Non-802.11 Interference

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First off, we're going to cover understanding different types of interference that can affect wireless network communications.

We have some non 802.11 interferers, such as microwave ovens, wireless video cameras, radar, and radar does specifically affect an area of the 5 GHz range especially, as it relates to 802.11ac Wave 2, motion detectors that are wireless in your home, wireless headphones, outdoor microwave links, fluorescent lights, wireless game controllers, any other type of bluetooth, or even proprietary wireless devices within your home or your business.

In order to really tell what's going on inside a wireless environment, especially for those things that are wireless, that are non 802.11 specific, (and we will talk about some of the 802.11 specific wireless interferers), you're going to need to have a spectrum analyzer, or some type of tool that will provide some spectrum analysis for you. We'll take a look at spectrum analyzers a little bit more in detail in the next section.

Some of these sources of interference can be managed and controlled by the wireless control system from Cisco, which is now part of the Cisco Prime Infrastructure.

The wireless spectrum analyzers actually give us the ability to take a look at the details of what's occurring within that wireless environment such as the real-time wireless flow, the duty cycle of the wireless information, spectrogram of what's occurring at each of the specific frequency ranges.

As you can see from the diagram here- we have a 2.4 GHz on the top row, and we have 5 GHz on the next two rows. If we take a look at some of these specifically, and the first one being a microwave oven. One of the things that you will notice that is extremely interesting about microwave ovens is that they tend to have an effect because of their duty cycle around channel 11 of the 2.4GHz frequency range.

If you remember we generally are going to use channels 1, 6 and 11for non-overlapping channels for 2.4GHz. Bluetooth also runs in the 2.4GHz range, so we're going to see that although it runs in that range, it has a relatively low duty cycle, and gets spread across that 2.4GHz band. It's not going to have a real negative impact on our wireless but it will have some impact. Wireless phones and these are generally the wireless phones that you're going to use in your house, not your mobile phone.

Now, we also have to look at where is this interference coming from, what other types of things are actually going to affect our wireless signal. From a reference point of

view, we have to kind of take a look at, say, a floor plan of a building, and note that a break room is going to have a microwave oven in it. So, probably wouldn't be a good idea to have the access point delivering wireless to that break room, to actually be on channel 11 because we know that a microwave ovens duty cycle and frequency range that gets affected is the frequencies around channel 11.

We also might have test labs in our environment that have all kinds of electrical equipment in them. We're going to have conference rooms, cubicles, stairwells, elevator shaft, closed offices. We're going to have file cabinets everywhere. All of these things are going to have some impact, and creates some phenomena that's going to affect our wireless communications. We're going to take a look at some of those.

The other thing is, and again, from a reference point of view looking at legacy of wireless, each of these wireless cells depicted by the access points and the different colored circles are indicative of a 2.4 GHz three non-overlapping channel environment. One of the things we have to think about and this is going to affect our wireless signal, it's going to affect signal strength, it's going to affect range, and we are going to be affected by all of these interferers. We have to look at where are we going to place our access points, how much coverage are we going to need. We need to avoid having co-channel interference, which means that we have to abide by the rules of the non-overlapping channels, both for 2.4GHz as well as 5GHz.

One thing that I'll mention is that when you start moving into the more advanced and more currently utilized wireless protocols such as 802.1n, 802.11ac Wave 1 and Wave 2, you actually start reducing the amount of 5GHz based non-overlapping channels that you have available to you because of the channel width, and the increased speed and performance. Keep that in mind that even though it's been historically commented that 5GHz gives you a lot more than three non-overlapping channels- which it does historically and from a legacy point of view. When you start getting into 802.11n, and 802.11ac Wave 1 and Wave 2, and specifically Wave 2, you're going to have a reduced number of non-overlapping channels even at 5 GHz.

Capacity and coverage area are going to have a significant impact on the way that the wireless signal will propagate your environment, and can unto itself, be in such a deployment that interference is going to come from other access points that are nearby, especially if you create an environment where you're going to have some co-channel interference where you're not adhering to the non-overlapping channel rules.

You also have to consider multiple floors, believe it or not wireless signal is going to propagate through floors in an organization. As a result, the access point straight up above you and right below you on a multi-floor environment also has to accommodate for the co-channel interference possibility, which means now you have to have non-overlapping channels between the floors as well. This is why we're going to take a look at some tools a little bit later that will actually help us not only deal with seeing

what interference we have, but also helping us to eliminate the chance or the potential for co-channel interference when we deploy our wireless environment.