December 23, 2105

Marlene H. Dortch
Secretary
Federal Communications Commission
455 12th St. SW
Washington DC 20554

RE: **EX PARTE** in Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band ET Docket No. 13-49

Dear Ms. Dortch:

Cisco Systems, Inc. ("Cisco") filed an ex parte in the above-captioned docket on December 22, 2015. The attachment was inadvertently omitted from the document that was uploaded to ECFS. The correct document is now provided.

Respectfully submitted,

CISCO SYSTEMS, INC.

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that balance that Cisco seeks to place the attached mitigation in the record, and looks forward to responsive comments from the parties.

Respectfully submitted,

CISCO SYSTEMS, INC.

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Attachment

Detect and Vacate Methodology – Cisco's Current View

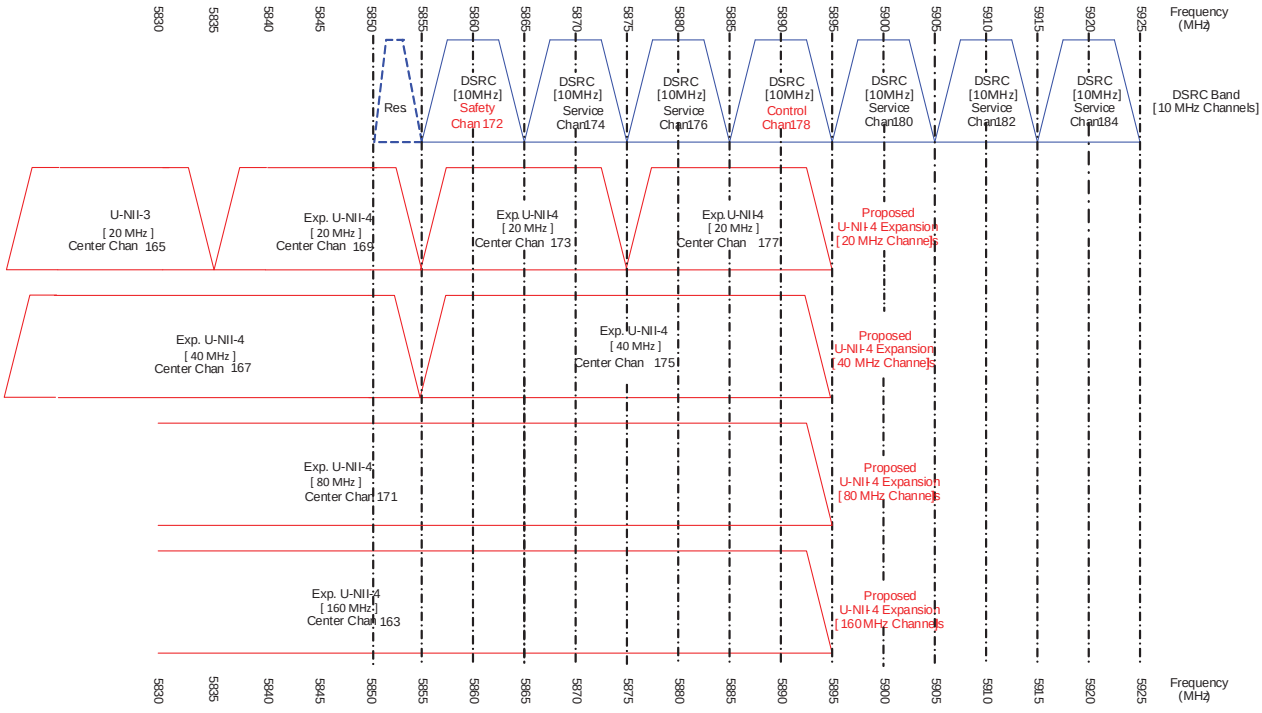
The following information represents Cisco's view of a D&V approach.

As with any problem set involving sharing of spectrum, the approach outlined here is band-specific and DSRC technology specific. It is also designed to both protect DSRC and provide an achievable means by which Wi-Fi can access spectrum in a commercially useful way. Cisco is not suggesting this sharing proposal as a "final" view, but one that would inform the next phase of development and testing. The goal is to permit as elegant and simple a solution as is possible for Wi-Fi while still protecting DSRC from interference. Accordingly, this proposal differs in certain respects from the proposal presented earlier to the IEEE Tiger Team and discussed in various industry fora. It represents Cisco's latest, best thinking on mitigation requirements for protecting DSRC.

Cisco views the 5850-5925 MHz ITS band as a band where every two seconds, everything is new again. If a U-NII-4 device sleeps or fails to communicate for two seconds, it cannot assume the other stations in the BSS are still active.

The DSRC and U-NII channel designations are shown in Figure 1.

Figure 1 DSRC and I-NII-4 channelization



The 10 MHz OFDM transmissions used in ITS are specified in IEEE 802.11-2012 clause 18, Annex D and Annex E. The clause 18 short training symbols begin each valid OFDM transmission, and U-NII-4 devices

seeking to operate in the ITS band should be required to detect DSRC short training symbols at -85 dBm in any 10 MHz channel within 5855-5895 MHz and at -65 dBm within 5895-5905 MHz.

Figure 2 10 MHz DSRC preamble

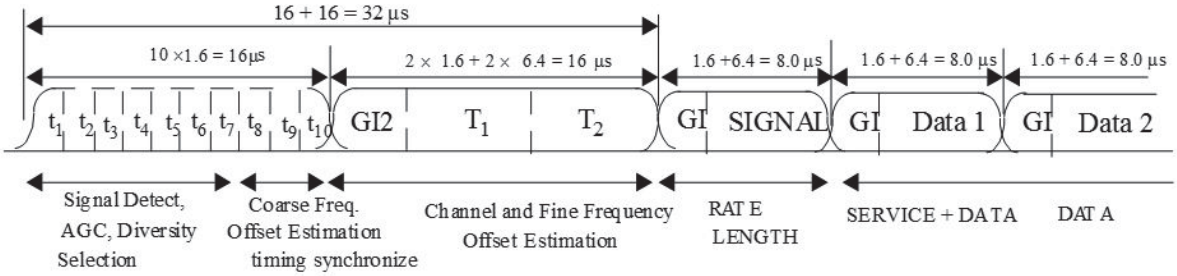


Figure 2 shows the 10 MHz OFDM training structure (PLCP preamble), where t1 to t10 denote short training symbols and T1 and T2 denote long training symbols. The total training length is 32 µs. The PLCP preamble is followed by the SIGNAL field and DATA.

U-NII-4 devices that operate in the 5850-5925 MHz ITS band shall be capable of detection of ITS transmissions in 10 MHz channels between 5855 MHz to 5905 MHz.

Cisco proposes that in addition to normal Clear Channel Assessment to determine whether the channels are idle or busy, U-NII-4 devices use four 10 MHz DSRC detectors that detect 10 MHz 802.11p transmissions on channels 172, 174, 176, 178 and at a higher threshold on channel 180 using the channel 178 DSRC Detector. Together the four 10 MHz DSRC detectors assert DSRC Not Busy (no DSRC short training field detected) or DSRC Channels Busy (five or more DSRC short training symbols detected on any one of channels 172, 174, 176, 178 and 180 within 10 microseconds). The DSRC Channels Busy remains true for one second. We call the use of these four DSRC detectors DSRC Clear Channel Assessment (DCCA), which is independent of and in addition to normal Clear Channel Assessment.

Cisco proposes that an Initial Clear Channel Assessment (ICCA) period of one millisecond be used whenever a U-NII-4 station has not successfully transmitted or received within the last two seconds, and both CCA and DCCA shall indicate channel idle and DSRC Channels Not Busy for 1 millisecond before a U-NII-4 device is allowed to transmit.

An ICCA for 1 millisecond, before an initial transmission of less than 200 microseconds is proposed, and if a unicast frame is not acknowledged within the retry limit, then a one second wait or a successful U-NII-4 frame reception is required.

After the initial transmission, normal RLAN operation continues while DSRC Channels Not Busy is true.

All U-NII-4 devices shall restrict their transmit period to 3 milliseconds or less to minimize the probability of interference to DSRC radios. After each transmit period greater than 2.2 milliseconds, an additional non-transmit period of 266 microseconds is required to afford DSRC devices the opportunity to transmit.

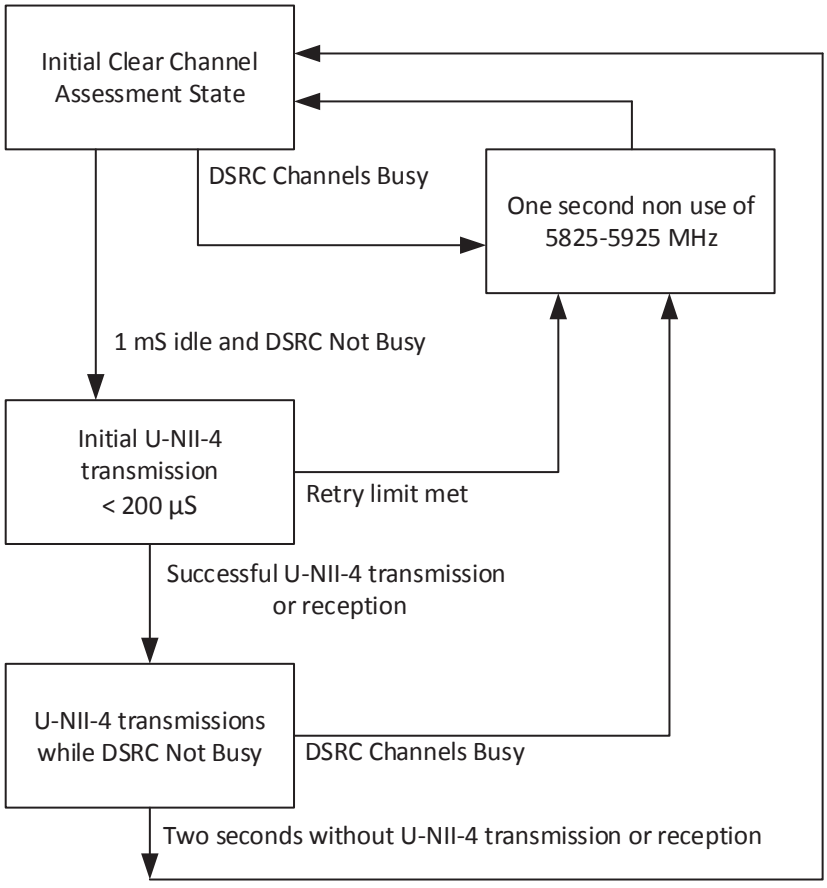
When the start of a valid DSRC transmission at a receive signal level equal to or greater than -85 dBm/10 MHz is detected in 10 MHz channels of 5855-5895 MHz, or equal to or greater than -65 dBm/10 MHz

within 5895-5905 MHz, then the U-NII-4 device shall not transmit in 5825 MHz to 5925 MHz for one second.

Stated differently, if the DSRC detectors detect DSRC transmissions on any of the 10 MHz channels up to 5905 MHz, then the U-NII-4 devices will vacate channels from 5825 MHz to 5925 MHz for one second. After two seconds without successful transmission or reception above 5825 MHz, the Initial CCA process repeats so that if continual DSRC usage is present, the U-NII-4 band and channel 165 will not be used by U-NII-4 devices.

Figure 3 shows the U-NII-4 device state machine.

Figure 3 U-NII-4 state machine



Cisco believes the approach benefits DSRC by extending protection down to 5825 MHz (an additional 25 MHz of protection compared to today). Moreover, a detection of any 10 MHz DSRC transmission below 5905 MHz means the U-NII-4 will stop transmitting in any part of the DSRC band. Finally, every U-NII-4 device (including client devices) will be listening for 802.11p DSRC transmissions before using the band.

The approach benefits Wi-Fi by allowing more channels to be available for wide bandwidth transmissions where DSRC is not present.