IEEE P802.11
Wireless LANs

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| D1 Comment Resolution, brianh, part 4 |
| Date: 2011-07-21 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Brian Hart | Cisco Systems | 170 W Tasman Dr, San Jose, CA 95134, USA |  | brianh@cisco.com |

##### Baseline is 11ac D1.0. Changes indicated by a mixture of Word track-changes and instructions. For equation changes, Latex notation is sometimes used. E.g. a\_{xyz}^b denotes axyzb

Coex CIDs addressed: 3318, 2725, 2185, 3547, 3499

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| 3318 | Rosdahl, Jon | 21.29 | 8.2.4.3.8 | If the I/G bit is set, it's not an individual address | Delete the word "individual" | Agree. See 11/1087r0 |

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| 2725 | Kneckt, Jarkko  | 21.36 | 8.2.4.3.8 | The note for the CTS frame is strange. As the note says CTS frame does not have TA, but still it may be transmitted with specific option in TA.  | Please delete the note.  | Decline. See 11/1087r0 |

Discussion: The CTS does not have a TA but is sent by the via according to TXVECTOR. The option is in the TXVECTOR thence scrambling sequence, not the TA. Note: in the changes below, the note is moved, not deleted

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| 2185 | Dehghan, Hossein | 21.36 | 8.2.4.3.8 | The note states that a CTS frame can also be transmitted with CH\_BANDWIDTH\_IN\_NON\_HT present. This is correct, but wouldn't the receiver have problems initializing the descrambler is that were done? | To be clarified | Decline. See 11/1087r0 |

Discussion: The insertion of CH\_BANDWIDTH\_IN\_NON\_HT is defined in clause 17 in such a way that the constructed scrambling sequence is a legal 11a/n or indeed 11ac scrambling sequence. Information is included by constraining the number of allowed scrambling sequences, not by changing the time evolution of any individual sequence. Thus all devices will receive this without change.

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| 3547 | Stephens, Adrian | 25.48 | 8.3.1.2 | I find it awkward that we have duplicate specification of the use of TA with I/G bit set to 1 both here and in the TA field description. Repeated specification is a bad idea because they may diverge. | Introduce a new term in the TA field description, which is the transmitters MAC address with the i/g bit set to 1. ("signalling TA"). Remove from TA field description any description of when this is used. In RTS describe that TA or signalling TA is used according to the defined condition.Can for any uses of the I/G bit =1 related to the TA field, and replace them with "signalling TA". | Agree in principle. See 11/1087r0 |

Discussion. Made the changes as requested. For clarity, changes (“writes”) to the I/G bit continue to refer explicitly to the I/G bit. Checks (“reads”) that “the I/G bit is 1” are changed to “the TA is a Signaling TA” as per commenter. Checks (“reads”) that “the I/G bit is 0” are changed to “the TA is an individual address” as per commenter. Changes affected multiple subclauses.

The descriptive language in clause 8 was moved to clause 9.7.9 and made normative, since this applies beyond just RTS/CTS. Also fixed the old language that said CTS had to include TA=1 if CTS includes chBwInNonHt.

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| 3499 | Stacey, Robert | 71.23 | 9.3.2.4.4 | Not just any group TA. A TA with the I/G bit set to 1. Should also mention that it is a non-HT or non-HT duplicate. | "A TXOP holder transmitting a non-HT or non-HT duplicate RTS with the Individual/Group bit of the TA set to 1 as part of a multiple frame transmission as described in…" | Agree in principle. See 11/1087r0 |

Discussion: Prevented this problem by adding normative language in 9.7.9.

**Change:**

**3.2 Definitions specific to IEEE 802.11**

Signaling Transmitter Address (Signaling TA): the IEEE MAC individual address of the STA that has transmitted, onto the WM, the MPDU contained in the frame body field, but with the Individual/Group bit changed to 1.

**8.2.4.3.8 TA field**

***Change the paragraph in this section as follows:***

The TA field contains an IEEE MAC address that identifies the STA that has transmitted, onto the WM, the MPDU contained in the frame body field. If the Individual/Group bit is 0, then the TA field is the individual address of the STA; otherwise the TA field is a Signaling TA.

**8.3.1.2 RTS frame format**

***Change the third paragraph as follows:***

The TA field is the address of the STA transmitting the RTS frame or a Signaling TA. The TA field is set to a Signaling TA in an RTS frame transmitted by a VHT STA in a non-HT or non-HT duplicate format PPDU to indicate that the scrambling sequence carries the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT (see 9.3.2.6a (VHT RTS procedure)). Otherwise the TA field is the address of the STA transmitting the RTS frame.

**8.3.1.3 CTS frame format**

***Change the second paragraph as follows:***

When the CTS frame follows an RTS frame, the RA field of the CTS frame is copied from the TA field of

the immediately previous RTS frame to which the CTS is a response and the Individual/Group bit in the RA

field is set to 0. When the CTS is the first frame in a frame exchange, the RA field is set to the MAC address

of the transmitter.

**9.3.2.4.4 PIFS**

- A TXOP holder transmitting an RTS with a Signaling TA within a multiple frame transmission sequence, as specified in 9.19.2.4 (Multiple frame transmission in an EDCA TXOP)

**9.3.2.6a VHT RTS procedure**

A VHT STA transmitting an RTS frame carried in non-HT or non-HT duplicate format and addressed to a

VHT STA shall set the TA field to a Signaling TA and shall set the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and CH\_BANDWIDTH to the same value. If the STA sending the RTS frame is using dynamic bandwidth operation, it shall set the TXVECTOR parameter

DYN\_BANDWIDTH\_IN\_NON\_HT to Dynamic. Otherwise, the STA shall set the TXVECTOR parameter

DYN\_BANDWIDTH\_IN\_NON\_HT to Static. A VHT STA that initiates a TXOP by transmitting an RTS with the TA field set to a Signaling TA shall not send an RTS to a non-VHT STA for the duration of the TXOP.

**9.3.2.7 CTS procedure**

***Insert the following as the first four paragraphs to this section:***

A STA that receives an RTS frame addressed to it considers the NAV in determining whether or not to respond

with CTS unless the NAV was set by a frame originating from the STA sending the RTS frame (see

9.19.2.2 (EDCA TXOPs)). Thus, in this subclause, NAV indicates idle means that the NAV count is 0 or that

the NAV count is not 0 but the MAC address in the TA field of the RTS frame with the Individual/Group bit

forced to 0 matches the saved TXOP holder MAC address.

A VHT STA that is addressed by a non-HT or not-HT duplicate RTS frame that has the TA equal to a Signaling TA and that has the RXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT equal to

Static, behaves as follows:

— If the NAV indicates idle and CCA has been idle for all secondary channels in the channel width

indicated by the RTS frame's RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT a period

PIFS prior to the start of the RTS frame, then the STA shall respond with a non-HT or non-HT duplicate

CTS frame. The CTS frame's TXVECTOR parameters CH\_BANDWIDTH and

CH\_BANDWIDTH\_IN\_NON\_HT shall be set to the same value as the RTS frame's RXVECTOR

parameter CH\_BANDWIDTH\_IN\_NON\_HT.

— Otherwise the STA shall not respond with a CTS frame.

A VHT STA that is addressed by a non-HT or non-HT duplicate RTS frame that has the TA equal to a Signaling TA and that has the RXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT equal to

Dynamic, behaves as follows:

— If the NAV indicates idle, then the STA shall respond with a non-HT or non-HT duplicate CTS

frame. The CTS frame's TXVECTOR parameters CH\_BANDWIDTH and

CH\_BANDWIDTH\_IN\_NON\_HT may be set to any channel width for which CCA on all secondary

channels has been idle PIFS prior to the start of the RTS frame and that is equal to or less than the

channel width indicated in the RTS frame's RXVECTOR parameter

CH\_BANDWIDTH\_IN\_NON\_HT.

— Otherwise the STA shall not respond with a CTS frame.

A non-VHT STA that is addressed by an RTS frame or a VHT STA that is addressed by an non-HT or non-

HT duplicate RTS frame that has the TA is an individual address or a VHT STA that is addressed

by an RTS frame in a format other than non-HT or non-HT duplicate behaves as follows:

— If the NAV indicates idle, the STA shall respond with a CTS frame.

— Otherwise, the STA shall not respond with a CTS frame.

***Change what was the first paragraph as follows:***

~~A STA that is addressed by an RTS frame shall transmit a CTS frame after a SIFS period if the NAV at the~~

~~STA receiving the RTS frame indicates that the medium is idle. If the NAV at the STA receiving the RTS~~

~~indicates the medium is not idle, that STA shall not respond to the RTS frame.~~ The RA field of the CTS frame

shall be set to the ~~value~~MAC address obtained from the TA field of the RTS frame to which this CTS frame

is a response with the Individual/Group bit in the RA field set to 0. The Duration field in the CTS frame shall

be the duration field from the received RTS frame, adjusted by subtraction of aSIFSTime and the number of

microseconds required to transmit the CTS frame at a data rate determined by the rules in 9.7 (Multirate support).

**9.7.5.6 Channel Width selection for control frames**

***Insert the following three paragraphs, note and fourth paragraph:***

A VHT STA that transmits a control frame that is not an RTS frame in a non-HT duplicate format (channel

width 40 MHz or wider), addressed to a VHT STA and eliciting a control response frame or a VHT Compressed

Beamforming frame shall set the TA field to a Signaling TA and shall set the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and CH\_BANDWIDTH to the same value. A VHT STA

that transmits a control frame that is not an RTS frame in a non-HT format (channel width 20 MHz), addressed to a VHT STA and eliciting a control response frame or a VHT Compressed Beamforming frame may set the TA field to a Signaling TA, in which case it shall set the TXVECTOR parameters CH\_BANDWIDTH\_IN\_NON\_HT and CH\_BANDWIDTH to the same value. Channel width selection rules for RTS frames are described in 9.3.2.6a (VHT RTS procedure).

A STA that sends a control frame in response to a HT or VHT format frame, shall set the TXVECTOR parameter

CH\_BANDWIDTH to indicate a channel width that is the same as the channel width indicated by the

RXVECTOR parameter CH\_BANDWIDTH for the frame eliciting the response.

A STA that sends a control frame in response to a non-HT or non-HT duplicate frame with the TA field equal toan individual address:

— Should set the TXVECTOR parameter CH\_BANDWIDTH to the same value as the RXVECTOR

parameter CH\_BANDWIDTH for the frame eliciting the response.

— Shall not set the TXVECTOR parameter CH\_BANDWIDTH to a value greater than the RXVECTOR

parameter CH\_BANDWIDTH for the frame eliciting the response.

NOTE—This rule permits an implementation that receives a non-HT duplicate frame but is not able to detect the channel

bandwidth occupied by the frame, either by design or because the frame was received over a channel bandwidth narrower

than it was transmitted, to respond with a 20 MHz PPDU.

A VHT STA that sends a control frame that is not a CTS in response to a non-HT or non-HT duplicate format

frame with the TA field equal to a Signaling TA, shall set the channel width indicated by the

TXVECTOR parameter CH\_BANDWIDTH to the same value as the channel width indicated by the RXVECTOR

parameter CH\_BANDWIDTH\_IN\_NON\_HT for the frame eliciting the response. For the channel

width selection rules for CTS sent in response to an RTS with the TA field equal

to a Signaling TA see 9.3.2.7 (CTS procedure).

***Note to reader, the baseline for 9.7.9 assumes that the resolution for CID 2600 in 11.926r0 is accepted***

**9.7.9 Channel Width in Non-HT and Non-HT Duplicate PPDUs**

A non-VHT STA shall include neither the CH\_BANDWIDTH\_IN\_NON\_HT parameter nor the DYN\_BANDWIDTH\_IN\_NON\_HT parameter in either of the Clause 17 TXVECTOR or RXVECTOR. A non-VHT STA shall not set the TA field to a Signaling TA. A VHT STA that includes the DYN\_BANDWIDTH\_IN\_NON\_HT parameter in the TXVECTOR shall also include the CH\_BANDWIDTH\_IN\_NON\_HT parameter in the TXVECTOR. A VHT STA shall include both the CH\_BANDWIDTH\_IN\_NON\_HT and DYN\_BANDWIDTH\_IN\_NON\_HT parameters in the Clause 17 RXVECTOR.

A Signaling TA shall only be included in non-HT and non-HT duplicate format PPDUs. If the TXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT is present and a control MPDU other than a CTS is being transmitted, then the TA field shall be set to a Signaling TA; otherwise, the TA field shall be set to an individual address.

NOTE—A CTS frame, which does not have a TA field, can also be transmitted with the TXVECTOR parameter

CH\_BANDWIDTH\_IN\_NON\_HT present.

**9.19.2.2 EDCA TXOPs**

***Change the last paragraph of 9.19.2.2 as follows:***

A STA shall save the TXOP holder address for the BSS in which it is associated, which is the MAC address

from the Address 2 field of the frame that initiated a frame exchange sequence except when this is a CTS

frame, in which case the TXOP holder address is the Address 1 field. If the TXOP holder address is obtained

from a control frame, the STA shall save the value with the Individual/Group bit forced to 0. If an RTS frame

is received with the RA address matching the MAC address of the STA and the MAC address in the TA field

in the RTS frame matches the saved TXOP holder address, then the STA shall send the CTS frame after SIFS,

without regard for, and without resetting, its NAV. When a STA receives a frame addressed to it that requires

an immediate response, except in the case of an RTS, it shall transmit the response independent of its NAV.

The saved TXOP holder address shall be cleared when the NAV is reset or when the NAV counts down to 0.

**9.19.2.4 Multiple frame transmission in an EDCA TXOP**

***Change 9.19.2.4 as follows:***

Multiple frames may be transmitted in an EDCA TXOP that was acquired following the rules in 9.19.2.3 (Obtaining an EDCA TXOP) if there is more than one frame pending in the primary AC for which the channel

has been acquired. However, those frames that are pending in other ACs shall not be transmitted in this EDCA

TXOP except when transmitted as part of a MU-MIMO transmission and if allowed by the rules in 9.19.2.2a

(Sharing an EDCA TXOP). If a TXOP holder has in its transmit queue an additional frame of the same primary

AC ~~as the one just transmitted~~ and the duration of transmission of that frame plus any expected acknowledgment for that frame is less than the remaining TXNAV timer value, then the ~~STA~~TXOP holder may

commence transmission of that frame a SIFS (or RIFS, underif the conditions defined in 9.3.2.4.2 (RIFS) are

met) after the completion of the immediately preceding frame exchange sequence. A STA shall not commence

the transmission of an RTS with a Signaling TA until at least PIFS time after the immediately preceding

frame exchange sequence. An HT or VHT STA that is a TXOP holder may transmit multiple MPDUs of the

same AC within an A-MPDU as long as the duration of transmission of the A-MPDU plus any expected

BlockAck response is less than the remaining TXNAV timer value.

A TXOP is obtained after a STA transmitting an initial frame successfully receives a response frame. If the

initial frame is a non-HT or non-HT duplicate RTS frame with the TA set to a Signaling TA and the TXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT set to Dynamic, the bandwidth indicated in the CH\_BANDWIDTH\_IN\_NON\_HT parameter in RXVECTOR of the response CTS frame is the

bandwidth obtained for the TXOP. In all other cases, the bandwidth indicated in the CH\_BANDWIDTH parameter in TXVECTOR of the initial frame is the bandwidth obtained for the TXOP. When a TXOP is obtained for a bandwidth that is greater than 20MHz by non-HT duplicate frame exchange, the TXOP holder

may transmit PPDUs using CH\_BANDWIDTH that are up to and including the bandwidth obtained for the

TXOP. During the TXOP, the TXOP holder shall not transmit PPDUs using CH\_BANDWIDTH greater than

the obtained bandwidth for the TXOP. If a TXOP is protected by non-HT or non-HT duplicate RTS/CTS, the

TXOP holder shall set the TXVECTOR parameter CH\_BANDWIDTHof a PPDU as follows:

— To be the same or narrower than RXVECTOR parameter CH\_BANDWIDTH\_IN\_NON\_HT of the

last received CTS frame in the same TXOP, if the RTS frame with the

TA set to a Signaling TA and the TXVECTOR parameter DYN\_BANDWIDTH\_IN\_NON\_HT set to Dynamic

has been sent by the TXOP holder in the last RTS/CTS exchange.

— Otherwise, to be the same or narrower than the TXVECTOR parameter CH\_BANDWIDTH of the

RTS frame that has been sent by the TXOP holder in the last RTS/CTS in the same TXOP.