Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street 11th floor
Arlington VA 22209
703-812-0400 (voice)
703-812-0486 (fax)

MITCHELL LAZARUS
703-812-0440
LAZARUS@FHHLAW.COM

November 19, 2004

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: IB Docket No. 02-10, *Earth Station Vessels*
Ex parte Communication

On behalf of the Fixed Wireless Communications Coalition (FWCC), and pursuant to Section 1.1206(b)(1) of the Commission's Rules, I am electronically filing this letter and attachments as a written *ex parte* communication. The materials include:

1. Data on growth on the 6 GHz Fixed Service band.

2. Examples of the critical need for reliable communications in this band.

3. Examples of specific Fixed Service microwave systems that are vulnerable to interference from Earth Station Vessels, supported by maps.

Note on terminology: References to the "6 GHz band" denote the frequency range 5925-6425 MHz. Sometime called the "lower 6 GHz," this band is shared with uplink earth stations in the Fixed Satellite Service, and is sought for uplink use by Earth Station Vessels.

The FWCC will make a separate filing in response to recent *ex parte* submissions by Broadband Maritime, Inc.

Please do not hesitate to call with any questions.

Respectfully submitted,

Mitchell Lazarus
Counsel for the Fixed Wireless
Communications Coalition

cc: Service list

GROWTH IN THE 6 GHZ FIXED SERVICE BAND

Licensed Channels
5925 - 6425 MHz

Year	2000	2001	2002	2003
Private Microwave	2838	3353	4260	4879
Non-Private Microwave	33323	32849	32332	32002
Total	36161	36202	36592	36881

Data provided by Comsearch. This is a snapshot at the end of each year showing the number of licensed channels.

While the total number of channels has increased only slightly each year, channel additions in the private sector have increased in double-digit percentages. The former long-haul 6 GHz networks (such as those of MCI and AT&T) are gradually being dismantled, while cellular backhaul and private networks are expanding quickly. We expect a strong continued growth in demand for private licences.

CRITICAL NEED FOR RELIABLE 6 GHZ FS 6 GHZ COMMUNICATIONS

The following statements are provided by representatives of the organizations involved in communications in public safety, railroads, pipelines, and electric utilities in the lower 6 GHz Fixed Service band.

Public Safety

Many state and local government agencies use lower 6 GHz microwave links to provide the "backbone" for their wide-are mobile radio networks. Microwave channels link the multiple transmitter sites needed to cover the relevant agencies' jurisdictions with a clear, interference-free signal. These radio networks typically provide *all* emergency radio dispatch and on-scene communications for police, fire, EMS, disaster relief, and other critical public safety services. Interference to a microwave link could disrupt communications to and from a particular transmitter site, potentially leaving large numbers of public safety personnel without effective radio communication. If the disruption occurs during an emergency of any scale, firefighters, police officers, and other "first responders" could be placed in danger. A "dropped" dispatch call could also delay or prevent emergency response, further endangering the public.

Railroads

When the microwave links fail, the trains stop moving. And when the trains stop moving, the U.S. economy stops, too.

The railroad industry uses microwave links, including links in the lower 6 GHz band, for a variety of railroad operational and business applications. The most critical of these is control of train traffic.

There are three principal ways in which train movements are controlled: (1) voice communications between a dispatch center and the crew in the locomotive, used to convey "movement authorizations" and other directives; (2) visual signal lights along the tracks (similar to traffic lights at intersections on streets and highways); and (3) physical switches at track junctions that direct train traffic from one track to another.

All three of these control functions (dispatcher authorizations, signaling, and track switching) are communicated over wide geographic regions via private networks owned and operated by the railroads, which include 6 GHz microwave links.

Because of safety concerns, the railroad industry's operating procedures require that trains stop moving in the event of a communications outage. This is because communications links are the key path for carrying the three train control functions described above. In other words, if the commands, controls, and authorizations for train movement cannot be communicated, then the trains cannot move.

These microwave links are also used to convey information on individual rail car performance, both for proper routing of cars and for defect detection. In addition, many business transactions are sent via microwave links for tracking shipments. Without these communications, a railroad would be impossible to manage and operations would quickly come to a halt.

The U.S. economy is inextricably linked to, and vitally dependent upon, effective and timely rail transportation. Freight railroads transport more agricultural products, chemicals, food products, motor vehicles and heavy machinery, forest products, minerals, petroleum products, and consumer goods than any other mode of transportation. Much of this is transported to meet highly efficient "just-in-time" delivery schedules that reduce inventory and storage costs. Any delay in rail transportation, including delays caused by communications outages, will have a significant ripple effect throughout the U.S. economy.

Railroads also carry millions of passengers to and from work every day on commuter lines that operate in and near major metropolitan areas in the U.S. Communications disruptions that halt rail traffic would have an enormous impact on the daily lives (and jobs) of hundreds of thousands of American commuters.

Pipelines

The natural gas pipeline industry is a critical part of America's infrastructure. The production, transportation and distribution of natural gas is critical to the economy, as well as to the safety and comfort of American citizens. Natural gas consumption in the U.S. is tremendous, exceeding 22.6 trillion cubic feet in 2000.[1] Supporting this critical industry are vast networks of natural gas pipelines emanating from the sources of gas to the gas markets. The gas-carrying pipes are as large as forty-two inches in diameter and the gas pressure often exceeds 1,000 pounds per square inch. In order to maintain efficient operating pressures, the gas is recompressed approximately every thirty miles. For safety reasons, pipeline rights-of-way are generally removed from populated areas to the extent possible, and therefore common carrier communications facilities are often unavailable, unreliable, or too costly. Because of this, and to ensure adequate operational control, most pipeline companies utilize private communications networks for operations.

Several natural gas companies are authorized by the FCC to operate facilities in the Fixed Microwave Service that use frequency assignments in the lower 6 GHz band. Many of these licensees operate multiple links in the 6 GHz band. These links comprise both "backbone" systems and spurs from long-haul microwave systems. Thus, a pipeline licensee that utilizes a 6 GHz long-haul system may also employ these links from its backbone to a field office, refinery, central production facility, or city gate. These lower 6 GHz links form an integral part of the telecommunications infrastructures that support the overall production, refining, and

---

[1] Source: Department of Energy web page. http://www.eia.doe.gov/neic/infosheets/natgasconsumption.htm

transportation processes used in day-to-day operations.[2] During an emergency (such as a pipeline rupture), these communications facilities potentially play a vital role in alerting public safety officials, coordinating response activities, and minimizing the impact of the incident on workers and the general public.

The communications systems operated by these pipelines are capable of monitoring and controlling a host of important variables, including pipeline pressures, temperatures, flow rates, volume, and alarm sensors. These systems are designed to detect abnormalities and permit remote control of valve settings and compressors, thereby maintaining safe operating conditions. These critical safety features are employed throughout tens of thousands of miles of pipeline in this nation. Operational information from these Supervisory Control and Data Acquisition ("SCADA") systems, widely deployed throughout the industry, is transmitted over a variety of communications circuits, including lower 6 GHz microwave links. Such timely and reliable information promotes the efficient operation of pipelines and dramatically enhances the ability of pipeline operators to respond to ruptures and other emergency situations. Without this information, pipeline companies would be severely hampered in their ability to conduct operations in a manner that best protects public health and safety and preserves the integrity of the natural environment. Further, and for this reason, the reliability and integrity of pipeline communications networks cannot be compromised. These stringent operational requirements often demand a network availability of "six nines" (i.e., 99.9999%, or no more than 30 seconds total outage per year).

Electric Utilities

Electric utilities rely on 6 GHz Private Operational Fixed Service facilities as a cost effective means of communications for a variety of applications, including radio backhaul, voice, administrative data, SCADA control and telemetering, protective relaying, and other communications. Loss of radio backhaul communications would prevent timely response to energy delivery system problems; loss of internal and external voice communications would similarly impair routine and emergency services to the public; and loss of administrative data would also impair service restoration and repair. Most importantly, loss of SCADA and protective relaying would create the potential for widespread outages and other threats to public safety.

Protective relay systems automatically identify and isolate fault conditions, protecting the rest of the grid from the fault, thus preventing outages and blackouts. Those systems must operate reliably and swiftly (in milliseconds) to protect equipment (*e.g.*, substation transformers),

---

[2] In many instances, because of the high volumes of gas – sometimes exceeding a billion cubic feet a day – passing through a "custody transfer point" (such as a "city gate"), remote terminal units monitoring the flow of gas are polled as often as every ten seconds. The polling data is carried via the company's private communications network, often supported by point-to-point microwave.

conductors, and busses from damage and to prevent widespread and cascading outages. These protective relay systems must have a reliable communication path at all times, and especially under fault conditions, to operate correctly. That is why critical infrastructure companies engineer these microwave systems to meet high standards for service reliability. For example, the Western Electricity Coordinating Council[3] prescribes standards for protective relaying that require up to 99.95% reliability.[4] The WECC guidelines for the design of critical infrastructure communications circuits recommends microwave circuits be at a composite signal level between 15-20 dBm, and at the same time be at a minimum of 6 dB above the manufacturer's guaranteed threshold of operation.[5] These exacting tolerances must be maintained in order to meet demanding standards that apply to both teleprotection systems (response times of 20 milliseconds or less) and event-monitoring systems (resolution times of 1 millisecond).[6]

Data integrity and security, though always important, are even more critical in light of recent terrorist events and threats. Moreover, after the Northeast blackout on August 14, 2003, electric transmission reliability is the mantra for the industry. Estimates of the economic cost of the Blackout are between $6.8 and $10.3 billion dollars.[7] The NERC Blackout Recommendations

---

[3] The Western Electricity Coordinating Council was formed on April 18, 2002 by the merger of the Western Systems Coordinating Council (WSSC) and the Southwest Regional Transmission Association (SWRTA) and the Western Regional Transmission Association. As the largest of the ten regional reliability councils under the North American Reliability Council (NERC), its electric utility members comprise a service territory of 1.8 million square miles that extends from Canada to Mexico, including the provinces of Alberta and British Columbia and the northern portion of Baja California and all or portions of the 14 western states in between. *See* www.wecc.biz/about.html.

[4] Western Electricity Coordinating Council, *Communications Systems Performance Guide for Protective Relaying Applications*, at 6 (2001).

[5] Western Electricity Coordinating Council, *Guidelines for the Design of Critical Infrastructure Communications Circuits*, at 6 (2002).

[6] *See Utilities Spectrum Assessment Task Force Report* at 14. ("USAT Report"). See also National Telecommunications and Information Administration, *Current and Future Spectrum Use by Energy, Water and Railroad Industries*, Report to Congress (released Jan. 2002) at http://www.ntia.doc.gov/osmhome/reports/sp0149/sp0149.pdf (citing USAT Report). *See also* IEEE PSRC Working Group H5 Report to the Communications Subcommittee, *Application of Peer-to-Peer Communications for Protective Relaying* (Dec. 22, 2000) at http://grouper.ieee.org/groups/c37/115/H5Documents/H5DOC.pdf (listing various relay applications and the reporting the performance requirements for each application).

[7] ICF Consulting, *The Economic Cost of the Blackout: An Issue Paper on the Northeast Blackout, August 14, 2003*, at

issued last year require electric utilities to take specific actions to correct deficiencies that caused the blackout and to implement strategic and technical initiatives to prevent future blackouts. Those recommendations include ongoing audits of the 20 highest priority areas that make up 80% of the electric demand.[8] In addition, the GAO recently released a report on SCADA security that cites "insecure connections" including wireless communications systems that may exacerbate vulnerabilities.[9] As such, the utility industry and the general public welfare can ill afford at this time to potentially compromise the reliability of SCADA systems that depend on these microwave systems to deliver essential services safely and efficiently.[10]

---

http://www.icfconsulting.com/Markets/Energy/doc_files/blackout-economic-costs.pdf.

[8] See NERC Blackout Recommendations at ftp://www.nerc.com/pub/sys/all_updl/docs/blackout/board_approved_blackout_recommendations_021004.pdf

[9] See United States General Accounting Office, Report to Congressional Requesters: *Critical Infrastructure Protection, Challenges and Efforts to Secure Control Systems* at 13 (March 2004) ("GAO Cyber Security Report").

[10] See also GAO Cyber Security Report at 17 (reporting cyber attacks carried out on a variety of utility SCADA systems).

Typical Point-to-Point Microwave Systems

The following is a description of five point-to-point microwave systems with operations in the 5.925 to 6.425 GHz band ("Lower 6 GHz"). ESV's may interfere with these systems.[1] A map of each system is attached.

Figure 1 – Stratos Offshore Services Microwave System

Stratos provides communications services to off-shore oil platforms in the Gulf of Mexico. The Stratos microwave system includes over 100 point-to-point microwave paths in the Lower 6 GHz band, licensed under FCC Part 101. Typical data rates on the Lower 6 GHz backbone paths are 135 Megabits per second. Stratos also operates a number of spur paths in the Part 101 band from 6.525 – 6.875 GHz ("Upper 6 GHz") and in the Part 27 band from 2.305 – 2.360 GHz ("2.3 GHz"). Data rates on the spur paths are from 1.5 to 45 Megabits per second.

The Stratos microwave system is used to transmit voice, video, data logging, and pipeline control information between remote oil platforms and production engineering centers on-shore. The attached system map shows Lower 6 GHz backbone paths only.

ESV's travelling between Galveston, Texas and the Caribbean may interfere with the Stratos system. Most of the Stratos antennas are installed on towers built above the deck of the oil platforms. As a result, there will be no terrain shielding between the Stratos antennas and the ESV earth station antennas.

The New York Times wrote the following regarding the increase in cruise ship activity in the Port of Galveston:[2]

> Five years ago Galveston was not a home port for cruise ships. This year, seven cruise ships will call the city home for at least part of the year, and 384,000 passengers are expected to embark here, which would make Galveston one of the top 15 cruise ports in the world.

Figure 2 – Verizon Falmouth – Hyannis Microwave System

Verizon uses point-to-point microwave to provide basic telephone service to Martha's Vineyard and Nantucket Island in Massachusetts. The Lower 6 GHz band is used on the long over-water paths between Cape Cod and the islands. The 10.7 to 11.7 GHz band ("11 GHz") is used on the short link on Martha's Vineyard. Data rates are 135 to 155 Megabits per second for each RF frequency. Multiple pairs of frequencies are used on each microwave path.

There are similar microwave systems all along the New England coast. These systems provide basic telephone service to small towns and islands where it is not practical to install undersea cable.

ESV's travelling up the coast from New York City to Boston, Bar Harbor, Maine; and Nova Scotia may interfere with the Verizon system. The islands south of Cape Cod are relatively flat and will provide little terrain shielding.

---

[1] Earth Stations on board Vessels ("ESV"). A ship or other vessel using an earth station antenna to communicate with satellites in the geostationary satellite orbit.

[2] *Spring-Summer Cruises: More Docks, Closer to Home*, New York Times, February 1, 2004.

Figure 3 – State of Florida Microwave System

The State of Florida operates an extensive microwave system for state government agencies. The system is used to transport voice and data between command centers, to dispatch emergency services, and to back haul mobile radio traffic from the State Police. There are 91 backbone paths in the Lower 6 GHz band and 96 spur paths in the Upper 6 GHz band. Data rates are 135 Megabits per second on the backbone paths and 3 to 24 Megabits per second on the spur paths.

Florida has extremely difficult radio propagation conditions. The microwave paths in Florida were designed with high fade margins and a large amount of clearance over terrain obstructions to maintain the path availability during obstruction fading and ducting conditions. Lower 6 GHz paths near Miami and Key West are particularly susceptible to interference from ESV's due to their high tower heights, flat terrain, and the heavy concentration of cruise ships in the area.

Figure 4 – State of Pennsylvania Microwave System

The State of Pennsylvania operates a microwave system of about 250 paths, similar to the Florida system. The Pennsylvania system includes a 20 path backbone between Pittsburgh, Philadelphia, and Scranton. Backbone paths are mainly in the Lower 6 GHz band with a data rate of 155 Megabits per second. Spur paths are in the Upper 6 GHz band with a data rate of 6 to 45 Megabits per second. There are a few 5.8 GHz unlicensed paths carrying 1.5 to 3 Megabits per second. Backbone and spur paths were designed to a very high availability objective of 99.9999%, which is equivalent to 31 seconds of outage per year. Unlicensed paths were designed to an availability objective of 99.999%.

Point-to-point microwave is attractive to state governments for emergency communications and back haul applications due to its high reliability. A number of states have constructed or are planning microwave networks. Michigan recently completed a new system. New York will start construction on a statewide network in 2005. Delaware recently went out for bid on a new system. Kentucky is planning to convert their existing analog microwave system to digital.

Most of the State of Pennsylvania system is in the Upper 6 GHz band and will not be affected by ESV's. The Lower 6 GHz paths in the southeast part of the state may be exposed to interference from cruise ships travelling to the Port of Philadelphia.

Figure 5 – University of North Carolina Microwave System

The University of North Carolina installed a statewide microwave system to distribute Public Television broadcasts and to transport voice and data traffic between different university locations. All 33 paths have Lower 6 GHz radios licensed under FCC Part 101. The backbone data rate is 135 Megabits per second. Eleven of the paths have parallel radios in the FCC Part 74 band from 6.875 to 7.125 GHz ("7 GHz"). The 7 GHz radios are used as studio-to-transmitter links to the Public Television broadcast transmitters.

Although it was technically possible to use the Lower 6 GHz radios to transport video on the eleven studio-to-transmitter paths, FCC Part 101.603(a)(7) prohibits Part 101 frequencies to be used as the final RF link to a broadcast transmitter. The regulatory solution was to install a second radio.

Eight of the paths in the North Carolina system are oriented east-west and are within 150 miles of the coast. The frequency coordination area for the Lower 6 GHz band is a 125 mile radius around each site, and a 200 mile keyhole +/- 5 degrees from the main beam of the antenna.

Naval vessels and other ESV's travelling south from Norfolk, Virginia will be within the coordination area of some of the North Carolina Lower 6 Ghz paths. ESV's may cause interference into mountaintop sites with clear line-of-sight to the coast.

Bill Knight
Senior Transmission Engineer
Alcatel North America

Stratos Offshore Oil Services Microwave System

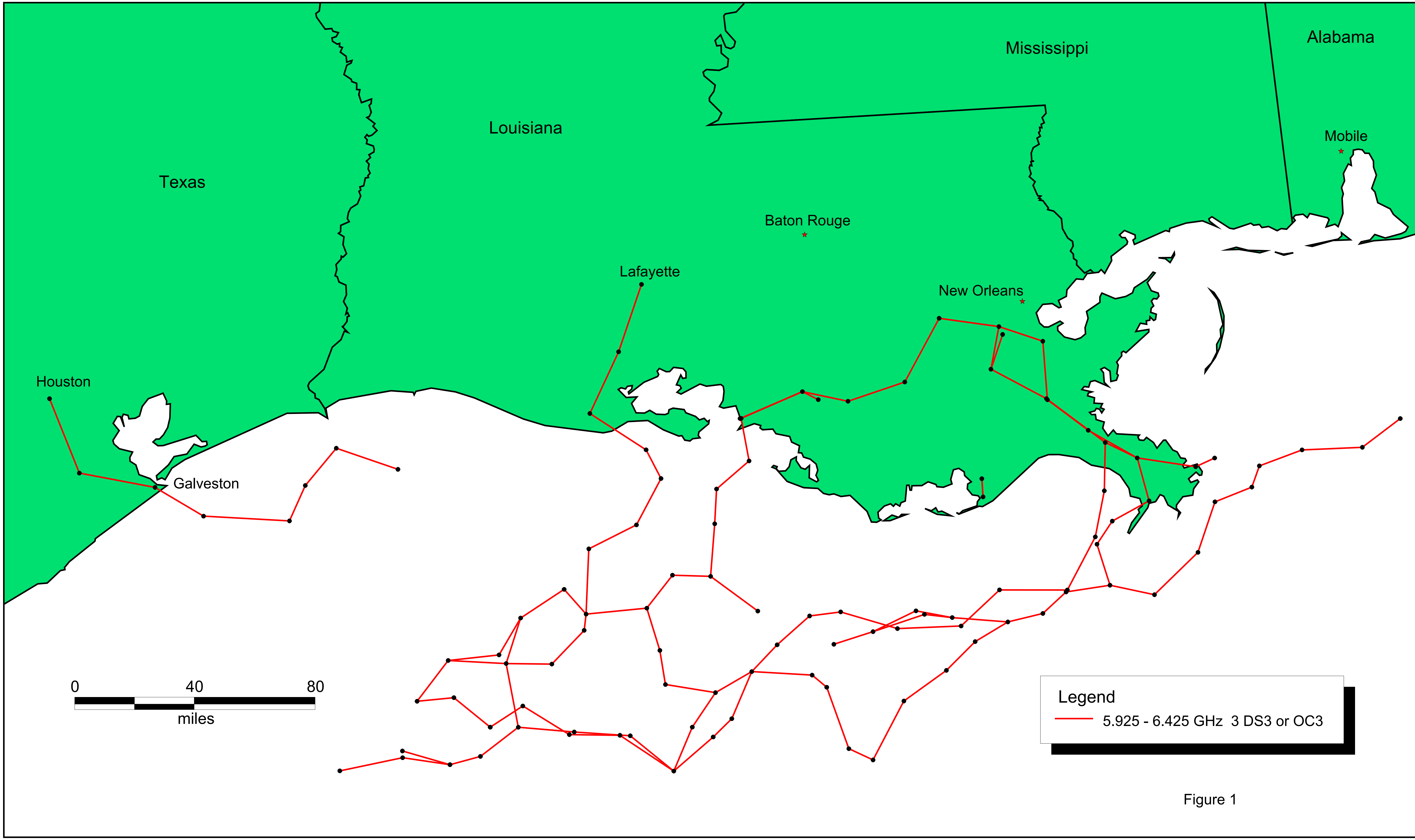


Figure 1

Verizon Falmouth – Martha's Vineyard – Nantucket Island – Hyannis Microwave System

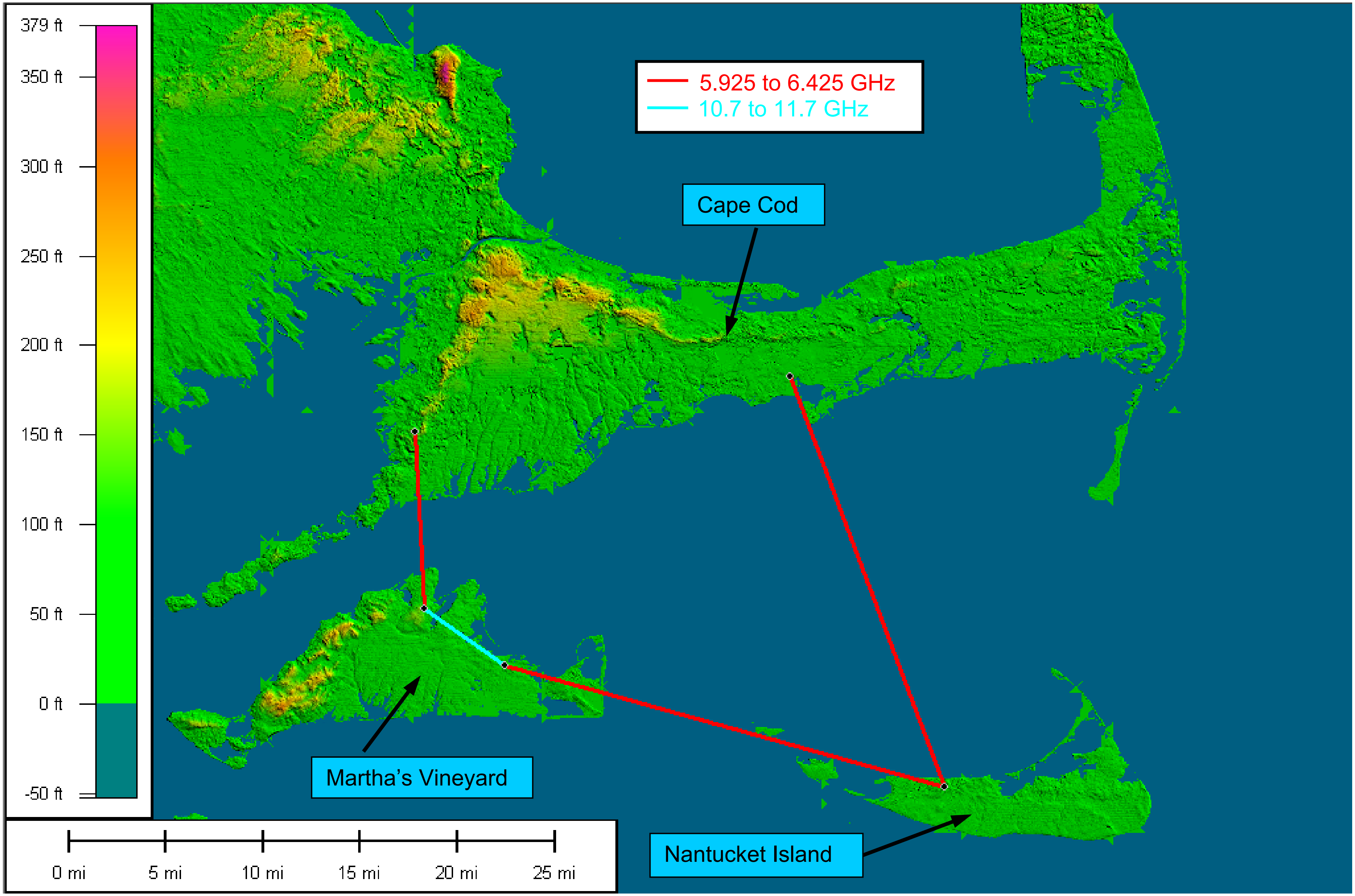


Figure 2

ALCATEL

State of Florida Microwave System

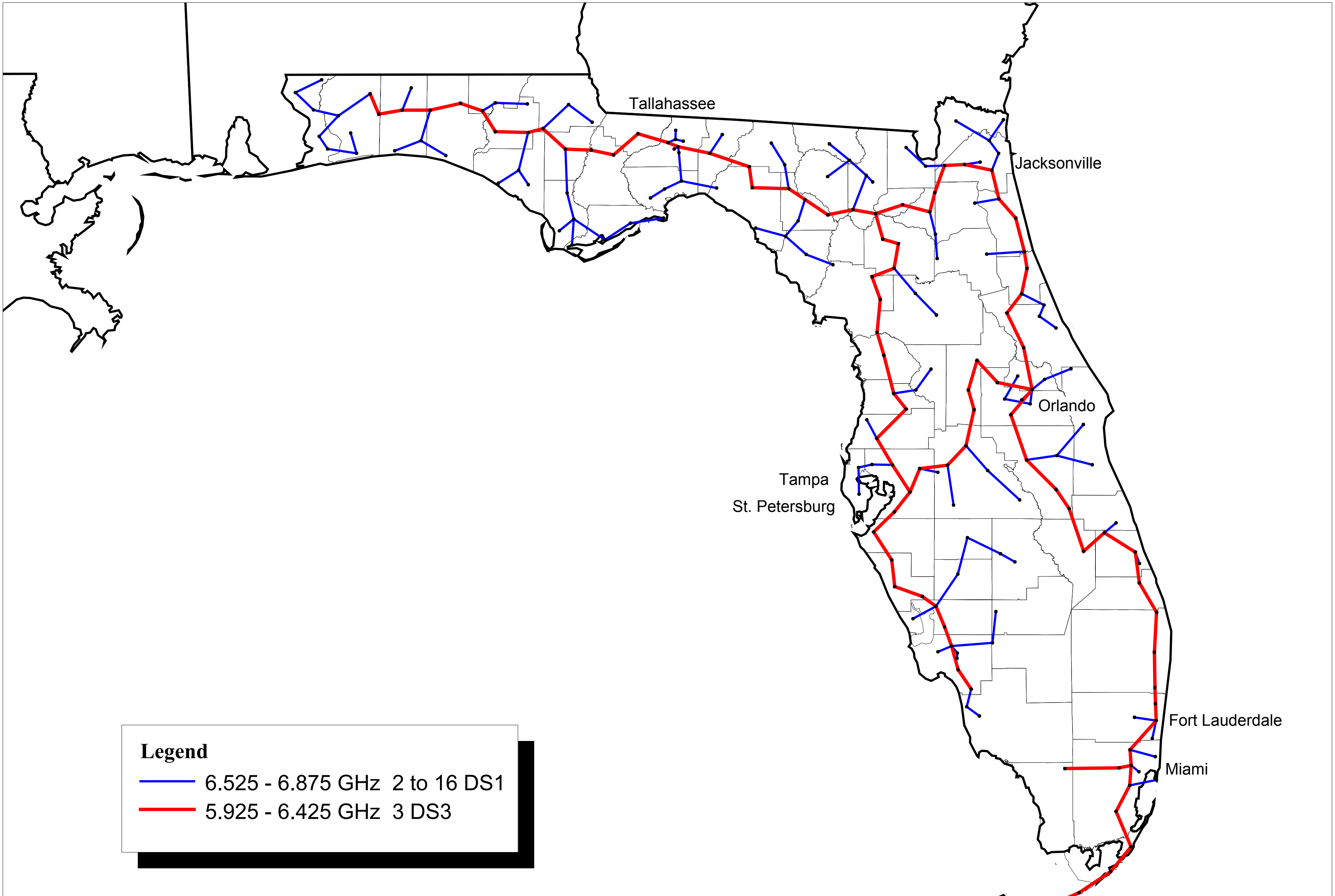


Figure 3

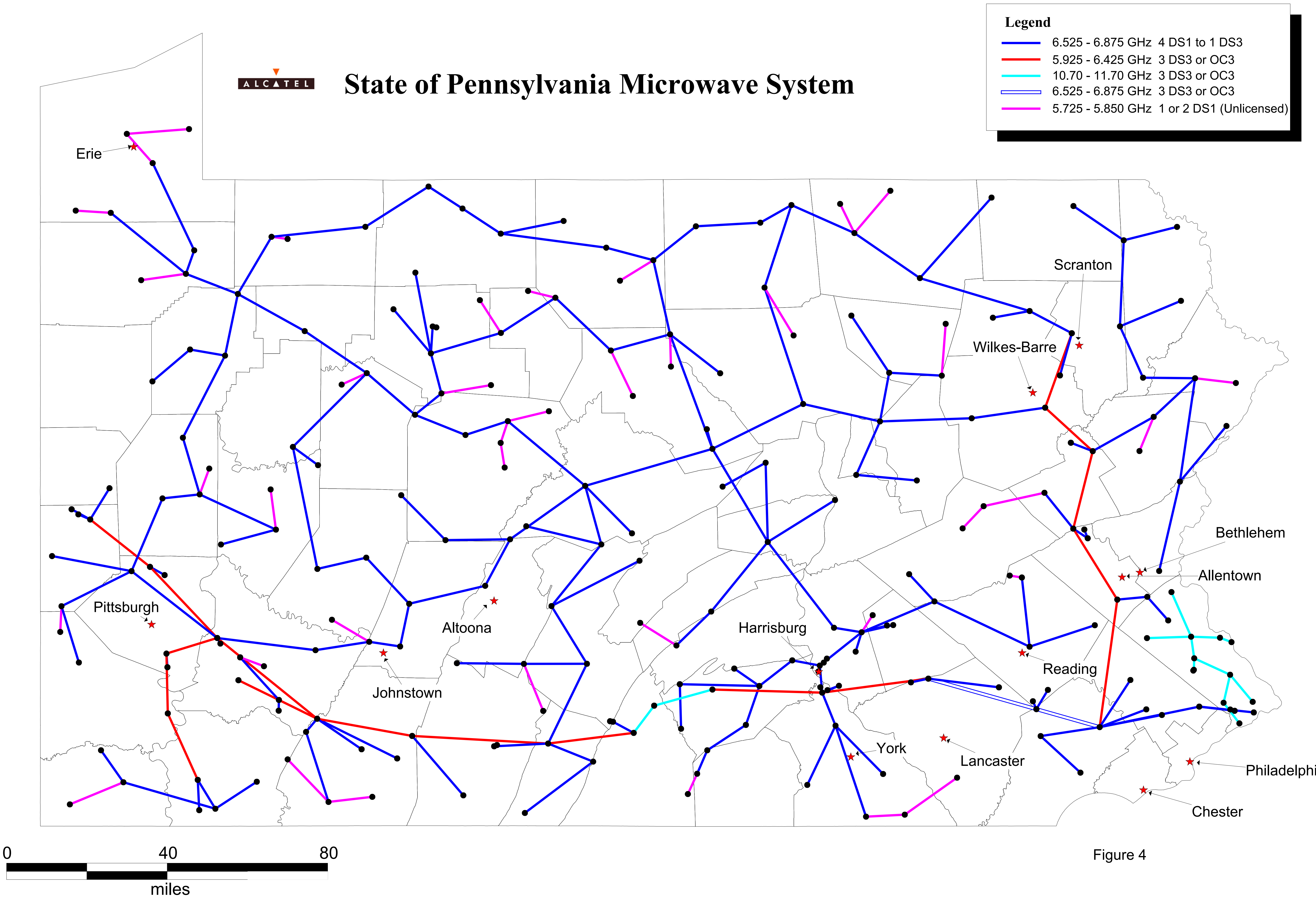
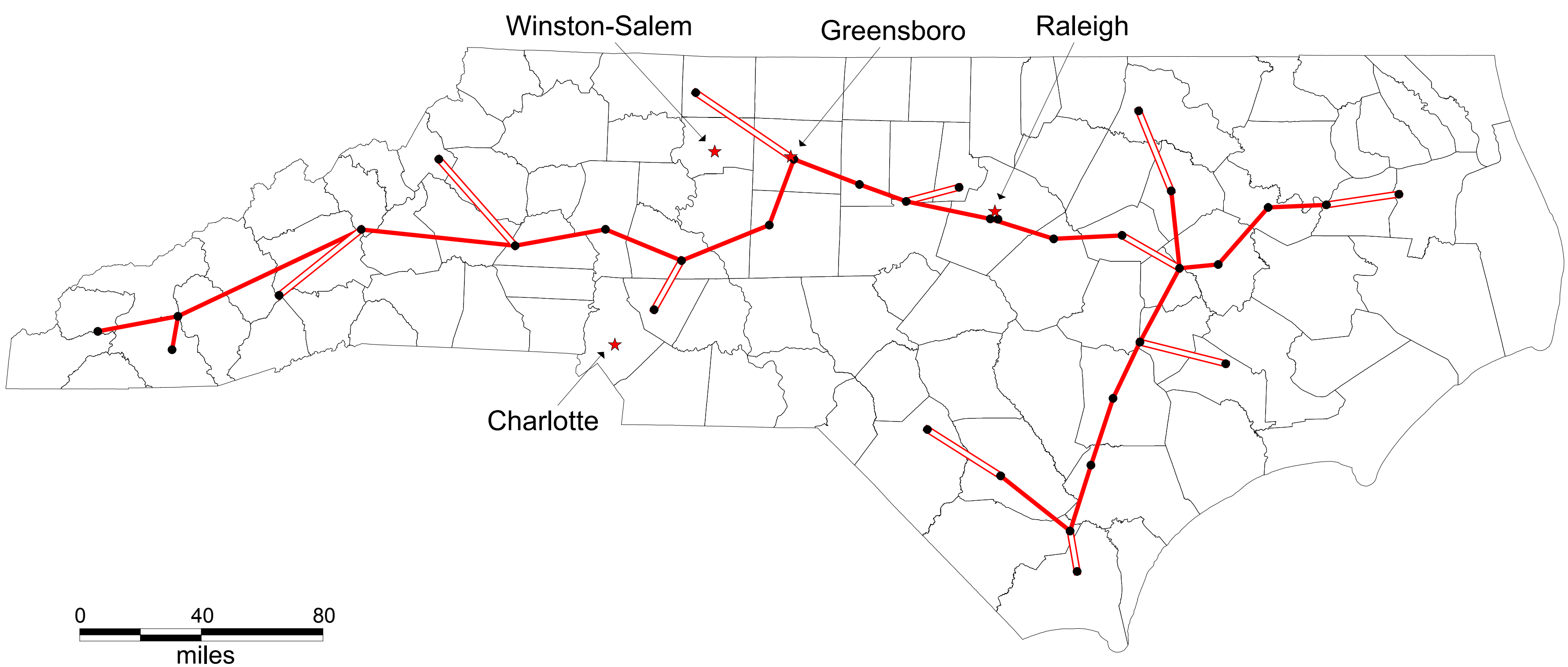

State of Pennsylvania Microwave System
Legend
6.525 - 6.875 GHz 4 DS1 to 1 DS3
5.925 - 6.425 GHz 3 DS3 or OC3
10.70 - 11.70 GHz 3 DS3 or OC3
6.525 - 6.875 GHz 3 DS3 or OC3
5.725 - 5.850 GHz 1 or 2 DS1 (Unlicensed)
Erie
Scranton
Wilkes-Barre
Bethlehem
Allentown
Pittsburgh
Altoona
Harrisburg
Reading
Johnstown
York
Lancaster
Philadelphia
Chester
0
40
80
miles

Figure 4

University of North Carolina Microwave System



Legend

5.925 to 6.425 GHz (Part 101 - 3 DS3)

5.925 to 6.425 (Part 101 - 3 DS3) and 6.875 to 7.125 GHz (Part 74 - Video)

Figure 5

SERVICE LIST

Chairman Michael K. Powell
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Kathleen Q. Abernathy
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Michael J. Copps
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Kevin J. Martin
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Commissioner Jonathan S. Adelstein
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Donald Abelson, Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Anna M. Gomez
Deputy Bureau Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Roderick Porter, Deputy Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Jackie Ruff, Associate Bureau Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Linda L. Haller, Associate Bureau Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Jacqueline M. Ponti, Associate Bureau Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

John Gusti, Associate Bureau Chief
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Richard Engelman, Chief Engineer
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Steven Spaeth, Legal Advisor
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

David Strictland, Legal Advisor
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Jim Ball, Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

JoAnn Ekblad, Assistant Division Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Alexandra Field, Assistant Division Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Howard Griboff, Assistant Division Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Breck Blalock, Deputy Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Claudia Fox, Deputy Chief
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

George Li, Deputy Chief, Operations
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Lisa Choi, Senior Legal Advisor
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

David Krech, Senior Legal Advisor
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Belinda Nixon, Attorney
Policy Division
International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

John Muleta, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Scott D. Delacourt, Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Uzoma Onyeije, Legal Advisor
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Joel Taubenblatt, Chief
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Peter Daronco, Assistant Chief
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Tom Stanley. Chief Engineer
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Mike Pollak, Electronics Engineer
Broadband Division
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554