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

In the Matter of	)	
	)	
Utilizing Rapidly Deployable Aerial	)	PS Docket No. 11-15
Communications Architecture	)	
in Response to an Emergency	)	

COMMENTS OF SPRINT NEXTEL CORPORATION

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Sprint Nextel Corporation ("Sprint") submits these Comments in response to the *Notice of Inquiry* ("NOI") issued by the Federal Communications Commission (the "Commission") that seeks comment on deployable aerial communications architecture ("DACA") that could potentially be deployed following a natural or man-made disaster.[1]

I. INTRODUCTION AND SUMMARY OF COMMENTS

While timely restoration of wireless communications networks remains essential, the use of aerial platforms will inhibit, rather than promote, this goal. All wireless carriers submitting comments in this docket strongly oppose a regulatory regime for the use of aerial systems on existing cellular spectrum.[2] Public safety organizations such as APCO similarly urge the Commission to use caution in allowing deployments of aerial devices on existing networks

[1] *In the Matter of Utilizing Rapidly Deployable Aerial Communications Architecture in Response to an Emergency*, Notice of Inquiry, PS Docket No. 11-15 (rel. May 24, 2012) ("Notice of Inquiry" or "NOI").

[2] *See generally* AT&T Comments, PS Docket No. 11-15 (filed Mar. 2, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021033089; T-Mobile *Ex Parte*, PS Docket No. 11-15 (filed May 6, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021347410; Sprint Comments, PS Docket No. 11-15 (filed Feb. 28, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021032254. These comments were filed in response to a Public Notice released by the Public Safety and Homeland Security Bureau on January 28, 2011, that sought comment on DACA technologies.

because of the high risk of harmful interference.[3] The commenters' concerns are straightforward: deployment of aerial devices during terrestrial network restoration would lead to operational, technical and coordination challenges and interference risks so numerous as to outweigh any potential benefits that DACA might theoretically provide.

Even if these challenges were overcome through new technological developments, which seem implausible, the Commission should ensure that aerial platforms are not deployed on commercial spectrum without the consent of the licensee. Licensees hold reasonable, investment-backed expectations in the exclusive use of their licensed spectrum during the license term that the FCC should not lightly override. In addition, Sprint and other commercial carriers have strong financial and customer-relations incentives to restore their networks as quickly as possible following a network outage. Sprint has already implemented a number of initiatives in this regard. As a result, most base station outages last little more than thirty minutes – a far shorter duration than the hour and fifteen minutes needed to deploy aerial platforms under even the most optimal conditions.

To the extent the Commission wishes to authorize the use of DACA technologies in non-commercial spectrum, considerable additional study is warranted since DACA technologies seem highly unlikely to offer the most capable or cost-effective approach to enabling emergency communications following a disaster. Numerous other alternatives, including pre-positioning equipment, deploying emergency response vehicles and constructing hardened facilities, are far better suited to network restoration and recovery after a disaster. In the majority of cases, deployments of aerial platforms seem far more likely to impede network restoration than to accelerate it.

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[3] *See* APCO Comments, PS Docket No. 11-15, at 1 (filed Feb. 28, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021031822 (noting the most important aspect to the deployment of aerial platforms is the need to avoid interference).

II. SPRINT IS COMMITTED TO QUICKLY RESTORING SERVICES AND PROVIDING COMMUNICATIONS SUPPORT IN THE EVENT OF A DISASTER

When a natural disaster or other event causes a network outage, prompt restoration of communications is not only essential to subscriber satisfaction and retention, but also an essential element in allowing public safety personnel to respond quickly. Sprint takes a number of precautions to aid in the expedited restoration of its network, including installation of permanent generators at wireless and wireline switches and at the company's network points of presence.[4]

As part of its disaster preparedness efforts, Sprint has developed an Emergency Response Team ("ERT") to promptly establish wireless voice and data communications services following a disaster. Sprint ERT is comprised of trained professionals who have experience in providing immediate restoration of wireless, voice, data and IP services. Sprint ERT rapid deployment solutions include maintaining a 24-hour hotline to address client needs during times of state and federally declared national disasters, providing twenty-five mobile phones and wireless service for free to public safety personnel for two weeks after a disaster and deploying critical infrastructure to assist with short-term communications for emergency personnel.[5] Most notably, Sprint ERT quickly delivers equipment, such as a satellite cell on light trucks ("SatCOLTs"), and personnel to manage and maintain communications after a disaster. SatCOLTs and similar systems are complete mobile cell sites that can be deployed and left to run for weeks, creating a large area of secure communications for public safety agencies to communicate.[6]

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[4] Sprint Nextel News Release, *Sprint's Network Disaster Recovery and Emergency Response Teams are Prepared for the Start of 2012 Atlantic Hurricane Season* (May 31, 2012), *available at* http://newsroom.sprint.com/article_display.cfm?article_id=2299.

[5] *Id*.

[6] SPRINT NEXTEL, MAINTAINING CRITICAL COMMUNICATIONS, EVEN IN A CRISIS (2007), *available at* http://shop2.sprint.com/assets/pdfs/en/solutions/case_studies/critical_communications_white_paper.pdf/.

For the 2012 Hurricane Season, for example, Sprint ERT has set up equipment in proximity to known hurricane areas. The team arranged portable generators to keep base stations running in the event of a power outage and had experienced technicians and engineers on hand to access, repair and harden Sprint's network.[7] The ERT has also deployed SatCOLTs and Cell Sites on Wheels ("COWs") in high-risk areas to facilitate immediate restoration of service and assist emergency response and disaster relief agencies with wireless and IP communications.[8] Furthermore, after the devastating tornadoes struck the Midwest in early 2012, Sprint ERT deployed emergency communications staff, Sprint Direct Connect phones and set up SatCOLTs to bring wireless and mobile IP data services to emergency responders in the affected areas.[9]

In short, Sprint, through prepositioning equipment, its ERT and numerous other initiatives, Sprint is dedicated to quickly restoring communications for the benefit of both public safety personnel and subscribers. Sprint ERT provides short-term wireless communications equipment, infrastructure and services to assist public safety personnel in recovery efforts after a disaster or emergency situation. These initiatives allow Sprint to quickly bring communications into affected areas while network recovery is underway. As discussed below, the deployment of aerial systems will only interfere with these actions.

III. AERIAL PLATFORMS PRESENT SUBSTANTIAL CHALLENGES AND INTEFERENCE RISKS THAT COULD IMPEDE TIMELY SERVICE RESTORATION

The use of aerial platforms presents technical, operational and interference obstacles that must be overcome prior to deployment on any frequencies, especially the commercial cellular

[7] *Id*.

[8] *Id*.

[9] Sprint Nextel, *Sprint Donates $50,000 to American Red Cross Relief Efforts Following Series of Tornadoes in the Midwest and Southeast* (Mar. 5, 2012), *available at* http://newsroom.sprint.com/article_display.cfm?article_id=2199.

bands. As a result, deploying aerial platforms following a disaster has limited utility for restoring service to subscribers and public safety personnel.

In the *Notice of Inquiry*, the Commission noted, "The United States Armed Forces use DACA technologies successfully in theater to provide communications in absence of available infrastructure."[10] While DACA may be a solution in areas that do not have existing infrastructure or where the infrastructure is completely destroyed,[11] it can cause significant problems in areas where there is already a functioning network or where a network is in the process of being repaired. There are a number of ways in which using aerial platforms in the commercial frequencies can cause operational and technical challenges.

In the most basic terms, deployment of an aerial platform will result in the aerial system transmitting downstream and, once the network is restored, the terrestrial base station will also transmit downstream. The mobile device will then hear both the terrestrial base station and the aerial system, and the device simply will not function. Absent extraordinarily careful coordination, therefore, use of an aerial system and ground system are mutually exclusive; operating both at the same time will cause harmful interference.

If network coverage were simply a matter of having the ground-based network either "on" or "off," DACA deployment might prove more feasible than it actually is. However, most network outages do not result in binary conditions where the network is either functioning or not functioning, but rather create a Rorschach pattern of "dark," "light" and "gray" areas where certain base stations do not function at all; other base stations are functioning, but at increased power to provide expanded, coverage-layer service to affected customers; and still other base

[10] NOI ¶ 2.

[11] DACA technologies can also affect operational base stations adjacent to the geographic area where DACA is deployed.

stations are operating, but with lower signal strength, reduced backhaul capacity or other limitations that can impede coverage, connectivity or both. The "inkblot" of terrestrial coverage that follows an outage can also change rapidly both as unaffected base stations increase power to try to replace lost coverage and as the network recovery efforts get underway. Thus, the only means of avoiding harmful interference between the aerial transmission platform and the zone of terrestrial-based coverage for the same geographic area is real-time coordination that takes into account the fluid nature of operations on the ground.

Moreover, real-time coordination between the aerial system and the base station would prove extremely challenging. As a threshold matter, the operator must know both precisely where the aerial platform is operational and precisely where the terrestrial network is operational. For the aerial platform, the slightest change in altitude or position, which can occur even when the aerial device is tethered or stabilized, affects the antenna pattern of the transmitter. Changes to the aerial platform can, in turn, affect coverage on the ground and create harmful interference with operational infrastructure.

At the same time, terrestrial base station coverage is not – as is often supposed – a constant value. Rather, terrestrial base station coverage depends on the amount of traffic managed by the base station – a factor that changes almost constantly, especially during a network outage. As indicated above, a terrestrial base station's coverage area typically shrinks when its traffic load increases, but expands to provide low-capacity coverage over a larger area in the event of a nearby outage. This type of real-time cell contraction and expansion makes coordination with a mobile aerial platform even more challenging for two reasons. First, terrestrial network coverage can change in meaningful ways on a dynamic basis. Second, terrestrial network coverage is often a pastiche of irregular coverage as multiple cells near the

affected area will "breathe" at once rather than broad swaths of "covered" and "uncovered" areas. Thus, even if the platform location were fixed, operational variants in the terrestrial network make coordination more challenging.

At the same time, the operator also needs to understand precisely when operations at the aerial platform will end and those at the terrestrial base station will resume. In many cases, however, the precise timing for restoration may depend on the resumption of electric power or repair of wireline backhaul circuits that fall outside of the base station operator's knowledge and control. More importantly, network restoration is rarely, if ever, an "all-or-nothing" activity. Most terrestrial base stations recover quite quickly. Indeed, the majority of network outages do not exceed thirty minutes – considerably less time than the hour and fifteen minutes for DACA deployment noted by the DACA proponent SpaceData.[12] And while some base station outages require longer than thirty minutes to correct, the affected geographic areas may receive service from adjacent base stations that extend temporary coverage into the area or from terrestrially based emergency response team equipment deployed in the affected area. The resulting uncertainty and confusion of precisely when the network is "restored" (and when it is not) creates a propensity for both the aerial system and the base station to operate simultaneously in some or all of the affected geographic area, which would disrupt both communications platforms.

The DACA infrastructure would also impede ground-based emergency restoration activities. As stated earlier, Sprint deploys SatCOLTs and COWs to establish or restore communications when the primary terrestrial network is disabled. SatCOLTs and COWs are exceptionally versatile and Sprint has used this equipment in all types of weather and under

[12] Space Data Submission for the Record, PS Docket No. 11-15 (filed by PSHSB on Dec. 28, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021752024 (Slide 2 notes the *SkySite* aerial takes 15 minutes to prepare and 60 minutes to reach the correct altitude).

many different types of exigent circumstances. The technology used to deploy this emergency-response infrastructure requires trained technicians to carefully calibrate the footprint that these emergency units establish based on a sophisticated understanding of the precise contours of current network operations to prevent harmful interference.

The technicians at Sprint that build and deploy this emergency-response infrastructure must ensure that the company is licensed to operate on the specific frequencies on which the platforms are deployed and that the equipment does not interfere with the network. The equipment replaces the existing coverage of the cell site that has an outage, essentially duplicating all propagation characteristics of that site. The challenges with deploying fixed emergency-response infrastructure are intensified exponentially if the types of technologies used on the fixed trucks are then used on free-floating aerial platforms.

Even if the challenges associated with real-time coordination of two flexible and dynamic platforms can be overcome, DACA would likely impose capacity challenges on the portion of the network that remains operational and, as a result, cause otherwise operational sites to overload and begin blocking communications traffic. The Federal Emergency Management Agency ("FEMA"), for example, proposes using a deployable, fixed-wing aircraft with a repeater package.[13] While FEMA correctly notes that a repeater aerial system could be used to expand the reach of an undamaged cell site, repeating an existing cell signal might actually do more harm than good. Unlike a separately backhauled communications base station or SatCOLT, a repeater simply brings additional traffic onto a nearby functional cell site. Unfortunately, the functional cell site will in all likelihood already face capacity constraints within its existing cell area due to the increase in usage following a disaster or other event that

[13] NOI ¶ 12.

generates a network outage. The additional coverage that the DACA repeater would deliver indiscriminately to the unaffected cell, combined with the higher than normal traffic volume that typically occurs on unaffected cell sites near an incident, would like cause the previously unaffected cell site to overload and block communications traffic.

Furthermore, the additional traffic from the cell site repeater will also encumber the objectives of Wireless Priority Service ("WPS"). WPS is a subscription-based service that allows key Emergency Preparedness and National Security personnel priority access to the communications network.[14] Generally, WPS queue time is approximately thirty seconds, disconnecting after that time period if the system cannot complete the call. However, with the additional traffic that is brought in by an aerial repeater, the queue time could be much longer, even greater than thirty seconds, which will not allow the priority call to go through. Thus, public safety personnel who rely on WPS after a disaster may not have access to this essential, reliable service if aerial repeaters are deployed.

An aerial repeater not only makes it difficult for public safety personnel to complete a call on the network, but also causes issues with subscribers' ability to complete calls, including 911 calls that increase in volume after any disaster. The capability of Enhanced 911 ("E911"), which provides the location of emergency callers, is also threatened by use of an aerial repeater system. The network may not be able to triangulate the position of the subscriber from the repeater. Consequently, an essential goal of the use of aerial devices—locating people after a disaster—will likely not be achieved by deploying an aerial platform with a cell site repeater.

Use of DACA technologies can impede, rather than promote, the timely restoration of a network. For the worst case scenario where terrestrial networks are completely destroyed,

[14] Sprint Nextel, *Wireless Priority Service*, *available at* http://shop2.sprint.com/assets/pdfs/en/solutions/case_studies/wireless_priority_service.pdf.

Mobile-Satellite Service ("MSS") offer an effective option to aid public safety in recovery efforts, along with emergency replacement mobile equipment such as Sprint's ERT. The Satellite Industry Association notes in this docket that following Hurricane Katrina mobile-satellite services served as means to provide communications in areas where networks were destroyed.[15] Currently, there is dedicated spectrum in the L-band and S-band for MSS, satellites that have been deployed and compatible devices sold on the marketplace.

Quick restoration of networks is the most important element in allowing public safety personnel to begin recovery efforts. The Commission should not authorize the use of any technology that can adversely affect the timely restoration of a network. Instead, technologies currently in use, such as MSS, should be considered viable solutions to restoring communications if a catastrophic event completely destroys terrestrial networks.

IV. THIRD PARTIES SHOULD NOT BE ALLOWED TO OPERATE AERIAL TRANSMITTERS ON COMMERCIAL FREQUENCY BANDS WITHOUT THE LICENSEE'S CONSENT

As noted above, the deployment of aerial technologies present coordination problems that are only exacerbated if third parties are able to operate on existing commercial licensees' spectrum. Many commenters in this docket, including public safety organizations, understand the potential for harmful interference from the deployment of aerial devices.[16] For instance, APCO notes "there are major problems that must be addressed to facilitate coordination, management, and control of aerial telecommunications platforms."[17] They note that inherently

[15] Satellite Industry Association Comments, PS Docket No. 11-15, at 3 (filed Feb. 28, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021032207.

[16] *See* APCO Comments at 2 (noting that high elevation systems pose problems due to wide signal coverage); AT&T Comments at 8; CTIA Comments, PS Docket No. 11-15, at 1 (filed Feb 28, 2011), *available at* http://apps.fcc.gov/ecfs/document/view?id=7021032233.

[17] APCO Comments at 2.

movable platforms, even if they are tethered, cause a wide variety of issues.[18] Both AT&T and CTIA note that interference issues are particularly problematic if the aerial platforms are intended for use in commercial cellular bands.[19] T-Mobile urges the Commission to consider other solutions outside of DACA currently on the market to mitigate harmful interference.[20]

Even if the technical and operational challenges of deploying aerial platforms can be overcome through new technology, the Commission should not allow DACA technologies to be deployed on commercial spectrum by third parties without the consent of the licensee.[21] Commercial carriers heavily invest in their networks; thus, they have very strong financial and business incentives to deploy the technology that offers the best possibility of restoring network services to as many people as possible in a timely manner. Sprint has invested in and will continue to invest in the technology that offers the potential for the quickest restoration of the network, with no preference for a particular technology, as long as it meets this objective. If DACA technologies provided superior means of restoring network functions in the complex, congested and ever-changing environment of wireless communications, Sprint would deploy this solution. However, for the reasons outlined above, DACA technology does not represent the best method for restoring services.

Use of an aerial system on any commercial spectrum should be subject to the express approval the licensee. Additionally, any service rules should adequately protect neighboring

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[18] *Id.*

[19] AT&T Comments at 2; CTIA Comments at 5 ("The risk of inserting aerial transmissions includes interference to commercial wireless systems that successfully maintained operations in the disaster area or that will restore service promptly").

[20] T-Mobile *Ex Parte* at 1. T-Mobile also urges the Commission not to take regulatory action regarding this matter.

[21] Sprint has experience leasing spectrum to a third party for deployment of terrestrial-based communication systems during emergencies. Sprint found it extremely difficult to ensure that the third party's operations did not interfere with Sprint's efforts to expeditiously restore its operations.

spectrum users from interference caused by deployments of DACA technologies. Without these protections, aerial platforms can cause harmful interference that will impede carriers' ability to timely restore their networks for use by public safety personnel and subscribers.

V. CONCLUSION

Sprint supports the goal of prompt restoration of service after a disaster for both subscribers and public safety; however, permitting DACA deployments on commercial spectrum threatens network restoration activity and may delay or deny wireless communications service to the public when public safety and consumer users most need it. At a minimum, the Commission should not allow third parties to operate on commercial spectrum without the express written permission of the licensee. To the extent the Commission intends to authorize DACA in non-commercial bands, moreover, the Commission should establish a robust record that specifically addresses in-band, adjacent-band and intermodulation interference. In short, while DACA

remains a potentially useful tool for military applications abroad, domestic use of this technology poses great risks to commercial and non-commercial users alike.

Respectfully Submitted,

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