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Via Electronic Filing
Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, DC 20554

Notice of Written *Ex Parte* Communication

RE: *In the matter of Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licenses:* **WT Docket No. 10-153**; *Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications:* **RM-11602**

Dear Ms. Dortch:

Clearwire Corporation ("Clearwire") operates open, Internet-Protocol ("IP") 4G wireless broadband networks in markets across the United States and Europe. As the nation's first, greenfield 4G wireless broadband provider, Clearwire was able to develop and deploy a backhaul strategy specifically designed for the demands of 4G mobile broadband. A key component of that strategy is the use of cost-effective microwave backhaul that is simple to install and manage, yet delivers the capacity and reliability needed for the explosive demand of broadband customers. Today, Clearwire operates the largest wireless backhaul network in the United States and uses microwave backhaul for more than 90 percent of its cell sites. Clearwire relies on a ring topology that provides 99.999 percent network availability by providing redundant link diversity from every cell site location. Clearwire submits this written *ex parte* presentation to offer proposals of changes in section §101.141 that will adjust the Commission's rules to take into account new network topologies and address two main drivers that affect broadband service providers, resilient network topologies and dynamic IP traffic growth.

Clearwire's proposes the following language as a means to encourage the deployment of resilient Ethernet backhaul networks while protecting against 'warehousing' of microwave spectrum. With the proliferation and Commercial Off-the-Shelf (COTS) availability of native Ethernet radios that support adaptive modulation rates from QPSK to 256 QAM, resulting in higher capacity microwave links, Clearwire recommends that certain §101.141 paragraphs be updated.

Specifically, Clearwire supports updating §101.141(a)(3) spectrum efficiency standards with the following proposal:

Frequency	Emission Bandwidth ≤5 MHz	5 MHz < Emission Bandwidth ≤50 MHz	Emission Bandwidth >50 MHz
3,700 – 10,550 MHz	2.4 b/s/Hz	4.4 b/s/Hz	6.0 b/s/Hz
10,550 – 13,150 MHz	2.4 b/s/Hz	3.0 b/s/Hz	4.4 b/s/Hz
13,150 – 23,600 MHz	1.0 b/s/Hz	1.0 b/s/Hz	3.0 b/s/Hz

Additionally, Clearwire recommends that the spectrum efficiency requirements specified above be met for equipment in all frequency bands from 4 GHZ to 23 GHz applied for, authorized, and placed into service six months after ratification and release of the updated rules. This proposal will harmonize spectrum efficiency standards for single-channel/single-carrier radios, multi-channel/multi-carrier radios, and multi-channel/single carrier (bonded contiguous channels) across the 4 to 23 GHz bands. Establishing minimum spectrum efficiency rates requires that operators proposing to deploy aggregated (bonded) channels in a single wide-channel/single-carrier radio meet minimum throughput requirements (expressed in Mbits per second) that are higher than that which can be achieved with radios available today. The proposed changes to the §101.141(a)(3) spectrum efficiency standard was agreed to in principle in discussions between Comsearch and Clearwire.

In addition to its proposed spectrum efficiency standard above, Clearwire also recommends that the 101.141 capacity loading standard be restated to recognize resilient Ethernet backhaul network topologies. As was done with respect to the frequency diversity rules,[1] the Commission should again recognize the inherent differences in topologies and update its rules to accommodate technological advances. In ring and mesh networks, with resilient routing protocols, there are a number of microwave links that are principally used for subscriber traffic aggregation and routing when there is an outage elsewhere in the backhaul network. These "*management*" links ensure service availability and ring integrity and would meet the proposed minimum spectrum efficiency standards. In normal operating mode, these links only carry ring integrity or continuity management message traffic (typically 64 bytes per message). When a backhaul network outage occurs, these "management" links carry aggregated subscriber traffic for the duration of the outage. However, when the outage is repaired, these links automatically revert back to their "management" traffic levels.

Clearwire proposes that any link identified by a licensee as a "management" link and that is used to provide service availability and network resiliency be exempt from any §101.141 minimum capacity loading and timing requirement. Clearwire further proposes that when a link is certified as constructed and "on-air," the licensee should identify each link based on its generic network topology.[2] For example, the link being certified is either a ring, mesh, or other resilient network path (links), or it is a linear (non-resilient) network topology path. If it is a ring, mesh, or other resilient network path (link), a sub-option would be required to identify the link as either a "traffic bearing link" or a "management/resiliency link."

[1] In the Matter of Alcatel USA, Inc. Request for Ruling that Part 101 Frequency Diversity Restrictions Are Not Applicable to Collapsed Ring Architecture for Microwave Systems, *Order*, DA 99-1502 (rel. Jan. 21, 2000) ("Alcatel Order").

[2] Clearwire proposes microwave link designation in order to protect against spectrum warehousing. However, Clearwire is aware that its proposed changes may require the Commission's ULS system to be updated. Clearwire is open to other suggestions that may protect against spectrum warehousing without necessitating changes to ULS.

This sub-option would identify those links used to maintain service continuity when an outage occurs elsewhere in the network but that under normal operating conditions are exempt from any §101.141 capacity loading and timing requirement. Ring, mesh, or other resilient network paths (links) identified as "traffic bearing" would be required to meet §101.141 minimum capacity loading and timing requirements. Only ring, mesh or other resilient network paths (links) identified as 'management/resiliency' paths (links) would be exempt from §101.141 capacity loading and timing requirements. In linear (non-resilient) network topologies (spur, hub and spoke, star, etc.) there are no resilient paths so when an outage occurs on any path in a linear network topology, all sites outbound of the outage site are affected. All paths (links) in linear (non-resilient) network topologies would be considered "traffic bearing" and required to meet §101.141 minimum capacity loading and timing requirements. As traffic patterns change and traffic is rebalanced around a ring or across a mesh network, causing the 'management/resiliency link to change, the licensee would be required to update all affected licenses to identify the new path (link) type for the affected links.

Clearwire shares the Commission's concern of spectrum warehousing and as stated above, all links would meet the spectrum efficiency standards by carrying traffic to monitor the network. This minor change in the rules would allow companies like Clearwire to utilize advanced microwave technologies to provide a wireless backhaul service that rivals traditional backhaul networks in terms of reliability and resiliency. It would also solidify advanced wireless backhaul as an attractive, competitively priced alternative to expensive special access circuits.

Please let us know if we can provide any further information regarding the proposal or address any questions or concerns you may have.

Sincerely,

By: /s/ Cathleen Massey

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cc: John Schauble
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