

WLX694
Demonstration of Substantial Service

Instructional Telecommunications Foundation, Inc. (“Licensee”) is the licensee of Educational Broadband Service (“EBS”) station WLX694 in Las Vegas, NV. Licensee leases its spectrum to a subsidiary of Clearwire Corporation.

I. Background

Section 27.14(o) of the Commission’s Rules states that EBS and Broadband Radio Service (“BRS”) licensees must make a showing of “substantial service” no later than May 1, 2011¹. Substantial service is defined as “service which is sound, favorable, and substantially above a level of mediocre service which might minimally warrant renewal.” 47 C.F.R. §27.14(o). In an effort to provide licensees a degree of certainty as to how to demonstrate substantial service, the Commission adopted several “safe harbors” for compliance. 47 C.F.R. §27.14(o)(1), (o)(2) and (o)(3).

While the satisfaction of any one safe harbor will be deemed substantial service, as described below, Licensee satisfies two safe harbors. First, Licensee satisfies the safe harbor specified in Section 47 C.F.R. §27.14(o)(3), which provides as follows: “An EBS or BRS licensee may be deemed to provide substantial service through a leasing arrangement if the lessee is providing substantial service under paragraph (o)(1) of this section.” Because Clearwire has satisfied the substantial service safe harbor specified in 47 C.F.R. §27.14(o)(1)(ii), Licensee is deemed to provide substantial service through its leasing arrangement with Clearwire pursuant to 47 C.F.R. §27.14(o)(3).

Second, Licensee also satisfies a safe harbor specified for EBS licensees in 47 C.F.R. §27.14(o)(2).

II. Safe Harbor Demonstrations.

A. Licensee Has Met the 30% Coverage Safe Harbor.

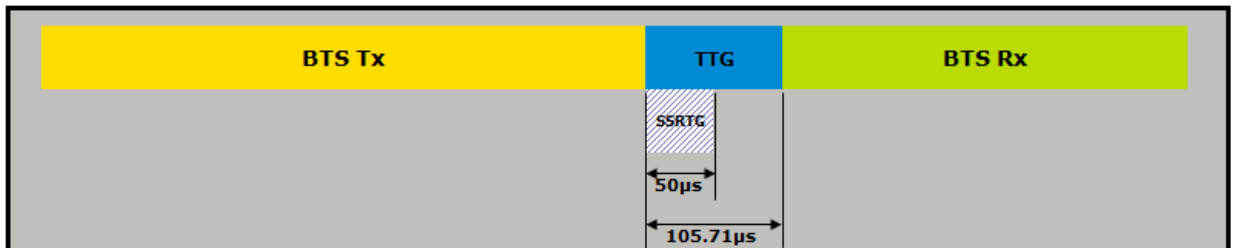
Clearwire has deployed and is operating a fourth generation (“4G”) mobile wireless broadband network in Las Vegas, NV that includes the Geographic Service Area (“GSA”) of the License as defined by the Commission’s rules. See 47 C.F.R. § 27.1206. Clearwire, doing business under the brand name CLEAR®, is a leading provider of 4G wireless broadband networks that provide high-speed mobile Internet and residential access services, as well as residential voice services, in communities throughout the country. Clearwire’s 4G mobile broadband networks currently operate based on the 802.16e standard, which is referred to as mobile WiMAX. The mobile WiMAX standard builds off of the 802.11 standards, commonly referred to as Wi-Fi, and facilitates 4G mobile broadband services. By the end of 2010, Clearwire’s 4G mobile broadband services covered an estimated 110 million people in 71 markets, including Las Vegas, NV.

¹ Extended to November 1, 2011 per DA 11-532.

Clearwire offers several ways to connect to its service including personal Wi-Fi hotspots such as the iSpot, Clear Spot 4G and Clear Spot 4G+, USB modems and performance docks, a dual-mode 4G/3G USB modem, home modems with built-in Wi-Fi, and other mobile devices like 4G enabled laptops. There are also dozens of 4G-ready laptops and netbooks available from leading manufacturers including Dell, Fujitsu, Lenovo, Samsung, and Toshiba.

Establishment of Population Covered Within the GSA. An incumbent EBS licensee's GSA is determined by Sections 27.1206(1) as "bounded by a circle having a 35 mile radius and centered at the station's reference coordinates, which was the previous PSA entitled to incumbent licensees prior to January 10, 2005, and is bounded by the chord(s) drawn between intersection points of the licensee's previous 35 mile PSA and those of respective adjacent market, co-channel licensees..." The attached map depicts the GSA, the location of Clearwire's base stations and the associated coverage areas for those base stations. In addition, the attached map shows the total population within the GSA, the population covered by Clearwire's base stations and the percentage of the total, which is greater than 30 percent. The attached map is based on Alteryx 2009 population data, which are 2009 estimates derived from 2000 census data.

Establishment of Service Area Contours Within the GSA. Clearwire used a maximum distance calculation for determining population coverage within the GSA. This methodology takes into account the base station antennae deployed at the site, typically from vendors such as KMW and Kathrein. The service area contour, depicted on the attached map, was achieved by using at least (3) base station antennae with 120 degree coverage.



WiMAX Frame Structure

Clearwire operates using the WiMAX Forum's Wave 2 profile. Clearwire's frame consists of 29 downlink symbols and 18 uplink symbols. Because WiMAX technology utilizes Time Divisional Duplexing (TDD), applying the laws of physics and device switching performance, the maximum useable range for WiMAX is 8.35 KM. This is due to what is known as Round Trip Delay ("RTD") that stems from what is known as the Transmission Time Gap ("TTG"), which represents the time interval between a base station's transmit period and its receive period, (105.71 µs subtracted by the Subscriber Station Return Time Gap ("SSRTG"), which represents the time required by a subscriber station to switch from receive to transmit, (50 µs resulting in 55.71 µs)). Because the one-way delay is half of this value, or 27.855 µs, the maximum useable range for

WiMAX technology is equal to the one way time of flight ($27.855 \mu\text{s}$) x speed of light = 8.35 KM.

Clearwire used this distance-based methodology rather than a propagation methodology because WiMAX technology is distance limited by TDD switching times well before it exceeds the technology's minimum signal thresholds. By examining the link budget of a WiMAX system using a typical off the shelf outdoor unit ("ODU"), it is clear that receiver sensitivity is not the limiting factor when determining coverage. The WiMAX link budget in the table below shows that the minimum required received signal level for the ODU to operate is over 41 dB below what would be received at the 8.35 KM TDD distance limit described above. Thus, either terrain blockage which is accounted by using the method described in the next paragraph or the WiMAX TDD distance limit are the two parameters limiting WiMAX coverage. Thus, to be conservative, Clearwire has established service area contours that are the minimum of the Line of Sight distance and the WiMAX TDD distance limit versus using a received signal level threshold.

Parameter	Units	Value
Transmitter Power (assuming 2T2R)	dBm	39.5
Cable Loss	dB	1.0
Antenna Gain	dBi	16.0
EIRP	dBm	54.5
Receiver Sensitivity	dBm	-94.0
ODU Antenna Gain	dBi	12.0
Maximum Path Loss (MAPL)	dB	160.5
Free Space Path Loss at 8.35 KM at 2600 MHz	dB	119.2
Received Signal Level at 8.35 KM	dBm	-52.7

To account for terrain obstructions, Clearwire also employed a calculation similar to Antenna Height Benchmarking as described in 47 C.F.R. § 27.1221. But, to account for the maximum useable range of 8.35 KM, instead of calculating Height Above Average Elevation along a radial with 50 points from 3 to 16 KM from the base station, Clearwire used 50 evenly spaced points from 0.5 KM to 8.35 KM. If this calculation resulted in service area contours that were less than the maximum useable range, then Clearwire relied on this calculation to establish the service area contours depicted on the attached map. Clearwire used MapInfo to provide a graphical representation of these contours.

The foregoing, in conjunction with the attached map, demonstrates that Licensee provided substantial service through its leasing arrangement with Clearwire and satisfaction of the 30% population coverage safe harbor set forth in 47 C.F.R. §27.14(o)(1)(ii).

Licensee certifies that it is in compliance with the programming requirements contained in Section 27.1203 of the Commission's Rules and that it is in compliance with Section 27.1214 of the Commission's Rules.

B. Licensee Also Has Satisfied an EBS Safe Harbor.

Though Licensee is relying on the signal coverage safe harbor for the purposes of this notification, as described below Licensee also satisfies the safe harbor specified for EBS licensees in 47 C.F.R. §27.14(o)(2), which states:

An EBS licensee has provided “substantial service” when:

- (i) The EBS licensee is using its spectrum (or spectrum to which the EBS licensee’s educational services are shifted) to provide educational services within the EBS licensee’s GSA;
- (ii) the EBS licensee’s license is actually being used to serve the educational mission of one or more accredited public or private schools, colleges or universities providing formal educational and cultural development to enrolled students; or
- (iii) the level of service provided by the EBS licensee meets or exceeds the minimum usage requirements specified in § 27.1214.

Per § 27.1214(a), ITF transmits a total of 80 hours of instructional television programming per week during the school year in the Las Vegas, NV metro area to four K-12 schools using analog transmission on WLX694’s channel G4. This programming covers art, economics, foreign languages, geography, health, language arts, mathematics, psychology, science, social studies and technology. Most individual titles are targeted at early elementary, middle elementary, middle school, or high school populations. Taken as a whole, the available programming covers kindergarten through advanced high school subjects.

Schedules for ITF’s Las Vegas, NV programming can be found at <http://itfitv.org/schedules.php>. These schedules are also sent to the schools receiving ITF’s programming each month.

The following is a list of accredited educational institutions within WLX694’s GSA that receive ITF’s educational video programming and use it for in-class instruction:

School Name	Address	City	ST
The Meadows School	8601 Scholar Lane	Las Vegas	NV
Biltmore Continuation School	801 Veterans Memorial Drive	Las Vegas	NV
Jeffrey Academy Center	602 W. Brooks Avenue	Las Vegas	NV
Global Community H.S.	3801 E. Washington Ave.	Las Vegas	NV

Licensee certifies that it is in compliance with the programming and minimum usage requirements set forth in Sections 27.1203 and 27.1214 of the Commission's rules. Moreover, as described above, Licensee satisfies the EBS-specific safe harbor specified in Section 27.14(o)(2) of the Commission's rules. The spectrum associated with the License is in use within a network that permits channel shifting and loading. Use of the spectrum associated with the system or a particular base station location can be dynamic, depending upon the frequency use and reuse plan that optimizes network performance. Thus, at any given time, educational usage may be on channels associated with the License or on other EBS or BRS channels associated with the system, as permitted under Section 27.14(o)(2)(i) of the Commission's rules.

WLX694-Las Vegas, NV

GSA POPs 1,844,633 Coverage POPs 1,781,923 Percent Covered 97%

