the curvature of the earth would block the interfering signals.

IV. THE COMMISSION SHOULD MODIFY ITS COMMERCIAL AIR-GROUND RULES TO REFLECT THE USE OF NEW TECHNOLOGIES TO PROVIDE WIRELESS SERVICES.

Competition has been a driving force in improving the affordability and quality of service in the CMRS market. The flexibility the Commission has integrated into its licensing regime to allow different technologies and equipment has contributed significantly to the rapid growth of the CMRS market. In order to bring the same benefits to the commercial air-ground market, the Commission should similarly adopt a flexible regulatory policy that will promote the development of competition in the air-ground market.

A. The Limited Amount Of Commercial Air-Ground Spectrum Band Effectively Limits The Number Of Licensees To Two Carriers.

The current annual revenue for commercial air-ground services is less than $50 million.[31] Although the Commission originally anticipated up to six providers in this market, it has become evident that the cost of developing, deploying and maintaining dedicated air-ground networks is an almost insurmountable barrier to entry. Increased competition, lower prices and higher consumer demand, can be accomplished, however, if air-ground licensees can limit the network construction requirements. For example, if airline passengers are able to use personal handsets to connect directly to an air-ground network, the air-ground carrier would avoid the expense of negotiating and entering into service arrangements with airlines and installing telephones and network equipment in airplanes.

Space Data disagrees with Verizon AirFone that the unique business risks and challenges associated with air-ground services undermine new entrants' incentive to enter this market.[32] There are always risks and challenges in entering new markets, but innovative technologies such

[31] *See supra* n. 11 and accompanying text.

[32] Verizon AirFone Comments at 14.

as those developed by Space Data and AirCell have the potential to allow additional carriers to enter the market in a cost effective manner. The Commission's rules, however, must be flexible enough for new entrants use these new technologies.

Furthermore, from a spectrum allocation standpoint, the 4 MHz of spectrum that is available in the commercial air-ground band allows at most two licensees with exclusive use spectrum. Space Data agrees with Verizon AirFone that "exclusive use" licensing would allow carriers the flexibility to leverage changes in technology. In order to maximize the use of the spectrum and accommodate as many CMRS customers as possible with quality air-ground service, however, the air-ground licensees must be required to allow third parties to roam on their air-ground networks.

To ensure a level of competition in the air-ground market, the Commission should require that the two commercial air-ground licenses are held by two unaffiliated entities. In implementing a two licensee assignment scheme, Space Data proposes two different channel widths – 1.25 MHz for CDMA-based systems and 200 KHz for GSM-based systems. Next generation technologies require 5 MHz paired channels and are thus simply too wide to be accommodated in the available commercial air-ground spectrum. Since GSM-based systems require a frequency reuse of at least 4, at least 800 KHz paired with 800 KHz (or 1.6 MHz total) is required for a GSM system to operate in the air-ground spectrum band. Based upon the Commission's initial sharing plan for air-ground licensees, the incumbent should be able to operate its legacy network with 667 KHz of spectrum. If, in the future, an air-ground licensee can demonstrate that handsets capable of roaming across the frequency band will not interfere with terrestrial operations, the licensee can petition the Commission to allow it more operating flexibility.

Based upon the limitations described above, the Commission should either auction two new nationwide 1.6 MHz licenses and grant the incumbent 0.8 MHz for "exclusive use" or allocate an extra 100 KHz of spectrum from an adjacent service so that a new 1.6 MHz license (the minimum spectrum needed for a GSM network) and a 2.5 MHz license (the minimum spectrum needed for a CDMA network) can be auctioned. The incumbent could be compensated with a bidding credit equal to value assigned to 667 KHz at the auctions and, if it wins the auction, decide to either operate its current network or to transition its network to a new technology.[33]

To encourage secondary use in rural areas, a bidding credit could be awarded to applicants that commit to serving these areas as part of their service offerings. A principal goal of the Telecommunications Act of 1996 is to promote competition, reduce regulation, and secure lower prices and higher quality services for all Americans.[34] The Commission has specifically recognized the benefits wireless carriers can bring to rural areas by providing telecommunications services to previously unserved areas, promoting competition, and deploying new technologies and services.[35] The Commission has established various bidding mechanisms to promote and facilitate the participation of small businesses in spectrum auctions and to encourage the deployment of telecommunications service to unserved or underserved tribal lands.[36] The establishment of a rural bidding credit in the auction of the commercial air-

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[33] The latter approach is preferable since it opens up the market to both CDMA-based and GSM-based technologies. The Commission also is exploring the use of two-sided auctions in its ITFS/MDS proceeding. If it concludes in that proceeding that a two-sided auction is a viable method of allocating spectrum, the Commission may want to consider using a similar approach for the allocation of commercial air-ground spectrum.

[34] Telecommunications Act of 1996, Public Law, 104-104, 100 Stat. 56 (1996).

[35] *See, e.g.,* Western Wireless Corp., 16 FCC Rcd 48 (2000), *aff'd* 16 FCC Rcd 19144 (2001).

[36] *See* 47 C.F.R. § 1.2110.

ground spectrum will similarly advance the provision of wireless services to currently unserved and underserved areas.

A practical and spectrally efficient approach to carry out the proposal described would be to take the needed 100 KHz of spectrum from the cellular allocation.[37] Cellular operators are migrating to networks with either 1.25 MHz channels or 200 KHz channels and employ guardbands equal to half a channel width at the edge of their allocation. Accordingly, the highest 50 KHz of spectrum in the cellular B Block allocation is likely fallow nationwide. Guardbands are needed between terrestrial providers to eliminate near-far interference, which can occur if a user is near a base station on an adjacent frequency and trying to communicate with a base station that is far away. In Space Data's proposed air-ground service, all users will be far from the stratospheric high altitude base stations so the need for guardbands is eliminated. The Commission should therefore investigate whether it is possible to allocate 200 KHz from each of the other three guardbands between the A and B Blocks for cellular to air-ground service (see Figures 4 and 5 below). If this spectrum is sitting fallow as carriers eliminate narrowband technologies, these three 200 KHz channels could be added to the proposed 1.6 MHz air-ground license to provide a GSM-based operator with seven channels or 2.8 MHz of spectrum, enabling this licensee to compete more effectively with the 2.5 MHz licensee.[38]

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[37] The extra 100 KHz mentioned above also could be drawn from the 50 KHz at the bottom of the ESMR base station allocation and 50 KHz from the bottom of the 900 MHz SMR device allocation as part of the Commission's public safety proceeding. Such an allocation would, however, effectively use 200 KHz of spectrum since 100 KHz of SMR spectrum would be leftover without a pair.

[38] If the Commission follows this approach, a CDMA and GSM network would use the air-ground frequencies. Although Verizon AirFone does not use these protocols, it commented that it wants to obtain spectrum compatible with CDMA technologies. This would provide the incumbent the means to acquire additional spectrum and update its network to CDMA.

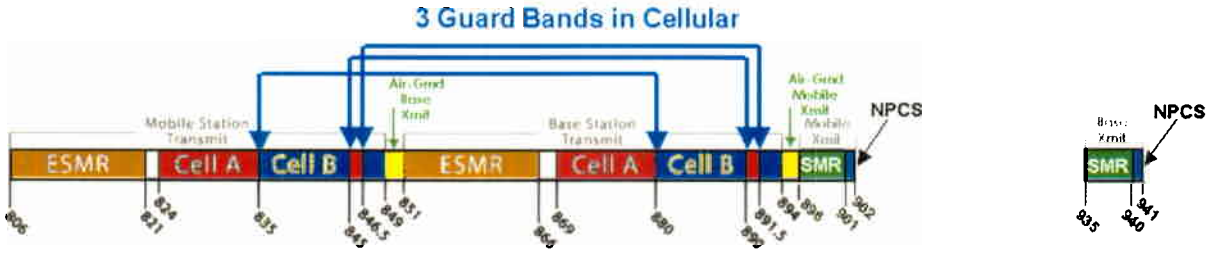

Figure 4: Three GuardBands Exist Within The Cellular Allocation Which Potentially Could Be Used To Enhance The Available Air-Ground Spectrum And Be Used Secondarily To Provide Rural Coverage.

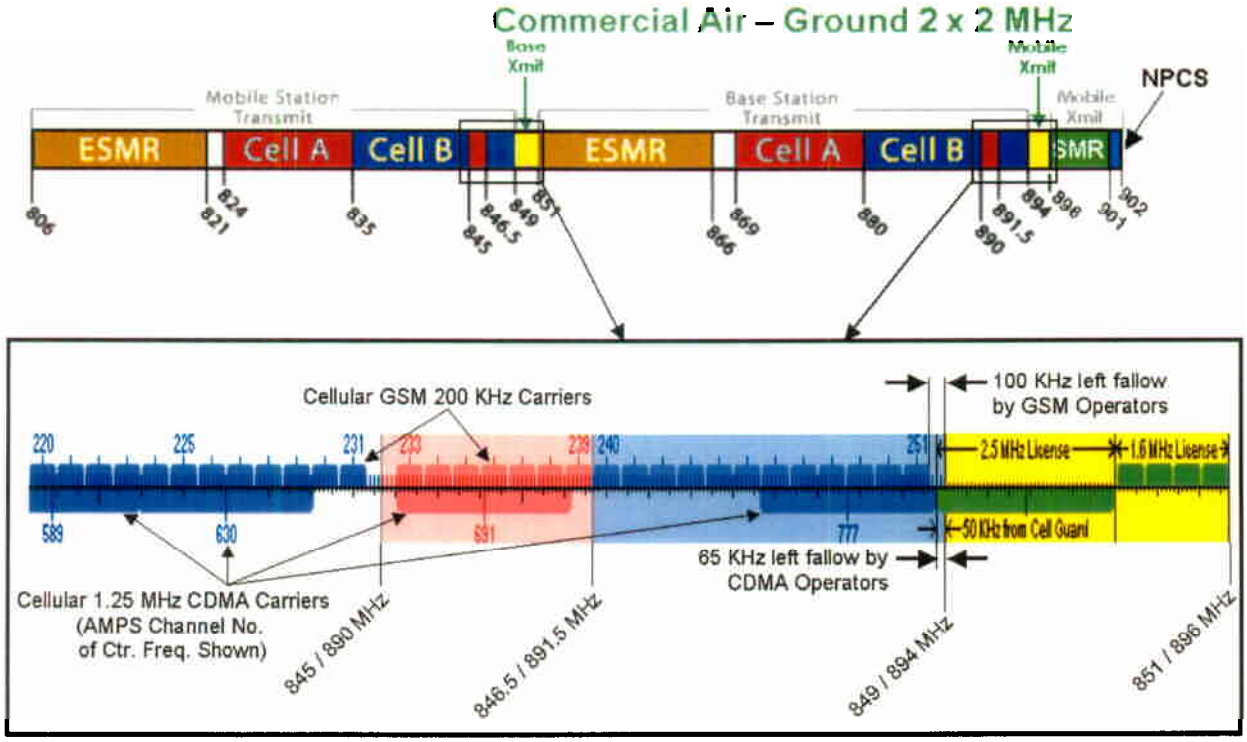

Figure 5: Cellular Operators Using GSM And CDMA Derived Technologies Leave Between 65 KHz And 100 KHz Of Fallow Spectrum At The Upper End Of The Cellular Allocation. By Utilizing 50 KHz Of This Otherwise Fallow Spectrum For Air-Ground Service, Two Licenses Can Be Created Which Accommodate Both Major CMRS Technologies In The Air-Ground Band.

Space Data agrees with Cingular Wireless that the uplink and downlink bands for air-ground services should be reversed to enable the linkage of CMRS technologies to the air-ground allocation.[39] In other words, the 849-851 MHz band should be used for the mobile devices and the 894-896 MHz band should be used for base stations.

V. CONCLUSION

Space Data strongly supports the Commission's initiative to reform the commercial air-ground spectrum rules. Space Data requests that the Commission consider the proposals set forth herein and looks forward to participating further in this proceeding.

Respectfully submitted,

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[39] Cingular Wireless Comments at 10.

CERTIFICATE OF SERVICE

I, Theresa L. Rollins, hereby certify that a copy of the foregoing **REPLY COMMENTS** has been served this 23rd day of October 2003 via electronic mail on the following:

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