



SUBSTANTIAL SERVICE INFORMATION GUIDE

Developed by the NEBSA EBS Radio Equipment Task Force

Co-Chairs

Robert Finch, Cirpass LLC

And

Kenneth Schuetz, Colorado State University

Overview

The following information guide was developed by the NEBSA Radio Equipment Task Force to assist Educational Broadband Service (EBS) license holders that must deploy their own transmission equipment on their channels to meet the Federal Communications Commission (FCC) requirement that all EBS stations be operating and providing “substantial service” by May 1, 2011 or risk forfeiting their license. This information is intended to give license holders a sense of types of facilities that might be deployed, how such facilities might be used to provide “educational” service, and a range of costs associated with these options.

Contributing Task Force Members

Ken Schuetz, University of Colorado, ken.schuetz@colorado.edu

Marty Ronning, University of Maryland, cronning@umd.edu

Darin Williams, University of Nebraska, dtwilliams@nebraska.edu

Steve Gorski, The Source For Learning, sgorski@sflinc.org

Mike Cowan, Wireless Connections, mikec@wirelessconnections.net

Robert Finch, Cirpass LLC, rfinch@cirpass.net

All task force members consists of professionals who understand EBS radio systems and who are willing to be of assistance to EBS licensees in planning, installing and using EBS wireless systems.

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Disclaimer

This information is not intended to provide specific legal advice about the FCC’s requirements, or substitute for a license holder’s seeking appropriate legal counsel. NEBSA encourages each EBS license holder to confirm its intended course of action with its own attorney.

The equipment and service vendors noted below participated in an extensive fact gathering process commissioned by NEBSA and have stated their willingness to be included in this communication. NEBSA appreciates their participation in this process and their willingness to work with EBS licensees, but cannot and does not endorse or guarantee their products and services

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Substantial Use Requirements and Examples

By the deadline of May 1, 2011, for a typical four-channel EBS station, the FCC requires a license holder to be operating transmission facilities on at least one of the EBS station's licensed channels within the Geographic Service Area of the station, and generating actual use of the transmission capabilities for at least 80 hours per week (20 hours per week per channel) for purposes that further the educational mission of one or more accredited schools. Such actual use could be, for example:

- the transmission of at least 80 hours per week of instructional video programs to and actual reception and use by students in classrooms and/or transmission and reception and use of training video programs by faculty and staff
- the connection of computers to the Internet or to a school's IT network via WIMAX or other wireless technologies operating on the EBS channels, in a library, computer lab, classroom, school office, or throughout a school building, across a school campus, or even into the community, where the computers are used for educational purposes by students or faculty or for the business purposes of the school by staff, so long as the collective use of such computers over the wireless connection is at least 80 hours per week
- the connection via WIMAX or other wireless technologies operating on the EBS channels of mobile devices other than computers for the operation of tracking, communications and safety systems in a building, on a campus, and/or in school vehicles (such as school buses or security vehicles), so long as the collective use of such devices over the wireless system is at least 80 hours per week
- the transmission from one point (such as a school building with broadband Internet access) to another point in a district (such as another school building otherwise lacking broadband access), via a point to point microwave system operating on the EBS channels, where the system is transmitting data at least 80 hours per week.

Equipment/Systems Examples

The EBS radio systems described below could provide wireless Internet access, point to point high speed data connections and video transmission.

Key Terms

A femtocell is a small cellular [base station](#), typically designed for use in a home, small business or for a portion of a larger building. It connects to the service provider's network via broadband (such as [DSL](#), [cable](#) or through a [LAN](#)). A femtocell allows service providers to extend service coverage indoors, especially where access would otherwise be limited or unavailable. The concept is applicable to all standards, including [GSM](#), [CDMA2000](#), [TD-SCDMA](#), [WiMAX](#) and [LTE](#) solutions.

A microcell is a cell in a mobile network served by a low power [cellular base station](#) (tower), covering a limited area such as a campus, a hotel, or a transportation hub. A microcell is usually larger than a [picocell](#), though the distinction is not always clear.

A **macrocell** is a cell in a mobile phone network that provides radio coverage served by a power [cellular](#) base station (tower). Generally, macrocells provide coverage larger than [microcell](#). The antennas for macrocells are mounted on ground-based masts, rooftops and other existing structures, at a height that provides a clear view over the surrounding buildings and terrain. Macrocell base stations have power outputs of typically tens of watts

The term **macrocell** is used to describe the widest range of cell sizes. Macrocells are found in rural areas or along highways. Over a smaller cell area, a [microcell](#) is used in a densely populated urban area. [Picocells](#) are for areas even smaller than microcells. An example of usage would be a large office, a mall, or train station. Currently the smallest area of coverage can be implemented with a [femtocell](#): used in homes, small offices or for portions of larger buildings where coverage is required.

Example System Parameters

Description	Use/Users	Coverage (radius)	Cost Equip (\$000)	Cost Core ¹ (\$000)	Project Total ² (\$000)
Enterprise Femtocell (indoor)	WI-FI like/64 Users	100 m	2-4	30-40	40-50
Microcell (indoor or outdoor)	128-512 Users	500 m	6-10	0-50	25-70
Macrocell Single Sector	128-512 Users	1-25 km	14-25	0-60	40-125
Three Sector Macrocell	128-512 Users per sector	2-39 km	35-70	40-70	100-250
Multi-cell Network	128-512 Users Per sector	2-39 km	350-700	50-90	500-1000
Point to Point Microwave	Building Connectivity	30 km	12-25	0	25-40
Video	Broadcast	40 km	40-70	5-20	60-100

Notes:

1. Some manufacturers provide microcell or macrocell base stations that can and operate in either standalone mode or with core equipment
2. Prices may be higher or lower than those identified above. The estimated total price includes external costs for basic design, vendor selection, network equipment and user device purchase, installation, testing and cutover. Operating prices are excluded from the prices above, and will vary significantly depending on the installation and level of user support required. These basic numbers include a minimal amount of CPE equipment, license holders need to add \$ 100.00-\$400.00 per extra device needed.
3. Coverage radii (other than point to point and video) are defined by hardware cell distance limitations (manufacturer specific) and most importantly by system design and channel re-use.

Example- Macro systems are generally considered long range, although they are commonly designed for 2-5KM coverage.

4. Supplier intervals from order to installation ready are typically 90 days and may be longer. It is recommended that license holders begin developing their use case quickly as time is running short. WiMAX is “built to order” and not on the shelf.
5. The “core” for a WiMAX system is computer server systems generally providing for mobility, roaming, authentication of system users and other functions. Some systems will operate with reduced functionality without a core (much like a WIFI hot spot).
6. At least one supplier has offered to lease use of their core which may reduce the upfront and ongoing cost of the system.
7. Use/Users lists approximate values which are manufacturer specific. These values represent a single transceiver even if this transceiver is part of a large campus wide system. Many systems will support 512 active users; however, the realistic number of users is normally defined by available system bandwidth. Example- manufacturer A can support 512 users and provide 40Mbps sector capacity. The system could not support all 512 simultaneously if each was watching a different 1 Mbps video stream.

Supplemental Sources

- A. An Introduction to WiMAX Presented By *Wireless Connections*
<http://wirelessconnections.net/EBStraining/>
- B. WiMAX System Equipment: Six Vendor Solution Presentations
<http://ms-websvr.ad.eng.umd.edu/DETSMediasite5/Catalog/pages/catalog.aspx?catalogId=3c5c4318-a1c5-4535-accb-df02d981f081>
- C. A list of equipment manufacturers, system integrators, commercial wireless operators and consultants who can assist with further information about these resources:

Company	Contact	Email	Phone	Web
Airspan Networks	Gregg Tome	gtome@airspan.com	561 443 1014	http://www.airspan.com
Alvarion, Inc.	Ed Wyatt	ed.wyatt@alvarion.com	301 865 5595	http://www.alvarion.com
Cirpass LLC	Robert Finch	rfinch@cirpass.net	703 635 2686	http://cirpass.net/
HiBeam	Chip Gaskins	cgaskins@myhibeam.com	202 294 1986	www.myhibeam.com
Juni Global	Daniel Hur	daniel.hur@juniglobal.com	425 702 0848	http://www.juniglobal.com
PureWave Networks	Les Sparrey	lsparrey@pwnets.com	925 759 0707	www.purewavenetworks.com
Wireless Connections	Mike Cowan	mikec@wirelessconnections.net	419 660 6100	www.wirelessconnections.net