IEEE P802.11  
Wireless LANs

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| Proposed Comment Resolutions | | | | |
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Abstract

Submission for P802.11af draft text. This document contains proposed resolutions for comments

3072,3073,3086

The baseline of this text is P802.11af\_D4

## Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGaf Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGaf Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

***TGaf Editor: Editing instructions preceded by “TGaf Editor” are instructions to the TGaf editor to modify existing material in the TGaf draft. As a result of adopting the changes, the TGaf editor will execute the instructions rather than copy them to the TGaf Draft.***

The editing instructions are shown in ***bold italic***. Four editing instructions are used: ***change, delete, insert, and replace***. Change is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editorial notes will not be carried over into future editions because the changes will be incorporated into the base standard.

**Relevant comments and discussion**

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| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Proposed resolution** |
| 3072 |  | GENERAL | I disagree strongly with the LB189 comment resolutions rejecting comments 459,460,583,585,588,593,594,595,596,606,732,735,736,760,761,766,841,842, and 846. And also LB192 comments 2045-2051, 2053, 2054, 2057, 2059-2063. The justification for rejecting these comments is based on "We don't see the need/benefit for multiple MCS at this point. See multiple MCS discussion in 802.11-12/1337r2." Close scrutiny of 12/1337r2 indicates a fundamental misunderstanding of the TVWS environment with respect to the magnitude of the SNR differences among TVWS channels authorized for unlicensed use near DTV transmitting stations. Page 11 of 12/1337r2 states "For channels with around 12dB difference in SNR there could be some potential gain of up to 20% at best but such high SNR discrepancy is less likely." The table on Page 11 which presents a simplified analysis of the throughput gains when using independent MCSclearly shows that for 12dB difference (the last two rows in the table) the gain can be as high as 50%, and not limited to 20% as stated in the quoted text above. Furthermore the the statement that "such high (12dB) SNR discrepancy is less likely" indicates a basic misunderstanding of the highly varied SNR levels currently observable in the TVWS. InterDigital has presented 3 different engineering simulation studies (12/0924r0, 12/0924r1, and 13/0129r0) which examine realistic TVWS SNR conditions near DTV transmitters. Chart 5 of 12/0924r0 indicates the analysis which concludes that SNR variance across TVWS channels may be as high as 35dB. SNR variances of 12 dB and higher will be quite common in all urban areas surrounding DTV transmitters. The statement in 12/1337r2 that "such high (12dB) SNR discrepancy is less likely" is clearly wrong, and leads to the objectionable conclusion that the listed LB189 comments should be rejected. InterDigital's detailed simulation studies (p11 of 13/0129r0) do indicate that for very low SNR variances (less than 4-6dB) there is no significant gain when using independent MCS for each TVWS channel. Furthermore for very high SNR levels (as shown on p9 in each of the 3 IDCC contributions) for free space radio ranges of less than 70m, there is no significant gain for independent MCS. However for all SNR variance greater than 6dB (which includes all urban areas), and for radio ranges greater than 70m (free space path loss) , using independent MCS provides maximum throughput gains of 80-90% with average gains of 40-50%. Under these conditions, the throughput gains show in the simulations are very significant. The 11AF draft should include an optional mode which permits independent MCS selection for each TVWS channel when operating on multiple TVWS channels. The 11af decision to base its new TVWS standard on 11ac is an expedient decision to promote early adoption of TVWS products, but basing 11af on 11ac EXCLUSIVELY is a shortsighted and arbitrary decision which will limit the applicability of the 11AF standard in the long run. | 11AF ammendment needs to specify an option to permit use of independent MCS values for each available TV channel when multiple TV channels used. | Rejected. |
| 3073 | 51.49 | 8.4.2.164 | This is rejected comment LB189CID736 and also LB192CID2050: Table 23-38: Single TXPWR\_LEVEL and single MCS is not sufficient for TVWS operation. Individual power levels for each TVWS channel for multi-channel waveforms should be supported  . | FCC rules define depending on the combination of gelocation and channel location, the TX power in an aggregated TVHT waveform must be varied from one TV subchannel to the nest subchannel. Single TxPOW Level would not be sufficient. The VHT Transmit Power Envelope is not sufficent to enable a different local maximum power for each separte TV channel use in the aggregated TVHT waveform. The VHT Transmit Power Envelope sets a SINGLE local maximum power for the sum of all TV channels used, and cannot specify a lower maximum power for a single TV channel (subchannel of the aggregate waveform) even if required by regulation. | Rejected.  . |
| 3086 |  |  | I disagree with the LB192 comment resolutions that rejected comments 2065, 2066, 2067, 2068, and related resolutions from LB189 that rejected comments 841, 842, and 846. The statement made in 802.11-13-0298r0 that "...the continuing regulatory issues in regards to TVWS and the uncertainty concerning the availability of channels in urban areas make the issue of adding additional modes to the design much less appealing at this point." while interesting and poses a question of the usefulness of the 802.11af amendment in toto, it does not in my opinion justify rejecting these comments. In my opinion in order for the 802.11af amendment to provide useful throughput efficient channel aggregation is an essential feature. Given the challenges of the TVWS bands and coexistence restrictions in these bands, the flexibility of independent MCS would yield significant benefits, as outlined in several contributions: 12/0924r0, 12/0924r1, and 13/0129r0. Lastly, I would like to thank the creator of the resolution for explaining that the gain showed in their table was only 20% and not 50%. But, as provided in the three contributions listed above, using independent MCS will provide for all SNR variance greater than 6dB (which In my view includes all urban areas), and for free space radio ranges greater than 70m maximum throughput gains of 80-90% with average gains of 40-50%. So for case of urban deployment and free space radio ranges greater than 70m, the throughput gains are significant and in my view these two deployment scenarios are critical to the success of the 802.11af standard. | The 802.11af amendment should include a mode that permits independent MCS selection for each TVWS channel when operating on multiple TVWS channels. The related clause number and pages are noted in the following previous comments from LB189 (841,842,846) and LB192 (2065, 2066, 2067,2068).  . | Rejected. |

**Multiple MCS Discussion:**

This is a resubmission of rejected comments on allowing different MCS to be used in modes that use multiple channels (e.g. W+W).

We note that although nothing changed from a pure technical point of view, the continuing regulatory issues in regards to TVWS and the uncertainty concerning the availability of channels in urban areas make the issue of adding additional modes to the design much less appealing at this point. It is unclear what channels, at what transmit powers and what interference levels will remain available after next year proposed auction.

We also note that according to OFCOM rules, transmission on multiple channels shall not use a sum power higher than the minimum allowed on those channels, hence reducing the appeal of unequal power allocation or unequal MCS.

We further would like to repeat our previous argument about 11ac doing away with unequal MCS for closed loop MIMO transmissions (a mode that existed in 11n).

As far as the comment referring our table, we would like to correct a misunderstanding – the potential gains are 20% and not 50% because the transmission mode will be chosen as the best one out of the three shown in the table using link adaptation. In other words, when the SNR difference between two channels is as high as 12dB, it may sometime be better to only use the best channel only and some times both channels.

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| Two MCS on two Channels | Tput Gain over min MCS +1 |  |  |
| QPSK, 16QAM (coding ½) | 0% |  |  |
| QPSK, 16QAM (coding ¾) | 12.5% |  |  |
| 16QAM,64QAM (coding ¾) | -6.5% |  |  |
| 64QAM, 256QAM (coding ¾) | 5% |  |  |
| 64QAM, 256QAM (coding 5/6) | -2.8% |  |  |
|  | Tput Gain over max MCS over **one channel** | Tput Gain over next higher MCS relative to min  **Two channels** | Tput Gain over next second higher MCS relative to min |
| QPSK,64QAM (coding ¾) | 20% | 50% | 0% |
| 16QAM, 256QAM (coding ¾) | 35% | 12.5% | 0% |
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