

## Filling in the White Spaces

BY STEPHEN E. CORAN

The Federal Communications Commission (FCC) is expected to adopt rules at its September 23, 2010 meeting that will open up vacant television spectrum, known as white spaces, for fixed and personal/portable broadband. If adopted, these new FCC rules will have a profound effect on network design and infrastructure cost, especially on the tower assets needed to bring broadband to rural, Tribal, unserved, and underserved areas. The purpose of this article is to shed light on this significant FCC ruling and its ramifications.

If the FCC retains its current rules, broadband providers will be subject to height and power restrictions that will require substantially more infrastructure, and the cost to deploy broadband in some areas could be prohibitive. If the FCC changes its rules as Wireless ISPs (WISPs) and others advocate, then broadband providers:

- Will require less new infrastructure
- Can increase wireless coverage by up to 350% per tower site
- Be more likely to lease towers (although much fewer due to technology advancements)
- Be more likely to deploy service due to significantly lower capital expenses.

### Introduction

In a proceeding begun in 2004, the FCC targeted unused TV spectrum for broadband use, while at the same time ensuring that broadcasters would not suffer increased interference. Some of the rules the FCC is considering could have a significant impact on tower siting; that is, on both the number of sites that will be required and the structures that will need to be constructed or modified to accommodate new wireless operations. If the FCC does not approve raising the antenna height from 30 meters to 100 meters, then operators will not be able to take advantage of existing cell towers, which would be inefficient and unnecessary.



## What are white spaces and how do they relate to 700 MHz?

White spaces are unused TV channels (below 700 MHz) that can propagate over long distances and do not require line-of-sight. The FCC decided to make this spectrum available for unlicensed devices at lower power and with little or no protection from interference. In so doing, the FCC hopes to lower entry costs and promote new services. Because the band includes TV stations and other incumbent stations, the FCC must adopt rules for interference protection. By contrast, for the nearby 700 MHz spectrum, the FCC has licensed spectrum on an exclusive basis in exchange for billions of auction dollars. Because all TV stations have migrated to other channels below 700 MHz, this spectrum is available nationwide and licensees do not have to protect incumbents from interference. These factors make the 700 MHz spectrum suitable for 4G mobile services.

Earlier this decade, as smart radio technology and wireless device usage proliferated, the FCC initiated a proceeding to determine how it should make the spectrum available. That kicked off a protracted and contentious proceeding that resulted in an initial set of rules that the FCC adopted in November 2008. The rules established two separate services – a fixed service with a maximum power of 4 Watts EIRP (Equivalent Isotropically Radiated Power) and a “personal/ portable” service with lower power levels.

These lower power levels were promoted by Google and Silicon Valley as a new platform for mobile wireless. The higher power service will enable Wireless Internet Service Providers (WISPs) to access new spectrum to provide broadband service to rural, Tribal, unserved, and underserved areas of the country where there are few, if any, alternatives. As illustrated in [Figure 1](#), the average total amount of TV white spaces bandwidth is greater than many other bands suitable for broadband applications, making it well suited for the aforementioned areas of the country.

Broadcasters, cable operators, wireless microphone users, and others have fought long and hard to ensure that the technical rules do not permit white space users to cause harmful interference to TV stations, news gathering, and other operations. The mobile wireless industry asked the FCC to auction the white spaces, but the FCC did not adopt this proposal. Even by FCC standards, the white space proceedings have been especially long and controversial.

## What is the controversy?

The operating requirements the FCC adopted for fixed use drew fire from WISPs and equipment vendors such as Motorola. That’s because the FCC set a 30-meter maximum height for base stations, a 3-meter minimum height for customer premises equipment (CPE), and a 4-Watt power limit. Individually and together, these rules limit the area a base station can cover.

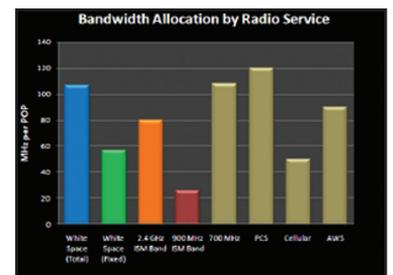


FIGURE 1: Bandwidth Allocation by Radio Service.

Source: Spectrum Bridge, White Spaces Report 2Q 2010

Some say that these limits are unnecessary and promote inefficiency while driving up deployment costs. For instance, in rural areas, where there is more white space spectrum and sparse population, WISPs can more economically and efficiently provide service from a single tower than they can using a multi-tower cellular configuration.

## What solutions have been proposed and why?

As a result, the Wireless ISP Association (WISPA) and others asked the FCC to reconsider its rules by raising the maximum antenna height to 100 meters and increasing power to 20 Watts, with safeguards to provide the same level of interference protection to incumbents. According to Motorola's FCC filings, ***the increase in height alone would enable WISPs to increase coverage from each base station by 350 percent.*** Spectrum Bridge, an emerging leader in the wireless industry, has deployed trial fixed white space operations. The company estimates that

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*“Raising the base station antenna height would be three times more cost effective because it would save on infrastructure costs.”*

Spectrum Bridge

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## What would be the impact of the proposed WISPA solution?

Increasing the maximum height for base stations from 30 meters to 100 meters will have the greatest impact on a WISP's ability to serve a larger area. ***Lowering the minimum height for CPE is estimated to save as much as \$400 per customer in installation and labor costs.*** How the FCC resolves these issues could be the difference between a WISP deciding to deploy or not to deploy, since the infrastructure costs under the current rules may not justify investment in equipment and tower leases; the low population density will not enable a sufficient return on that investment. In other words, keeping the rules as they are will theoretically require more towers, but if the WISPs do not build, then that will likely be a victory with unrealized practical benefits.

### About the Author

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