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A NEW SOLUTION FOR THE SPECTRUM CRUNCH: SPECTRUM SHARING

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A new solution for the spectrum crunch: **Spectrum sharing**

By Neal Gompa on June 4, 2013 at 10:36 am 2 Comments



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Spectrum is a finite resource. There are only so many radio frequencies that can be allocated exclusively for mobile services. Given how compressed most non-cellular frequencies are, it becomes increasingly unlikely for more

spectrum to be freed up for operators to use exclusively for cellular service. Enter spectrum

Spectrum sharing is the principle of allowing multiple users to utilize the same block without providing exclusivity to either of them. One user may have "priority" over the other, but generally all users assigned to those frequencies can use them. This way, more spectrum can be made available to those who need it faster than it would normally be possible.

The government loves this idea

The government likes this because it does not have to repack federal usage of radio waves even tighter than before. For the AWS-1 spectrum (which T-Mobile uses for UMTS/HSPA+ and LTE service), government users had to clear out of the band entirely before T-Mobile could use even a portion of it. The problem with that lies in how efficiently they can move out. By design , the government is a large bureaucracy that moves very slowly to implement change. Furthermore, military users on the band in some areas were being less than cooperative. This forced T-Mobile to delay UMTS deployment in many areas several times.

With spectrum sharing, the government could have cleared out from the band in stages, allowing T Mobile to roll out LIMTS consider factor by prioritizing to mayo out of T Mobile's

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allowing 1-mobile to roll out OWLD service laster by phonicizing to move out of 1-mobile s licensed frequencies first. Then, the government could slowly move out of the rest of the frequencies, prioritizing on who actually will use it right away. This would allow the government to better absorb the costs of moving users off the band.

In <u>future</u> ν^{T} auctions, spectrum sharing would be set up so that the government does not have to move out of commercially licensed frequencies very quickly (or possibly at all). The government has already had to switch frequencies three times in the last decade. It is very difficult for the government to move to another band because there are very little unused or lightly used frequencies left. Exclusivity on spectrum licenses may be short or non-existent.



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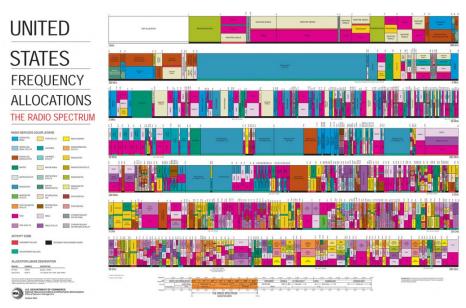
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United States radio frequency allocations

The operators are uneasy about it

Understandably, many mobile operators are skeptical of how useful this could be. In the past, they've been guaranteed exclusive access to spectrum. This allowed them to minimize any potential interference issues that could crop up from multiple users operating on the same frequencies.

In order to support spectrum sharing, a lot of extra coordination will be required in order to minimize interference issues. One <u>solution</u> \mathbf{r}^n is to have a database that is updated in real-time with information on who is using the frequencies and develop automatic reconfiguration around that. This solution is being used for white space wireless systems.

The CTIA (a wireless network trade organization for the US) suggests that spectrum sharing would be a short term solution to transition to exclusive access to spectrum, and that spectrum sharing is not workable as a long term solution due to the lack of cognitive radio $\underline{\text{technology}} \, \underline{\nu}^{\text{T}}$ that works on a national scale.

AWS-3, the first band that may require spectrum sharing

The FCC is required to auction several more frequencies by mid-2015, thanks to the "The Middle Class Tax Relief and Job Creation Act of 2012" passed by Congress. One band in particular that FCC is required to auction is the 2155-2180 MHz (unpaired AWS-3 band) frequency range. By itself, AWS-3 is not a problem. But the FCC (and mobile operators)



wish to have AWS-3 become a paired band. 2155-2180MHz would be paired with 1755-1780 MHz, extending the paired AWS band with an 25MHz channel. It is slated to be auctioned by the end of next year.

However, 1755-1780 MHz has not been cleared of government users yet. Consequently, if a paired AWS-3 band is to be auctioned by the time that Congress mandated to the FCC, spectrum sharing will be required. T-Mobile is already conducting trials to prove that spectrum sharing is doable for the frequency range.

There is a lot of skepticism in spectrum sharing on a national basis, but perhaps this is the solution that will allow mobile operators to have access to greater radio bandwidths as the demand for data and greater speeds rises.

Now read: The wireless spectrum crunch, illustrated



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Maventwo • 4 months ago

On eetimes .com they have written an article in 2011 I think it was that described that in UK they discuss to force Radar uses by military instead using ordinary radio spectrum waves from Terrestrial digital radio communication and smart algoritmes recognice echo waves when objects in air or on Sea be detected.

So traditional Radar spectrum waves can be reused for mobile communication. Another possibility is to make all types of radio waves using MIMO with man antennas for both sending and recieving digital radio transmitting. Both IEEE 802.11n and 802.11ac is using MIMO and 4G-standard LTE is prepaired for 2x2 and 4x4 MIMO and LTE Advanced-standard supports up to 8x8 MIMO.

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