

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

In the Matter of	)	
	)	
Expanding Flexible Use in Mid-Band	)	GN Docket No. 17-183
Spectrum Between 3.7 and 24 GHz	)	
	)	

**COMMENTS OF  
SOUTHERN COMPANY SERVICES, INC.**

Jeffrey L. Sheldon  
LEVINE, BLASZAK, BLOCK & BOOTHBY, LLP  
2001 L Street, N.W., Suite 900  
Washington, DC 20036  
202-857-2574  
jsheldon@lb3law.com

Its Attorney

October 2, 2017

## TABLE OF CONTENTS

Executive Summary.....	iii
I. Introduction .....	1
A. Southern Company .....	1
B. Southern’s Use of Point-to-Point Microwave in Bands Between 3.7 and 24 GHz .....	2
II. New Services Cannot be Readily Accommodated at 6 GHz or Other Fixed Service Bands Unless they are Fixed and Subject to Prior Coordination.....	3
A. Sharing Between Mobile Services and Point-to-Point Microwave Is Not a Viable Long- Term Solution.....	4
B. It is Unclear Whether or How Incumbents Could be Relocated from 6 GHz .....	7
1. Possible Media for Relocation.....	7
2. Relocation Procedures .....	11
3. Incentive Auctions.....	12
III. Conclusion .....	13

## **EXECUTIVE SUMMARY**

Southern Company Services, Inc., a subsidiary of Southern Company, relies on point-to-point microwave facilities in various Fixed Service bands to support the provision of energy services to the public. These facilities are designed for high reliability to support delivery of energy services to the public.

Successful sharing in the Fixed Service bands is possible due to the prior coordination process. Mobile operations create a dynamically changing spectrum environment and are incompatible with fixed operations, particularly those used to support critical infrastructure or public safety. Techniques such as spectrum-sensing or authorization by a centralized coordination database might be useful in bands where all users are on essentially equal-footing and subject to the same requirements, but they appear inadequate to protect critical fixed microwave systems. It is contrary to the public interest to jeopardize fixed systems used for operation of the nation's critical infrastructure, and to impose burdens on those licensees to track down and enforce interference mitigation efforts against mobile service users, whether licensed or unlicensed.

There do not appear to be many viable options for relocating incumbent fixed microwave systems from 6 GHz. Although fiber would be the preferred medium, it is exponentially more expensive than microwave and is more difficult to restore in the event of outage. To maintain the same level of reliability in higher microwave bands, additional infrastructure would be required with attendant cost, delay, environmental reviews, and the introduction of yet another point of potential failure. Leased line services are less reliable than private microwave, lack redundancy, and increase dependencies between commercial power and commercial telecommunications, contrary to national policies on National Security/Emergency Preparedness.

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

In the Matter of	)	
	)	
Expanding Flexible Use in Mid-Band	)	GN Docket No. 17-183
Spectrum Between 3.7 and 24 GHz	)	
	)	

**COMMENTS OF  
SOUTHERN COMPANY SERVICES, INC.**

Southern Company Services, Inc. (“Southern”), on behalf of itself and its operating affiliates, hereby submits its comments on certain of the issues raised in the *Notice of Inquiry*, FCC 17-104 (“*NOI*”), in the above-captioned matter. Southern has serious concerns about the detrimental impact to point-to-point microwave systems used to support the nation’s Critical Infrastructure if mobile services are allocated to Fixed Service bands, whether on a licensed or an unlicensed basis.

**I. Introduction**

**A. Southern Company**

Southern Company Services, Inc. is a wholly-owned subsidiary service company of Southern Company, a holding company based in Atlanta, Georgia, which operates 11 regulated utilities serving 9 million customers in 9 states. Southern Company owns 4 electric utility subsidiaries – Alabama Power Company, Georgia Power Company, Gulf Power Company, and Mississippi Power Company – which provide retail and wholesale electric service throughout a 120,000-square mile service area in Alabama, Georgia, Florida, and Mississippi. Southern Company supplies wholesale electric power to municipalities, rural electric cooperatives, and other distribution providers through its Southern Power subsidiary, which operates natural gas,

solar, wind, and biomass generating facilities in 9 states. Southern Company Gas provides natural gas distribution and storage in 7 states: Illinois, Georgia, Virginia, New Jersey, Florida, Tennessee, and Maryland.

Members of the Southern Company family use a variety of communications technologies and services to support the safe and efficient generation, transmission, and distribution of energy services to their retail and wholesale customers. As explained in the next section, Southern relies on point-to-point microwave links in the Fixed Service bands between 3.7 and 24 GHz, and in particular the 6 GHz and 11 GHz bands. Southern is therefore pleased to have this opportunity to explain how introduction of distinct services in the Fixed Service bands could negatively impact the nation's critical infrastructure and the transmission and distribution of energy services to the American public.

#### **B. Southern's Use of Point-to-Point Microwave in Bands Between 3.7 and 24 GHz**

Southern holds more than 175 point-to-point microwave licenses that collectively authorize the operation of about 150 frequency paths in the 6 GHz band. Southern also holds approximately 700 licenses for point-to-point microwave facilities in the Fixed Service bands between 11 and 24 GHz where shorter frequency paths can be accommodated. However, because of Southern's extensive service area, and the need to communicate with facilities in very rural areas, the 6 GHz band is the only band that can accommodate Southern's bandwidth and performance objectives over very long paths.

Southern's fixed microwave facilities support a variety of utility applications, including voice and data communications between and among energy control centers, transmission and distribution substations, power generating stations, and the other utilities with which Southern must coordinate in real-time for management of the interconnected power grid. Microwave is also used to backhaul voice and data from land mobile radio systems used by field crews to

coordinate the safe and efficient construction, maintenance, and restoration of Southern's electric facilities.<sup>1</sup>

Southern also uses point-to-point microwave to backhaul data from supervisory control and data acquisition ("SCADA") systems. These systems allow Southern and its operating companies to remotely monitor and control a multitude of devices on the power grid, thereby improving electric service to its millions of residential, commercial and industrial customers. Microwave systems also allow Southern to closely coordinate power flows and minimize service disruptions among many other wholesale and retail power distributors (e.g., municipally-owned utilities, rural electric cooperatives, and other investor-owned electric utilities) with which Southern's electric system is interconnected.

## **II. New Services Cannot be Readily Accommodated at 6 GHz or Other Fixed Service Bands Unless they are Fixed and Subject to Prior Coordination**

The Commission has asked whether it should allow flexible use in the Fixed Service bands, and if so, how new services could be introduced without adverse impact to incumbent operations. Although Southern generally supports the concept of flexibility in spectrum use, there are a number of hurdles that would have to be overcome to allow any significant flexible use in the Fixed Service bands. The FCC has invited comment on several methods to introduce more flexibility, such as band-sharing, repacking incumbents, or relocating incumbents to other frequency bands or media. As explained in the following sections, each of these options would

---

<sup>1</sup> Southern Company's field crews rely on mobile radio services provided by Southern Communications Services, Inc. d/b/a Southern Linc ("Southern Linc"), a wholly-owned subsidiary of Southern Company. Southern Linc also provides commercial mobile radio service to public safety agencies, industrial users, and individuals throughout Southern's electric operating area. Disruption of Southern's microwave facilities could also disrupt Southern Linc's provision of mobile voice and data services to these other users.

subject incumbent microwave systems to potential interference, or impose costs and operating constraints on incumbent licensees, to the ultimate detriment of the consuming public. At most, consideration could be given to authorizing additional types of fixed service operations that are subject to the prior coordination process under Part 101.

#### **A. Sharing Between Mobile Services and Point-to-Point Microwave Is Not a Viable Long-Term Solution**

The Commission has asked whether mobile services could share the Fixed Service bands, citing to other proceedings where flexibility was introduced, such as:

1. Devices operated on an unlicensed basis (TV Whitespace Devices or Unlicensed National Information Infrastructure (U-NII) devices).
2. Devices operated on a lightly-licensed basis (3.5 GHz Citizens Band Radio Service (CBRS) devices).
3. Devices operated on a fully licensed basis (AWS-3).

However, any sharing between mobile devices and point-to-point microwave is problematic, even under the examples cited in the NOI.

Successful sharing in the point-to-point bands is premised on the time-tested prior coordination process by which new users are obligated to design systems that will not cause interference to authorized or previously applied-for systems. This process helps to ensure that systems needing high levels of availability and reliability can maintain those parameters, while also giving new entrants significant flexibility to engineer systems that will optimize the use of available spectrum, including the potential to work with existing licensees during the coordination process to modify their systems to improve overall spectrum use.

By contrast, mobile operations create a dynamically changing spectrum environment, and thus are incompatible with fixed operations, absent special technical and/or operational requirements on the mobile systems. Mobile system design is based on propagation and

interference models that estimate general coverage and interference, and without any degree of precision as to impact on a specific receive point. Mobile systems do not adapt to changes in the spectrum environment, and therefore cannot protect new fixed systems that would be deployed in the same band. Thus, even as Southern foresees the need to expand capacity on its existing microwave paths and to extend communications to new generating facilities, the presence of mobile operations could block the coordination and licensing of new or modified microwave paths.

Southern is skeptical as to whether imposition of special technical requirements on mobile systems, such as use of cognitive radios or authorization from a centralized coordination database, would be sufficient to protect point-to-point microwave systems used by public safety entities and critical infrastructure entities. Spectrum-sensing capabilities and sharing protocols might be useful in bands where all users are essentially on equal footing and subject to the same requirements, but appear inadequate to protecting fixed microwave systems

Southern previously expressed its concerns with an application and waiver request for FCC authority to deploy hand-held mobile earth stations in the 6 GHz band.<sup>2</sup> Among other things, Southern pointed out that it and other fixed microwave licensees will have no visibility into the mobile licensee's self-coordination process; they will be forced to spend time conferring with the mobile licensee every time unexplained interference is experienced by the microwave system, and they will be unable to quickly and inexpensively resolve interference issues. In other

---

<sup>2</sup> In the Matter of Higher Ground LLC, Application for Blanket License to Operate C-Band Mobile Earth Terminals, IBFS File No. SES-LIC-20150616-00357, "Comments of Southern Company Services, Inc.," filed September 30, 2016. The application and waiver were granted, subject to conditions, by *Order and Authorization*, 32 FCC Rcd 728 (IB/WCB/OET 2017) (Applications for Review pending).



words, the allowance of a mobile system in a band used for fixed microwave will effectively place the primary obligation for interference identification and resolution on the Fixed Service licensee, and with no assurance that mobile system operations can, or will, be modified to prevent similar cases from arising in the future. It is contrary to the public interest to jeopardize systems that are used for public safety and operation of the nation's critical infrastructure, and to impose the burden on them to track down and enforce interference mitigation efforts against mobile service licensees.

For the same reasons, Southern is opposed to the introduction of unlicensed devices in the 6 GHz band. The risks of interference from unlicensed devices are even greater than with licensed devices because it truly would be impossible for fixed service licensees to identify the sources of interference or the operators of those devices. Experience with the roll-out of U-NII devices illustrated that even with very clear operating requirements intended to prevent interference to critical radar systems, many users were either unaware of, or chose to ignore, those requirements.<sup>3</sup>

With respect to sharing of 2 GHz microwave spectrum by Personal Communications Services or AWS, it must be acknowledged that band-sharing was limited geographically and by time. That is, the rules allowed deployment of mobile systems only where those operations would be geographically separated from potentially-affected microwave systems, and only for a period sufficient to allow for relocation of incumbents from the band, after which mobile systems would become the predominant, if not exclusive, users of the bands. The rules also

---

<sup>3</sup> See *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order in ET Docket No. 13-49, 29 FCC Rcd 4127 (2014).

prohibited licensing of new or modified microwave paths. Thus, the rules for deployment of Personal Communications Services (“PCS”) and Advanced Wireless Services (“AWS”) do not represent examples of long-term band sharing, but were simply precursors to band-clearing.

## **B. It is Unclear Whether or How Incumbents Could be Relocated from 6 GHz**

The NOI invites comment on whether or how incumbent licensees could be relocated from Fixed Service bands to enable access by other services. Even assuming relocation could be justified under a cost-benefit analysis, there is no readily-apparent or ideal replacement for the existing, as well as future, point-to-point microwave paths at 6 GHz.

### **1. Possible Media for Relocation**

#### **Private Fiber**

Southern’s preferred relocation medium would be private fiber, but it is exponentially more expensive than microwave, particularly for applications that do not need huge amounts of bandwidth. In addition, because many of Southern’s microwave paths are to remote or rural locations there is little to no opportunity to partner with commercial providers to help underwrite the cost of the deployment.

The business case at Southern, and most likely at other critical infrastructure entities, supports private microwave because it is very cost-effective, and it is much easier to restore service in the event of a communications outage. For one thing, there are fewer points of potential failure with a microwave system, and redundancy can be more easily provisioned (e.g., through installation of hot standby transmitters or alternate microwave paths) than is possible with private fiber. Fiber is very expensive to install, and any additional fiber routes that are intended to provide diverse routing will probably be even more expensive than the primary route.

### **Other Fixed Service Bands**

With the loss of the 2 GHz microwave bands to PCS and other “emerging technologies,” the 6 GHz band has become the next best alternative for licensees needing relatively long path lengths. Loss of the 6 GHz band would make the 11 GHz band the next best replacement band, but it would be inadequate to accommodate anything more than very short path lengths. To achieve Southern’s levels of reliability, Southern’s typical paths at 6 GHz are in the range of 16 to 18 miles. Some 6 GHz paths are in the 23- to 24-mile range, but they are also designed with space diversity to improve reliability. By comparison, Southern’s existing paths at 11 GHz are generally less than 10 miles in length for the same level of reliability.

Thus, to maintain requisite levels of reliability, paths relocated from 6 GHz to 11 GHz would very likely require additional infrastructure; i.e., new mid-path antenna structures, with attendant cost, delay, environmental reviews, and the introduction of yet another point of potential failure. Southern estimates that only about 5 percent of its existing paths at 6 GHz could be relocated to 11 GHz without an intermediate relay. Existing antenna structures would have to be inspected to determine if they could accommodate the size, weight, and wind-loading of the larger antennas used at 11 GHz (e.g., typically 10 feet in diameter, versus the 6-foot antennas typically used at 6 GHz), as well as the implications for tower space and tower loading if the system design requires an additional 11 GHz antenna for space-diversity.

### **Leased Line Services**

Relocation to carrier-based networks (leased lines) would be the least preferred option, for several reasons. It has been Southern’s experience that leased line services are less reliable and lack redundancy. For example, the following table compares the uptime, during each of the

last seven years, of Southern’s owned and maintained transport facilities (“COAM”) with leased lines provided by wireline carriers:

<b>TRANSPORT</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>
<b>COAM Uptime %</b>	99.974	99.964	99.976	99.979	99.976	99.959	99.958
<b>LEASED Uptime %</b>	99.928	99.936	99.937	99.938	99.926	99.897	99.909

Southern’s COAM transport facilities had an average uptime of 99.969% over the seven-year period, compared with an average uptime of 99.924% of all leased transport lines. Stated differently, Southern’s COAM facilities suffered outages averaging about 2.7 hours per year, whereas leased lines suffered outages averaging about 6.6 hours per year. It took carriers about 2.5 times longer to restore service than was the case with Southern’s COAM transport facilities.

Because the leased line facilities are under the carrier’s complete control, customers such as Southern must wait for the carrier to restore service. This severely impacts operation of the electric system, and particularly the restoration of electric service following widespread outages, when the carrier’s limited service crews are spread even thinner. Wireline carriers lack sufficient manpower and incentives to promptly restore leased line services. Although certain utility leased line services would qualify for priority restoration under the Telecommunications Service Priority (“TSP”) program, the TSP rules do not contemplate or guarantee that service on any particular circuit will be restored within any definitive timeframe; it is still a best-efforts program that takes into consideration the carrier’s resources and ability to effect repairs.

Finally, it is unwise, and contrary to national policies on National Security and Emergency Preparedness (“NS/EP”), for the Commission to contemplate a migration of electric utilities’ microwave systems to commercial leased lines. Interdependence between commercial power systems and commercial telecommunications networks has been a long-standing concern

in relation to NS/EP. In a January 2006 Report, the Telecommunications and Electric Power Interdependency Task Force (“TEPITF”), within the National Security Telecommunications Advisory Committee (“NSTAC”), U.S. Department of Homeland Security (“DHS”), observed that electric power service providers largely rely on private, internal communications systems for “mission-critical functions, such as process control systems, supervisory control and data acquisition (SCADA) systems, generation facilities, transmission grids, and the distribution network, including emergency response communications.”<sup>4</sup> TEPITF further noted that many private communications systems operated by electric utilities are protected with back-up power, stating, “These backup capabilities, which are not economical or feasible for commercial networks, are required by utilities to ensure reliable communications in emergencies.”<sup>5</sup>

Even if commercial communications networks *could* serve as replacements for relocated microwave paths, increasing the interdependence between these critical infrastructures would not be in the national interest. The implications for such interdependencies were further explored in a February 17, 2009, report by the Communications Dependency on Electric Power Working Group of the National Communications System (“NCS”) Committee of Principals, which found that because of these interdependencies, long-term outages of electric power could have devastating consequences to millions of people.<sup>6</sup>

---

<sup>4</sup> NSTAC Report to the President on Telecommunications and Electric Power Interdependencies: People and Processes: Current State of Telecommunications and Electric Power Interdependencies, January 31, 2006, at 3.1 and 3.2. The Report is reprinted in the following compilation of NSTAC reports: [https://www.dhs.gov/sites/default/files/publications/NSTAC\\_XXIX\\_Reports\\_082206\\_0.pdf](https://www.dhs.gov/sites/default/files/publications/NSTAC_XXIX_Reports_082206_0.pdf) (last visited June 15, 2017).

<sup>5</sup> *Id.*

<sup>6</sup> Communications Dependency on Electric Power Working Group Report, "Long-Term Outage Study" National Communications System Committee of Principals, February 17, 2009.

More recently, the U.S. Department of Energy (“DOE”), in conjunction with DHS, highlighted the interdependence of energy and other critical sectors, including communications, in the 2015 Energy Sector-Specific Plan, which was in turn responsive to the 2013 National Infrastructure Protection Plan:

During the last half of the 20th century, technical innovations and developments in digital information and telecommunications dramatically increased interdependencies among the Nation’s critical infrastructures. The energy infrastructure provides essential fuel to all critical infrastructure sectors, and without energy, none of them can operate properly. Thus, the Energy Sector serves one of the four lifeline functions, which means that its reliable operation is so critical that a disruption or loss of energy function will directly affect the security and resilience of other critical infrastructure sectors. In turn, the Energy Sector depends on many other critical infrastructure sectors, such as transportation, information technology (IT), communications, water, financial services, and government facilities. A disruption in a single facility of capability can generate disturbances within other infrastructure or sectors and over long distances. A series of related interconnections can extend or amplify the effects of a disruption.<sup>7</sup>

## **2. Relocation Procedures**

The NOI invited comment on relocation of incumbent users, similar to the Commission’s approach in the Emerging Technologies Proceeding.<sup>8</sup> That approach involved specific time periods for voluntary negotiations between new entrants and incumbent licensees over the terms for relocation, a period of “good faith” mandatory negotiations over relocation terms, a process for new entrants to compel relocation of incumbent system by guaranteeing all replacement

---

<sup>7</sup> Energy Sector-Specific Plan 2015, U.S. Department of Homeland Security, at 19 (emphasis added); available at: <https://www.dhs.gov/sites/default/files/publications/nipp-ssp-energy-2015-508.pdf> (last visited June 15, 2017).

<sup>8</sup> *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, ET Docket No. 92-9, Second Report and Order, 8 FCC Rcd 6495 (1993).

costs, and, at the end of the transition period, conversion of any remaining incumbent licenses to secondary status, with loss of all rights to interference protection.<sup>9</sup>

Southern's experience with the 2 GHz relocation was mixed. It took about one to two years to migrate each path, which imposed a significant burden on Southern's personnel to manage that process while continuing to maintain system operations. However, on the positive side, the company was able to use this opportunity to upgrade some analog 2 GHz paths to digital at 6 GHz, at Southern's own expense for the upgraded equipment. The vast majority of Southern's 2 GHz paths were migrated to 6 GHz, and less than about 5 percent of the paths could be relocated to higher bands. The relocation from the 2 GHz band was not a small undertaking, but a complete system redesign. Each site required a complete changeout of transmitters, receivers, waveguide, and antennas. As noted above, some longer paths that were easily accommodated at 2 GHz required addition of space-diversity antennas to maintain the same reliability at 6 GHz.

### **3. Incentive Auctions**

The Commission has asked whether an approach similar to the Broadcast Incentive Auction could be used to encourage incumbent non-federal licensees to relinquish their licenses in exchange for incentive payments. Broadcasters were given a choice of whether to continue broadcasting, curtail broadcast operations, or put their spectrum up for auction and exit the business if the price was right.

Southern, as well as all other public safety/CII licensees, rely on private microwave facilities for communications essential to their primary missions; in Southern's case, the

---

<sup>9</sup> 47 C.F.R. §101.69, *et seq.*

generation, transmission and delivery of energy services to the public. Spectrum has value to Southern based on the role it plays in supporting Southern's utility operations. Unlike a television broadcaster, Southern has no real choice in whether to use spectrum or exit the business. Therefore, an incentive auction would be unlikely to create an incentive for Southern, or, for that matter, very many public safety and CII licensees, to relinquish spectrum in the Fixed Service bands.

### **III. Conclusion**

Fixed Service bands do not appear to be viable homes for new mobile services, whether authorized on a licensed or an unlicensed basis. The prior coordination process under Part 101 works very well in preventing interference among fixed systems needed for highly reliable communications, but this process does not accommodate mobile services. Moreover, anyone proposing to clear the 6 GHz band for new services should be required to identify replacement media that offer at least the same level of reliability, cost and operational control as can be obtained with 6 GHz private microwave.

**WHEREFORE, THE PREMISES CONSIDERED,** Southern Company Services, Inc. respectfully requests that the Commission take action in this docket consistent with the views expressed herein.

Respectfully submitted,

**SOUTHERN COMPANY SERVICES, INC.**

By: /s/ Jeffrey L. Sheldon

Jeffrey L. Sheldon

LEVINE, BLASZAK, BLOCK & BOOTHBY, LLP

2001 L Street, N.W., Suite 900

Washington, DC 20036

202-857-2574

jsheldon@lb3law.com

October 2, 2017

Its Attorney