IEEE P802.11
Wireless LANs

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| TVHT comment resolutions  |
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Abstract

This document contains the discussion of and proposed resolutions to CIDs 5942, 5943, 5944, 5945, 5946, 6222, 5949, 5950, 5951, 5952 and 5953.

### CID 5942

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5942 | 23.3.8.2 | 2612 | 52 | Change "Non-TVHT portion of VHT format preamble" to "Non-TVHT portion of VHT format in TVWS bands preamble" | See comment |



Naming of this PHY is a bit sloppy. The title of Clause 23 is “Television Very High Throughput (TVHT) PHY specification”. However, sometimes this PHY is also referred to as “VHT PPDU format in TVWS bands” (see for instance the clause describing the PPDU format (23.3.2)).

For comparison, the title of Clause 22 is “Very High Throughput (VHT) PHY specification” and the clause describing the PPDU format is called “VHT PPDU format”.

First, we need to decide on what to call this PHY. Is it “TVHT” or “VHT in TVWS bands”? Either way, the reference to “VHT format preamble” on line 52 of page 2612 is wrong.

NOTE: some clean up Clause 23 may be required to consistently use the same term to refer to the Clause 23 PHY.

**Proposed resolution: Revised.**

Refer to Clause 23 PHY as “TVHT PHY” or “TVHT format”

Change text as follows:

**23.3.8.2 Non-TVHT portion of TVHT format preamble**

### CID 5943

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5943 | 23.3.38.2.1 | 2612 | 57 | Change VHT-SIG-A to TVHT-SIG-A(also on line 59) | See comment |



The description of the Clause 23 PPDU in 23.3.2 mentions the field TVHT-SIG-A, not VHT-SIG-A:



This is the naming that should be used in Clause 23.

**Proposed resolution: Revised**

Change text as follows:

The cyclic shift value $T\_{CS}^{i\_{TX}}$ for the L-STF, L-LTF, L-SIG, and TVHT-SIG-A fields of the PPDU for transmit chain $i\_{TX}$ out of a total of $N\_{TX}$ is defined in Table 22-10 (Cyclic shift values for L-STF, L-LTF, L-SIG, and TVHT-SIG-A fields of the PPDU) with a scaling factor to account for the change in sampling clock frequency. The CSD delay values shall be multiplied by the corresponding correction values for the 6 MHz, 7 MHz, and 8 MHz channels, respectively.

### CID 5944

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5944 | 23.3.8.2.2 | 2613 | 14 | Wrong reference. Reference to (20-20) should probably be (22-20) | Correct |



The reference to Equation (20-20) is wrong, since that equation does not show the time-domain representation of L-STF and does not contain any of the parameters that are referenced:



The correct reference is (22-20) which does show the time-domain representation of L-STF and also contains the referenced parameters:



**Proposed resolution: Revised**

Change text as follows:

The time domain representation of the signal on BCU $i\_{seg}$ in transmit chain $i\_{TX}$ is specified in

Equation (22-20), where $Υ\_{k,BW}$ is replaced by $Υ\_{k,M}$ as defined in Table 23-12 (Transmission mode and Gamma subk,m) and where $N\_{SR}$ is defined in Table 23-8 (Timing-related parameters).

### CID 5945

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5945 | 23.3.8.2.2 | 2613 | 15 | In additon to the substitution of Gamma, Delta\_F in (22-20) should also be replaced with the value in Table 23-8.Similar comment for 23.3.8.2.3, 23.3.8.2.4, 23.3.8.3.4, 23.3.8.3.5 | Correct. |



After correction of the reference to Equation (20-20) (see CID 5945), the reference equation contains parameters $Υ\_{k,BW}$, $N\_{SR}$ and $Δ\_{F}$ that needs to be replaced with values that are appropriate for TVHT. $Υ\_{k,BW}$ and $N\_{SR}$ are covered, but $Δ\_{F}$ is not mentioned.

**Proposed resolution: Revised**

Change text as follows:

The time domain representation of the signal on BCU $i\_{seg}$ in transmit chain $i\_{TX}$ is specified in

Equation (22-20), where $Υ\_{k,BW}$ is replaced by $Υ\_{k,M}$ as defined in Table 23-12 (Transmission mode and Gamma subk,m) and where $N\_{SR}$ and $Δ\_{F}$ are defined in Table 23-8 (Timing-related parameters).

### CID 5946

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5946 | 23.8.3 | 2614 | 1 | Change "TVHT portion of VHT format preamble" to "TVHT portion of VHT format in TVWS bands preamble" | See comment |



Similar to CID 5942, naming of the Clause 23 PHY needs to be applied consistently.

**Proposed resolution: Revised**

Change text as follows:

**23.3.8.3 TVHT portion of TVHT format preamble**

### CID 6222

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 6222 | 23.3.9.2 | 2616 | 12 | "Transmission of HT PPDU with any number of antennas is not supported" is ambiguous (does it merely mean you can't have a million antennas?) and irrelevant (there are plenty of other things which are not supported) and confusing (it's in a subclause titled "Transmission of HT format PPDUs with more than four antennas") | Delete the referenced subclause |



This section mimics the following section in Clause 22:



This is relevant for the VHT PHY because each VHT STA is also an HT STA. However, HT format as defined in Clause 20 does not specify cyclic shift for more than four antennas. A VHT STA is allowed to transmit on more than four antennas, so this clause specifies how to apply cyclic shift in that case.

This rationale for including the section in Clause 22 probably does not apply to Clause 23. The Introduction (23.1.1) makes no mention of HT support, so there appears to be no need to talk about HT with more than four antennas.

**Proposed resolution: Accept**

Delete sub-clause 23.3.9.2.

### CID 5949

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5949 | 23.3.10.11 | 2618 | 45 | "For TVHT transmissions, the signal (...) shall be as specified in Equation (22-96)." Need to add the substitutions given in Table 23-8 + Table 23-12. | See comment |



**Proposed resolution: Revised**

Change text as follows:

For TVHT transmissions, the signal from transmit chain *iTX*, 1≤ *iTX ≤ NTX* shall be as specified in Equation (22-96), where $Υ\_{k,BW}$ is replaced by $Υ\_{k,M}$ as defined in Table 23-12 (Transmission mode and Gamma subk,m) and where $N\_{SR}$ and $Δ\_{F}$ are defined in Table 23-8 (Timing-related parameters).

### CID 5950, 5951, 5952

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5950 | 23.3.12 | 2620 | 12 | VHT-LTF should be TVHT-LTF | Correct |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5951 | 23.3.12 | 2620 | 17 | VHT-SIG-A should be TVHT-SIG-A | Correct |



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5952 | 23.3.12 | 2620 | 19 | VHT-SIG-B should be TVHT-SIG-B | Correct |



CIDs 5950, 5951 and 5952 are a couple of instances of incorrect naming of the fields in the TVHT preamble. VHT-SIG-A should be replaced with TVHT-SIG-A, VHT-LTF should be replaced with TVHT-LTF and VHT-SIG-B should be replaced with TVHT-SIG-B, as shown in the definition of the TVHT PPDU format:



**Proposed Resolution: Revised**

Change text as follows:

NOTE—The number of TVHT-LTF symbols in the NDP is determined by the SU *NSTS* field in TVHT-SIG-A.

The TVHT NDP PPDU has the following properties:

— Uses the TVHT PPDU format but without the Data field.

— Is a TVHT SU PPDU as indicated by the TVHT -SIG-A field.

— Has the data bits of the TVHT -SIG-B field set to a fixed bit pattern (see 23.3.8.3.6 (TVHT-SIG-B

definition)).

### CID 5953

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 5953 | 23.5 | 2631 | 24 | Note is probably not correct. The number of symbols (740) is obtained by dividing 20msec by 27usec. However, 27usec is the short GI symbol length for 6/7 MHz, while the note uses 32 MHz for calculation of the number of bytes (20.25 usec sumbol duration). Also, this calculation makes no provisions for the preamble length. | Correct |



Let’s try reconstruct the calculation that leads to the value of 1,065,600 bytes:

* aPPDUMaxTime = 20 msec
* short GI data symbol = 27 usec when using 6 or 7 MHz
* max # symbols = floor(20e-3/27e-6) = 740
* MCS 9 for TVHT\_MODE\_4C and TVHT\_MODE\_4N, NSS = 4 carries 11520 data bits per symbols
* Hence: 740 x 11520/8 = 1,065,600 bytes

The problems with this calculation are:

1. The number of symbols is calculated for 6MHz channel width, while the number of bits carried per symbol is calculated using 32 MHz channel width (4 x 8 MHz)
2. Overhead due to preamble is not subtracted

Instead, the following calculation should be used:

Assume 20.25 usec symbol duration (8 MHz) and 4 streams:

* Preamble length is 292.5 usec
* Max data field length is 20000-292.5 = 19707.5 usec, i.e. 973 (short) data symbols
* The maximum number of data bits per symbol is 11520 (8 MHz, TVHT\_MODE\_4C and TVHT\_MODE\_4N)

Therefore, the maximum number of bytes that can be carried in the data field of a TVHT PPDU is:

973\*11520/8 = 1 401 120 bytes.

**Proposed resolution: Revised**

Change text as follows:

|  |  |
| --- | --- |
| **Characteristics** | **Value** |
| aSlotTime | 24 μs (BCUs: 6 MHz or 7 MHz)20 μs (BCUs: 8 MHz) |
| aSIFSTime | 120 μs (BCUs: 6 MHz or 7 MHz)90 μs (BCUs: 8 MHz) |
| aSignalExtension | 0 μs |
| aCCATime | < 15 μs (6 MHz or 7 MHz)< 11.25 μs (8 MHz) |
| aCCAMidTime | < 94 μs (6 MHz or 7 MHz)< 70 μs (8 MHz) |
| aAirPropagationTime | 3 μs |
| aPPDUMaxTime | 20 ms |
| aPSDUMaxLength | 1 401 120 octets (see NOTE) |
| NOTE—This is the maximum length in octets for SU PPDUs with a bandwidth of 32 MHz or 16+16MHz, MCS9 and 4 spatial streams, limited by 973 possible Short GI data symbols in aPPDUMaxTime. |