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

In the Matter of	)	
	)	
Public Safety and Homeland Security Bureau	)	
Seeks Comment on Rapidly Deployable	)	PS Docket No. 11-15
Aerial Telecommunications Architecture	)	
Capable of Providing Immediate	)	
Communications to Disaster Areas	)	

COMMENTS OF SPRINT NEXTEL CORPORATION

Sprint Nextel Corporation ("Sprint Nextel") submits these Comments in response to the *Public Notice* issued in the above-referenced proceeding, which seeks comment on aerial telecommunications architecture that could potentially be deployed following a natural disaster or terrorist attack.[1] Expedited restoration of communications capabilities is essential for public safety as well as for customer satisfaction and retention, and Sprint Nextel has extensive experience with rapid network restoration and providing communications support during emergencies. Sprint Nextel has previously evaluated the potential use of aerial platforms for disaster recovery and concluded that the operational challenges and interference risks associated with aerial platforms outweigh their potential benefits. If the record demonstrates that new technological developments can overcome the current obstacles posed by aerial platform deployments, however, the Commission could launch a rulemaking proceeding to establish

[1] *Public Safety and Homeland Security Bureau Seeks Comment on Rapidly Deployable Aerial Telecommunications Architecture Capable of Providing Immediate Communications to Disaster Areas*, PS Docket No. 11-15, Public Notice, DA 11-175 (rel. Jan. 28, 2011) ("*Public Notice*").

service rules for aerial platform deployments by licensees. Any such rules should ensure that deployments adequately protect neighboring spectrum users from interference, and in no event should third parties acting independently of a wireless carrier be permitted to operate aerial platforms using the carrier's licensed spectrum.

I. SPRINT NEXTEL IS AN INDUSTRY LEADER IN NETWORK RESTORATION

The prompt restoration of communications capabilities is essential to ensuring that public safety personnel are able to respond effectively to natural or man-made disasters. It is also important for continued customer satisfaction and retention. Sprint Nextel is committed to responding to network outages as swiftly as possible, as demonstrated through its industry-leading Emergency Response Team ("ERT").

Since its creation in 2002, the Sprint ERT has responded to 34 presidentially declared national disasters, conducted more than 4,400 deployments, and provided emergency wireless support for more than 1,200 events.[2] The ERT can deploy wireless voice and data communications to replace or supplement existing public safety networks, including off-network "talk around" capabilities and satellite backhaul-supported mobile infrastructure, on very short notice. It maintains a fleet of Satellite Cell Sites on Wheels ("SatCOWs") and Satellite Cell Sites on Light Trucks ("SatCOLTs") that can restore wireless and IP wireline connectivity without the need for terrestrial backhaul connections, permitting first responders to access interoperable communications during emergencies. The ERT also developed Go-Kits™ so public safety officials can keep a supply of mobile phones on hand for rapid activation during a

[2] *See generally* Sprint Emergency Response Team, http://shop.sprint.com/assets/pdfs/en/solutions/case_studies/case_study_ert_top_deployments.pdf (last visited Feb. 15, 2010); Sprint Nextel News Release, *Sprint's Networks and Emergency Response Staff Are Prepared for the First Storm of the 2010 Atlantic Hurricane Season* (June 30, 2010) *available at* http://newsroom.sprint.com/article_display.cfm?article_id=1568.

crisis. Additionally, Sprint Nextel provides premier push-to-talk communications service for numerous public safety agencies that remains operable even when the public switched telephone network ("PSTN") is unavailable, allowing first responders to share critical information and communicate off-network in times of emergency. Sprint Nextel is also the only nationwide carrier to offer DirectTalk, an all-digital *off-network* push-to-talk service that works between compatible phones within a range of up to six miles. Direct Talk operates on 900 MHz unlicensed spectrum and offers instantaneous connectivity in remote locations or when network coverage may not be available.

II. AERIAL PLATFORMS PRESENT SUBSTANTIAL OPERATIONAL CHALLENGES THAT LIMIT THEIR UTILITY FOR RESTORING SERVICE

Sprint Nextel has previously studied the possible use of aerial platforms as a tool to aid network restoration efforts in the event of a service outage, including in cases of natural or man-made disasters. As described below, however, aerial platforms present substantial operational challenges and complex interference issues that have led the company to conclude that they would be of limited practical utility in restoring service to subscribers, including public safety users.

There are three basic types of aerial communications platforms:

1. An aerial platform with a cell site repeater, but with no backhaul;
2. An aerial platform with on-board switching capability, but with no backhaul; and
3. An aerial platform with backhaul.

An aerial platform with a cell site repeater, but with no backhaul. In this configuration (the simplest of the three architectures), an untethered, disposable balloon could be used as a repeater to expand the footprint of an undamaged cell site. The repeater would simply amplify

signals in both directions (*i.e.*, signals from the tower and from mobile devices), forming an aerial bridge to extend service into the affected area.

Although the geographic reach of the functioning cell site would be extended to cover the affected area, this solution does nothing to expand the site's inherent capacity. On the contrary, by expanding the size of the cell site the aerial repeater could considerably increase the number of mobile units covered by the functioning cell tower's signal, which could create significant traffic congestion problems. Given the generally limited time between infrastructure damage occurring and the urgent need for service restoration, and taking into account the problematic nature of cell size expansion in most contexts, the costs of maintaining a cell-expansion capability outweigh the available benefits.

An aerial platform with on-board switching capability, but with no backhaul. The on-board switching equipment adds both cost and weight to this architecture. The high-power demand of the switching equipment also requires larger batteries, which further increases the weight. The size and weight of the equipment and power supply suggest that larger, more complex aerial vehicles would be needed, such as blimps or planes (whether manned or unmanned). Due to refueling needs, these vehicles would need to be rotated out of service at regular intervals.

In addition to these challenges, this architecture is further limited because, without backhaul connectivity to the network, there will be no connectivity to the public switched telephone network ("PSTN") and users will only be able to communicate with other users who are also located within the coverage footprint of the same aerial transceiver. Thus, this solution would not enable the completion of most subscriber calls, including 911 calls.

Moreover, to ensure that the equipment is not "jammed" with requests for service from subscriber devices that ultimately will not be able to complete their calls (because of the lack of PSTN connectivity), the aerial switch would need to be programmed to connect only with a pre-determined list of mobile identification numbers ("MINs"). The carrier, therefore, would need to distribute a supply of "permitted list" devices to public safety and emergency workers.[3] Such a process adds another layer of logistical complexity, cost, and delay to this solution, rendering it impractical in all but the most extreme circumstances.

An aerial platform with backhaul. To overcome the problems noted above associated with aerial platforms that lack backhaul to the network, a third solution incorporating backhaul connectivity is possible. However, providing backhaul to an aerial platform presents implementation challenges. For example, one approach would be to use a tethered balloon with a T-1 line running along the tether cable. This option presents a hazard to low-flying aircraft such as helicopters, which are a common presence in disaster recovery situations. Indeed, FAA regulations prohibit moored balloons from exceeding a height of more than 500 feet above the ground and from being located within five miles of an airport or in an area where ground visibility is less than three miles.[4] Other FAA rules require 24-hour advance notice to the nearest

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[3] For the same reasons that mobile networks used by different public safety agencies are often not interoperable, it would not be feasible to develop an aerial platform that could communicate with all possible existing public safety mobile devices. For this reason, public safety personnel would need to be provided with compatible mobile devices which are pre-placed in caches around the country. Establishing handset caches is not unusual and Sprint Nextel already maintains many geographically diverse caches of handsets that can be used in emergencies as a part of its ERT; however, closed-loop aerial platforms communications would offer little *incremental* utility beyond the off-network Direct Talk features that most of Sprint Nextel's iDEN handsets currently offer. As indicated above, Direct Talk allows for all-digital off-network push-to-talk service that works anywhere, anytime between compatible phones at a range of up to six miles – without requiring an aerial platform. *See generally, e.g.*, Sprint Nextel, *Direct Talk, available at* http://shop.sprint.com/en/services/walkietalkie/offnetwork.shtml (last visited Feb. 28, 2011).

[4] 14 C.F.R. § 101.13. These restrictions apply to balloons with a diameter greater than six feet. *Id.* § 101.1(a)(1).

air traffic control facility, as well as special lighting and marking of the balloon and the mooring cable.[5] Complying with these restrictions presents yet another deployment challenge and may also decrease the effectiveness of the platform.

Another option would be to use a microwave link for backhaul. This would require a microwave transceiver to be held in a relatively stable position to maintain the communications link, which may require use of a motorized blimp or similar steerable vehicle and further increases the cost and logistical complexity of the proposed deployment. As noted above, the need for periodic refueling requires a relief vehicle to ensure continuity of service over extended periods. Given the complexities and expense of maintaining airborne backhaul, this aerial platform architecture is also difficult to justify in most situations.

III. AERIAL PLATFORMS POSE UNUSUALLY HIGH INTERFERENCE RISKS IN BOTH AFFECTED AND ADJACENT AREAS

While the different aerial platform architectures described above present different operational challenges, all aerial platforms present special interference risks both in the affected area and in adjacent areas where terrestrial service is still operational. Because of their higher altitude (*i.e.*, higher than a tower), transceivers mounted on an aerial platform can "see" a much larger section of the earth's surface. Sprint Nextel's network is engineered such that most cell sites reuse all of its licensed frequencies in a given area. Thus, any overlap of signals from an aerial platform with coverage from a functioning terrestrial site can easily create co-channel interference.

It is very difficult to control with precision the coverage footprint of an airborne transceiver. The simpler platforms (*e.g.*, balloons) experience major changes in altitude as they continue their ascent, as well as major positional changes due to wind currents. And more stable

[5] *See id.* §§ 101.15, 101.17.

platforms such as motorized blimps also present challenges because of the inability to sectorize the coverage in the same way as terrestrial sites. For example, a terrestrial transmitter would typically have three antennas pointed away from the tower in different directions that form three distinct sectors for communications. By controlling which frequencies are transmitted in which direction from the tower, interference with signals from nearby towers can be avoided. When the "tower" is airborne, however, all antennas are pointed in essentially the same direction – down. This generally makes it impossible to prevent signals from overlapping with the same frequencies from functional towers on the ground.

Moreover, reliance on an aerial platform could mask otherwise undamaged parts of the network to subscriber and public safety devices, effectively blocking or causing capacity constraints despite the availability of terrestrial sites. For example, if a mobile device receives a stronger signal from an aerial platform than from a functional terrestrial site, the device is likely to lock onto the stronger signal, even if capacity constraints on the aerial platform will prevent call completion.[6] This situation is even worse in the case (described above) of an aerial platform that only completes calls coming to/from pre-authorized devices, such as devices distributed to public safety. By effectively "spoofing" the terrestrial base station signals, the aerial platforms could block calls that otherwise could have been completed over existing terrestrial infrastructure.

In addition to affecting neighboring areas unaffected by the service outage, interference from aerial platforms could impact service provided in the affected area by temporary infrastructures such as Cells on Wheels ("COWs") and Cells on Light Trucks ("COLTs"), especially because these systems would be squarely in the "target" zone. Likewise, in larger

[6] Even if this call is completed, it occupies capacity on the aerial platform that could have been used to provide service to devices that actually are located in the area without any terrestrial service.

outage areas, the aerial platform could adversely affect service from newly restored cell sites if the aerial platform continues to operate to cover the still unrestored sites.

The threat of interference from an aerial platform exacerbates as its altitude increases, creating an expanded coverage footprint on the ground with greater elevation.[7] Operating at a much lower altitude, therefore, is one means of limiting interference. However, a low altitude deployment may not create enough practical utility to justify use of these platforms. If the footprint is less than five miles, the reach of the aerial platform would be comparable to a terrestrial base station. In this situation, repairing a damaged base station would likely prove both more practical and more expedient than grappling with the logistical difficulties of aerial platform deployment.[8]

IV. ONLY LICENSEES SHOULD HAVE AUTHORITY TO USE LICENSED SPECTRUM ON AERIAL PLATFORMS

If the interference and operational challenges posed by aerial platforms can be overcome through new technological developments, the Commission should support the investment-backed expectations of its spectrum licensees and limit any flexibility to deploy aerial platforms for service restoration purposes exclusively to Commission licensees.[9] Licensees are best suited to determine whether, when, and how to permit aerial platforms to operate using their licensed spectrum. Licensees know their networks best, have the institutional knowledge to predict and

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[7] As noted above, larger footprints can also create capacity problems. A footprint much larger than 5 miles would result in traffic demands that would outstrip the capacity available on the aerial platform.

[8] Although there could be a middle ground between these two situations, disasters resulting in the "right" factual scenario where an aerial platform would be a viable interim or restorative option are rare. In the thousands of ERT deployments that Sprint Nextel directed, there has almost never been a situation where an aerial platform would have been the preferred technology. Even if an aerial solution had been used in the aftermath of Hurricane Katrina, it would only have been useful in the first 48 hours. After that time, teams were already on the ground actively restoring sites, which would have received interference from the aerial platform.

[9] Of course, the licensee should have the flexibility to contract with third parties to deploy the aerial platforms so long as the licensee retains control over the spectrum.

prevent interference problems, and many already have internal communication and coordination procedures in place in the event of problems that might require the immediate shutdown of a transmitter.

Licensees such as Sprint Nextel have invested billions in their network and must be able to maintain control over the service that is provided to their subscribers. Allowing third parties to operate on a licensee's spectrum – especially when these operations are prone to causing interference to the licensee's own network operations – would upset carriers' and subscribers' reasonable financial expectations, as well as subscribers' service expectations. Indeed, third-party operation would be somewhat analogous to the unauthorized use of in-building wireless signal boosters. In that more limited context, the Commission has clearly stated that such devices "may only be operated by a licensee or pursuant to the licensee's permission or control."[10] While a rogue signal booster typically creates interference to only a small number of cells, unauthorized, uncoordinated use of spectrum from an aerial platform has the potential to create harmful interference over a footprint that could be one hundred square miles or more. For these reasons, aerial platforms should only be deployed by a terrestrial spectrum licensee or pursuant to the licensee's direct permission or control. Moreover, any flexibility permitting the use of aerial platforms should only be granted after conducting a notice and comment rulemaking proceeding that carefully considers interference issues and develops service rules to fully protect neighboring spectrum users.

[10] *Amendment of Part 22 of the Commission's Rules To Benefit the Consumers of Air-Ground Telecommunications Services; Biennial Regulatory Review—Amendment of Parts 1, 22, and 90 of the Commission's Rules*, Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd. 4403 ¶ 133 (2005).

V. CONCLUSION

Based on its extensive network restoration experience, Sprint Nextel has concluded that the potential benefits of aerial platforms simply do not outweigh the substantial operational challenges and interference risks associated with their use. To the extent new technological developments address these concerns in the future, however, the Commission could consider, in a future rulemaking, granting terrestrial licensees the flexibility to use aerial platforms as another tool for service restoration. In no event, however, should the Commission grant such authority through the use of wireless carriers' spectrum by independent third parties.

Respectfully submitted,

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