IEEE P802.11
Wireless LANs

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| IEEE 802.11bd Task Group Meeting Minutes – July 2019 |
| Date: 2019-07-18 |
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Abstract

This document includes minutes of all IEEE 802.11bd meetings from the week of July 15, 2019:

Monday AM1 Task Group ad-hoc

Tuesday AM1 PHY ad-hoc

Tuesday AM1 MAC ad-hoc

Wednesday and Thursday Task Group meetings.



The secretary would like to thank Hongyuan for taking minutes during the PHY Ad-Hoc and Joseph for taking minutes during the PHY Ad-Hoc.

**Minutes**

**Monday AM1 TGbd Ad-hoc**

1. Chair convened the meeting at 8:00am. Approx. 50 participants in the room.
2. Agenda displayed is 802.11-19/0985r2.
3. Chair welcomed the members and introduced the task group leadership.
4. Chair read patent policy slides and called for potentially essential patents.
5. No response to the call for patents.
6. Chair read rules and procedures slides.
7. **Agenda**
	1. Chair presented the agenda 802.11-19/0985r2
	2. Discussion on the agenda
	3. No discussion
	4. Agenda is accepted by unanimous consent.
8. **FRD and SRD update (Bahar Sedeghi)**
	1. Presentation 802.11-19/0497r2
	2. Presenter showed latest version of the SFD and highlighted changes
	3. Question about when this was posted
	4. The latest version was posted several weeks ago in June
	5. Chair mentions that there will be a motion to accept the FRD and SFD documents on Wednesday AM1 session
9. **MAC and PHY Ad-hocs**
	1. Volunteers to run the adhoc meetings separately Tuesday AM1 will be:
		1. PHY Ad hoc: Bo Sun, Hongyuan Zhang
		2. MAC Ad hoc: James Lepp, Joseph Levy
	2. Chair read through the list of presentations in the agenda and members identified them as MAC, PHY or TG (for full task group). These are being noted in the agenda on screen and will be posted in the next revision of document 802.11-19/0985.
10. **Technical Presentations**
	1. **Presentation 802.11-19/1055r0**
		1. Discussion:
		2. Question about how gain is shown for legacy 11p device. Response is that the packet is sent twice, so the probability of missing both is less than it was when only one is sent. Also packet reception rate is calculated at the MAC layer.
		3. Question about coexistence for 802.11p-only devices trying to use the channel when these 11bd repetitions are being sent. Response that these time gaps will need to be defined by upper layer application standards (SAE/1609/ITS-G5/C2C-CC) and designed to let emergency messages to be transmitted with higher prioity.
		4. Question whether this is for broadcast channel or other channels in DSRC channel plan. Response that its not necessarily limited, but has been designed with broadcast safety channel in mind.
		5. Comment that choosing the right gap may be hard to design, taking into account safety vs latency. Suggestion to analyse latency. Response that they have simulated up to 60% channel load with no latency issue, more simulations are in progress at system/network level.
		6. Comment about whether this proposal meets the 3db lower sensitivity level written in the PAR.
		7. Comment about using the same scrambler for the repetition.
		8. Receiver only needs to store and combine repetition for frame where the CRC check fails.
		9. Question about adding intelligence for the application to decide whether to transmit repetitions based on the application or size of the message as this can vary from 100 bytes to 1000 bytes.
		10. Comment on reliability of preamble. After 3 repetitions there is no gain, after that you are basically protecting the payload more than the preamble and its of no use.
		11. Comment on 802.15.4g which has a mode called a dieing gasp where the sensor sends the same message 4 times in a row. So it does make sense to make the scheme for repetitions is tied to the application. Save the most information for the most valuable messages.
		12. Question about different channel models. This was run with different channel models, not all included to keep the presentation simple. Even in highway NLOS, gain was seen there, can share the simulation data.
		13. Question about using CBR to choose to repeat transmission or not. Response that devices already calculate it, so that number is available. Could use another metric, but this one is readily available in devices today.
		14. Strawpoll displayed
			1. Discussion: not limited to 11p or 11bd PPDU, though an intended benefit is the backwards compatibility. Text adjusted in the strawpoll.
			2. Strawpoll not run, presenter will modify text to match style of other FRD and present in a later session this week.
	2. **Presentation 802.11-19/0808r0**
		1. Discussion
		2. Questions about whether extra information transmitted beyond just an indicater of NGV capability appended to an 802.11p transmission is necessary.
		3. Comment that this extra information is useful, and resolves an ambiguity.
		4. Question about the multiple hop issue, not convinced that the 11p fallback will propogate multiple hops.
		5. Comment that this is something that the higher layer decides.
		6. Comment about an SAE group talking about multi-hop, proxy or relaying of messages. Suggest to involve them in the discussion.
		7. The mechnisms presented are to give that upper layer more information than the binary capability indication.
		8. Strawpoll 1
			1. Do you agree that the additional information (e.g. hop cound, received signal strength) is needed in 11p PPDU transmitted by 11bd devices?
			2. Y:6/N:4/A:many
	3. **Presentation 802.11-19/0788r0**
		1. Presentation was given, but ran out of time and will continue at the PHY ad-hoc tomorrow AM1.

Chair adjourned the Ad-hoc session at 10:01am

**Tuesday AM1 PHY Ad-hoc**

1. **Meeting called to order by Bo Sun (ZTE)**
	1. The agenda is contained in 11-19/1288r0 which is on the server.
		1. No aware of essential patent claims from the floor

**Technical Presenations**

**1.1**

**11-19-0788-00-00bd-considerations-on-ranging-in-ngv (continue from TGbd meeting on Monday)**

**Stephan Sand (German Aerospace Center (DLR))**

**Discussions:**

Q: does it require beam steering tech in automotive environment?

A: fixed antenna in trains, could use additional antennas

SP: Do you agree to add that 802.11bd in the 5.9 GHz band supports round-trip-delay (RTD) ranging for 10 MHz and 20 MHz bandwidth PPDUs?

Y17N0A2

SP: Do you agree to add that 802.11bd in the 60 GHz band supports round-trip-delay (RTD) ranging for TBD Hz bandwidth PPDUs?

Q: no 60GHz PHY so far, this SP should be based on 60GHz PHY

A: can defer this SP.

SP Deferred

**1.2**

**11-19-0774-01-00bd-modulation-scheme-for-11bd-range-extension-update**

**Jianhan Liu (Mediatek)**

**Discussions:**

SP: Do you agree to include the following BPSK DCM modulation scheme in the section 3 of 11bd SFD for achieving lower sensitivity?

 For a BPSK DCM modulated OFDM symbol, the subcarriers in the second frequency segment is modulated by the rotated version of the signal modulated on the corresponding DCM subcarrier in the first frequency segment



Where NSD is defined for DCM which is half of

Q: why only BPSK, but not DCM in general (for other QAMs)

A: to meet the 3dB range extension

Y19N0A3

**1.3**

**11-19-0859-00-00bd-ranging-performance-in-11bd**

**Qinghua Li (Intel)**

**Discussions:**

Q: TGnF 5th path is the strongest.

A: will need special algorithm to handle NLOS

Q: reference for TGnF, any experiment to get the model

A: TGn time there was the measurement compaign.

**1.4**

**11-19-1070-00-00bd-NGV-MIMO-Simulations**

**Rui Cao (Marvell)**

**Discussions:**

Q: how about STBC

A: may consider later

Q: why odd number periodicity.

A: happened to be good numbers

Q: two antenna placements need investigations. For example, 2 antennas are with very different RSSI.

A: simulated collocated case, and we propose 2ss as optional feature.

Q: modulation and coding rates in simulations?

A: BPSK up to 256QAM

SP1: Do you agree to add the following text into Section 3 of SFD?

* + “11bd STA may support two spatial streams for unicast transmissions.”

Q: how about broadcast case?

A: Tx has no Rx antenna config information.

Y10N0A7

**1.5**

**11-19-1071-01-00bd-ngv-frame-format-discussion**

**Rui Cao (Marvell)**

**Discussions:**

Q: What is definition of ER preamble

A: Only one preamble format, no diff between ER and normal preambles.

SP1: Do you agree to add the following text into Section 3 of SFD?

* + “11bd PHY shall support only one PPDU format”

Q: what does “for each bandwidth” mean?

A: delete this sentence.

Q: with power boost it may not be one PPDU format for ER and regular rates

A: power boost is transparent to Rx.

Q: excluding 11p PPDU format?

A: This is for 11bd standard not for 11bd device, which support both 11bd and 11p PPDU formats.

Y12N2A4

SP2: Do you agree to add the following text into Section 3 of SFD?

* + “The preamble of 11bd PPDU shall include repeated LSIG symbol after LSIG.”

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**(ran out of time, defer to next TG session)**

SP3: Do you agree to add the following text into Section 3 of SFD?

* + “11bd PPDU shall boost L-STF by x1dB, with x1 value TBD.”
	+ “11bd PPDU shall boost L-LTF by x2dB, with x2 value TBD.”

**(ran out of time, defer to next TG session)**

Chair adjourned the ad-hoc session at 10:00am

**Tuesday AM1 MAC Ad-hoc**

1. Chair convened the meeting at 8:00am. Approx. 25 participants in the room.
2. **Agenda**
	1. Chair presented the agenda 802.11-19/1280r0
	2. Chair reviewed slides 5-9
		1. Chair called for patents, no response
		2. Chair called for questions – there were none.
	3. Discussion on the agenda
		1. No discussion
		2. Agenda is accepted by unanimous consent.
3. **Technical Presentations**
	1. [**11-19/0809**](https://mentor.ieee.org/802.11/dcn/19/11-19-0809-01-00bd-channel-usage-in-ngv-follow-up.pptx) **- Channel usage in NGV: follow-up – Hanseul Hong (Yonsei Univ.)**
		1. Discussion
			1. Questions:

Q - Is this without upper layer management?
Ans – There was no upper layer congestion management.

* + - 1. Straw Polls:

**Do you agree to add the following text in Section 2.1 of Functional Requirements Document?**

The 802.11bd amendment shall provide at least one mode of channel access that reduces collision probability under congested communication environment compared to IEEE Std 802.11™-2016 operating in 5.9 GHz band
C - There is no concrete text here.

C - There is nothing proposed here.

Ans - We are just trying to say we need a solution. We are saying we need to meet this requirement.

C – Suggestion to remove the mechanism.

Modified straw poll proposed:

C – I think we need more information than this. In the requirement document. We can define what we want as a requirement – I need more information to make a decision.

C - What type of information do you want.

Ans - More information about the mode.

**Revised Straw Poll:**
The 802.11bd amendment shall provide at least one mode of channel access that provides improved transmission reliability under congested communication environment compared to IEEE Std 802.11™-2016 operating in 5.9 GHz band.

**Y/N/A: 6/2/6**

* 1. [**11-19/1076r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1076-00-00bd-medium-access-with-20mhz-bw.pptx) **Liwen Chu (Marvell) presented – not uploaded due to Mentor issues – will be** uploaded as soon as possible – no objection to presenting without uploading.
		1. Discussion

Q - slide 4 – 20 MHz STA – on the secondary – what information is used to update the MAC?
Ans – The duration in the MAC header – will be based on SIFS – is based on the STA operation

Q – slide 5 – the STA takes use PIFS or longer?
Ans – longer – you have the PPDU and frame decoding – it is not just PIFS
Q – is it ED or PD?
Ans – Decoding the header, we may decide a lower CCA.
Q - What is the difference between Method 2 and 3

Ans – In method 3 you have two back-off counters – so you have guarantee fairness.
Q – If you require two PHY and MAC counters, we have a concern with this and think we should consider all possible solutions.
Q – Method 3 has two back-off counters, but you only wait for one of the counters to go to zero – why are you considering the minimal / first only? And not the maximal.
Ans – If you have two back off counters – if you wait you have the chance the other channel becoming busy.

Additional discussion on fairness number of back-off counters and how they are used, no conclusion was reached as to what is preferred – more discussion is required.

* 1. **Presentation** [**11-19/1105r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1105-00-00bd-study-on-20mhz-channel-access-schemes.pptx) **– Hanseul Hong (Yonsei University)**
		1. Discussion

Q - What is the sensitivity you set?

Ans – the sensitivity -82dBm -we didn’t consider anything other than fairness.

Q – On slide 7 do you count down on each band?

Ans – We look to count down on both channels.

Q - The countdown will be chosen randomly. So, do you decrease both?

Q – Are you saying there are scenarios where you would allow only 10 MHz and others where you allow only 20 MHz so this will only happen in some cases.

Ans – We have AIFS on both channels, therefore we have better fairness.

C – The upper layers will tell you which channels should be used for what service. We should allow the upper layer to make the decision as to if these are 20 MHz only channels or not.

Ans – We agree this this approach

* + 1. Straw poll:

**Do you agree to consider only 20MHz channel transmission due to problems (e.g., heavy traffic load increment on WBSS primary channel and/or strong adjacent channel interference) with 10MHz fallback?**

Discussion – Concluding, this is about the allowable modes of operation that can be controlled by the higher layers.
Concern was expressed that we need to make decisions.
Concern was also expressed that we should define the 10 or 20 channel access – but not define when they are used.

Straw Poll results: y/n/a: 8/4/1

* + 1. Straw poll:

 **Do you agree with followings?** In order to consider the fairness and performance of 20MHz channel access, more investigation of the various 20MHz channel access schemes is required.
Poll is withdrawn – as we all agreed that this is being discussed.

* 1. **Presentation** [**11-19/1156r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1156-00-00bd-20mhz-channel-usage-options.pptx) **- Onn Haran (Autotalks)**
		1. Discussion

C - For -72 dBm as it is now – we need two NAV protections for each 10 MHz channel

C 2 NAVs is too complex

Ans – we need to understand if we can do -82 dBm – because this hasn’t been done for the mobile 10 MHz channel. I think the goal is to have the 20 MHz were possible.

Q – On slide 6 – does the receiver receive the 10 MHz transmissions

Ans – We assume the receiver is receiving 20 MHz only and can therefore ignore all 10 MHz transmissions – except for the headers / NAV setting.

C – Maybe we should consider energy levels – if the field is wrong due to detection. – you decode the duration from the packet - -

* + 1. Straw Poll: withdrawn
	1. **Presentation** [**11-19/1103r0**](https://mentor.ieee.org/802.11/dcn/19/11-19-1103-00-00bd-20mhz-channel-access-in-11bd-follow-up.pptx) **– Insun Jang (LG Electronics)**
		1. Discussion

Q – how do you think you can meet the sensitivity of these channels, -85 dBm? How is this sensitivity achieved? Does this require ant another receiver or an additional correlator in V2V channels? Is this an obtainable sensitivity?
Ans – We assume we can meet this on the primary channel.

C – but this means you need a full receiver and not a correlator, can we do this?

Ans – We just focussed on the fairness, we did not focus on if it is possible or not.

* + 1. Straw Poll:

**Do you agree to add the following text into 11bd SFD?**- The transmission of 10MHz PPDU shall be supported in a 20MHz channel
- A 20MHz channel in 11bd consists of a 10MHz OCB primary channel and a 10MHz

* OCB secondary channel OCB primary channel means a 10MHz channel for an 11bd STA to contend, i.e., perform EDCA
* OCB secondary channel means a 10MHz channel for an 11bd STAs to form the 20MHz channel with OCB primary channel.
* An 11bd STA sets OCB primary channel and OCB secondary channel upon request from upper layer

There was some discussion on the poll. We have asked this question –

Straw Poll results: y/n/a: 3/4/5

1. Chair adjourned the ad-hoc session at 10:00am

**Wednesday AM1**

1. Chair convened the meeting at 8:00am. Approx. 40 participants in the room.
	1. Agenda displayed is 802.11-19/0985r4
	2. Chair reminded members to record their attendance
	3. Chair went through the meeting policy slides
	4. Chair welcomed the members and introduced the task group leadership.
	5. Chair called for potentially essential patents
	6. No response
	7. Overview of the agenda for the week
	8. No objections to adopt the agenda

**Minutes**

1. Motion: Approve the TGbd minutes for the May meeting and TCs before Jul meeting as below: <https://mentor.ieee.org/802.11/dcn/19/11-19-0890-00-00bd-tgbd-may-2019-meeting-minutes.docx> <https://mentor.ieee.org/802.11/dcn/19/11-19-1033-02-00bd-tgbd-june-july-2019-teleconference-minutes.docx>

Moved Qinghua Li

Seconded James Lepp

Approved unanimously

**Appointments**

1. Motion: Approve the appointment of PHY/MAC Adhoc Co-chairs as below:

-Qinghua Li/Hongyuan Zhang as PHY Adhoc Co-chairs

-James Lepp/Joseph Levy as MAC Adhoc Co-chairs

Motion passes unanimously

**Liason Update**

1. Presentation 802.11-19/1295r0
	1. John Kenney is not attending the meeting this week, so Michael Montemurro has been asked to present this document from IEEE 1609 WG.
	2. Two requests: First is a request for 802.11 to define a MAC Services interface. Second is to continue discussion between 802.11bd and 1609 regarding control interfaces and any PHY changes that may affect backwards compatibility.
	3. No other new liaisons this week. We do have some old liaisons that haven’t had responses. Group is contribution driven, so members can bring proposals to send liaisons.

**Technical Presentations**

1. **Presentation 802.11-19/01071r1**
	1. This presentation is a continuation of this discussion on this document from the 802.11bd PHY Ad-hoc meeting yesterday. Presenter has started with slide #17 titled Straw Poll 3.
	2. Discussion:
		1. Comment that any value used will be within regulatory constraints
		2. Comment about power boost changing the preamble detect sensitivity level which could affect fairness compared to legacy (non-boosted) transmissions.
		3. Discussion of bigger coverage (comparing 11bd and 11p) not being an unfair advantage, but is a design goal and feature of 11bd.
		4. Comment that power amplifiers in devices today may already be at their limit, unsure if its feasible to boost much power at high temperature. Suggest getting more feedback from power amplifier developers
		5. Comment that an equivalent definition of this is that you de-boost the data portion of the PPDU compared to the preamble.
		6. Comment that regulation is not power per symbol, but the mean power over the transmission
		7. Comment that if you boost L-STF and L-LTF, why not just boost the data power too? Suggestion to look closer on the regulatory rules.
		8. Comment that regulations are average power of the whole packet. OFDM today already has many power peaks. Suggests this also fixes some hidden node problems. PAPR is already optimized for the preamble when compared with the data portion. Suggestion that there is amplifier margin to boost the preamble
		9. Comment that we need to check the emmissions mask for a boosted preamble – is the mask peak or average?
		10. Comment that strawpoll has “x” db so the exact power limits need further study to decide the exact values.
		11. Concern about AGC gain
		12. Comment that receiver needs to know if there was a boost because it may make incorrect assumptions about the channel leading to incorrect values in the decoder.
		13. Strawpoll 4: Do you agree to add the following text into Section 3 of SFD? “11bd PDU shall boost L-STF and L-LLTF for BPSK and BPSK with DCM.”
		14. Comment about boosting 11p PPDU. Response that 11p can be boosted, but for that frame format L-SIG is the bottleneck. Benefits for 11bd are more than that.
		15. Y13/N1/A12
		16. Strawpoll 3: Do you agree to add the following text into Section 3 of SFD? “11bd PPDU shall boost L-STF by x1dB, with x1 value TBD. 11bd PPDU shall boost the L-LTF by x2dB, with x2 value TBD”
		17. Y11/N1/A17
2. **Task group document motions** (adoption of Functional Requirments Document)
	1. The versions were presented on Monday in the Ad-hoc session. No comments were received, one typo was corrected and uploaded as 497r2.
	2. Motion: “Approve the updated SFD document as in 11-19/0497r2”
	3. Move: Bahar Sadeghi
	4. Second: Jianhan Liu
	5. Motion passes unanumously

**Technical Presentations**

* 1. **Presentation 802.11-19/0840r0**
	2. Discussion:
		1. Comment on packet error rate for 60GHz transmission.
		2. Question about transmission power level and radio coverage range for 60GHz.
		3. Strawpoll 1
		4. Do you agree to adopt the text changed on “4 Infrastructure Applications” proposed in slide 7 to 11-18/1323r02 NGV SG Use Cases?
		5. Comment that range of 60GHz is too short distance for the V2I use case
		6. Comment that this slide isn’t limited to that oneband
		7. Y18/N0/A16
		8. Strawpoll 2
		9. Do you agree to add the V2V See-through” use case on slide 14 to 11018/1323r02 NGV SG Use Cases.
		10. Comment that it would be good to support this use case in any band, disagree with the target performance numbers on this slide – specifically >1Gbps.
		11. Opt1: yes keeping target performance “>1 Gbps max data rate” 8
		12. Opt2: yes with removing target performance “>1 Gbps max data rate” 9
		13. Opt3: no 1
		14. Opt4: abstain 13
	3. **Presentation 802.11-19/1055r1**
		1. Continuation of presentation on Monday and strawpoll
		2. Strawpoll: Do you agree to add the following text into Section 3 of SFD? “11bd shall support adaptive repetition of PPDU in broadcast mode. The number of repetitions shall be determined by the upper layers and could be combined with boosted L-STF, L-LTF.”
		3. Comment about communication range of 11p already supports communication range, issue is with hidden nodes and this proposal doesn’t solve hidden nodes.
		4. Presenter disagrees. The PAR asks for extended range, and this proposal addresses that.
		5. Comment that this is about chase combining which is also being discussed in 802.11be. Because its broadcast mode not sure if receiver has this capability.
		6. Presenter shows slide 11 showing gain for legacy device, existing commercial hardware. So this provides gain even without special new receiver behavior
		7. Comment about 20MHz vs 10MHz
		8. Comment that this proposal is in line with the strategy to not disrupt the existing market for 802.11p. Don’t see how switch to 20MHz works with this.
		9. Comment of support
		10. Y12/N4/A12
1. Chair recessed at 10:03am

**Thursday AM1**

1. Chair convened the meeting at 8:00pm. Approx. 60 participants in the room.
2. Agenda displayed is 802.11-19/0985r4
3. Chair introduced the task group leadership
4. Chair presented IEEE 802 policies and procedures and called for potentially essential patents
5. No response to the call for patents.
6. Two presentations added to the agenda.
7. Order for today’s AM1 session is 1071, 1153, 1108, 1324, then proceed in order

**Technical Presentations**

* 1. **Presentation 802.11-19/1071r2**
		1. Presentation continued from last session
		2. Straw Poll 2
		3. Do you agree to add the following text into Section 3 of SFD? : The preamble of 11bd PPDU shall include repeated LSIG symbol after LSIG”
		4. 12Y/0N/11A
	2. **Presentation 802.11-19/1153r0**
		1. Discussion
		2. Question about MRC and multi-antenna
		3. Comment that it might be possible to combine the DCM bit with the MCS bits.
		4. Response intention of this list is to show that the total number of bits would fit in one OFDM symbol, not an exact list of bits
		5. Comment that the 3dB improvement in preamble is good, but we should go for more. In particular, the duration field should be very robust. Helps with hidden node, and helps more stations use PD instead of ED.
		6. Comment to keep in mind efficiency of the system when adding all the robustness ensure its not at the cost of efficiency, particularly since the application sends short 300-800 byte frames.
	3. **Presentation 802.11-19/1108r1**
		1. Discussion
		2. Question about rotated-BPSK vs BPSK. A repeated L-SIG but rotated 90 degrees. Provides the same reliability, but also adds early detection of 11bd.
		3. Response: concerned about reliability. Prefers to use same modulation.
		4. Comment about DCM vs BPSK
		5. Comment that this proposal isn’t in conflict with using DCM
		6. Strawpoll
			1. “Do you agree that the rate field in L-SIG of 11bd PPDU shall be set to the value of 3Mbps”
			2. Y14/N0/A14
			3. “Do you agree that NGV-SIG symbol(s) is located right after the RL-SIG symbol in 11bd PPDU”
			4. Y12/N0/A15
	4. **Presentation 802.11-19/1243r0**
		1. Discussion
		2. Straw Poll discussion
		3. Discussion about what “one receiver” means.
		4. Discussion about what “receiver complexity” means
		5. Concern that wording about “identical receiver sensitivity” is too precise and excludes some solutions.
		6. Strawpoll wording changed to higher level concept of fairness.
		7. Questioning the definition of fairness.
		8. Strawpoll is now so high level it isn’t useful text for the FRD. Strawpoll not run.
	5. **Presentation 802.11-19/1073r0**
		1. Discussion
		2. Strawpoll: “Do you agree to add the following text into section of SFD? “11bd shall support two Midamble periods.”
		3. Comment that the member has a similar presentation and would like to present it before the strawpoll is run.
		4. Question about signalling for no midambles.
		5. Comment that it would be implied if it is such a short frame that it is shorter than the midambles.
		6. Comment that only 2 midamble periods may be limiting the design too much.
		7. Comment that there should be explicit switch to turn on/off midambles
		8. Comment that we need to still allow BCC to work
		9. Comment if you want no midambles and BCC why not just use 11p PPDU
		10. Comment that BCC is sometimes better than LDPC and want to take advantage of new numerology
		11. Comment about adding a bit to turn off midambles
		12. Question about packet error rate, might be a good metric of quality to measure
		13. Strawpoll deferred
	6. **Presentation 802.11-19/1072r1**
		1. Discussion
		2. Comment that option A is unacceptable.
		3. Comment that option B is preferred, but option C could be an acceptable compromise.
		4. Question about how do we assess that option C is acceptable. We need to further study the impact on the adjacent channel.
		5. Comment that IEEE 802.11 can define the mask, but other regulators and ETSI may or may not use it. Member wants to get more information on the emmissions mask requirements from other organizations.
		6. Comment that is still worthwhile for use to standardize this, as it is useful to implementors and regulators to refer to.
		7. Strawpoll:
		8. Option B: A new tight spectrum mask with similar leakage level as 10MHz spectrum mask, but with -50dBr+xdB at +/-20MHz from center frequency, 10>x>=0?
		9. A:1 /B:11 /abstain:15
1. Chair recessed at 10:00am.

**Thursday PM2**

**Opening and Agenda**

1. Chair convened the meeting at 4:00pm. Approx. 60 participants in the room.
2. Agenda displayed is 802.11-19/0985r5
3. Chair presented IEEE 802 polocy slides
4. Chair called for potentially essential patents
5. No response
6. Chair presented agenda for this sessionon slide 21
7. No discussion on the agenda
8. Agenda adopted by unanimous consent

**Technical Presentations**

* 1. **Presentation 802.11-19/1104r2**
		1. Discussion:
		2. Comment on which channel. Response: same 10MHz channel
		3. Comment on 96 bits for DACE vs 104 bits.
		4. Comment that the results that in some cases one configuration is better and in other cases another configuration is better. Due to this it is important to provide the higher layers the tools to decide which to use at the correct time.
		5. Comment that the results are misleading. Expect to see 2-3dB gain in the low SNR scenarios.
		6. Response that in this case DACE is performing better than midambles channel estiation.
		7. Comment that also want to see PER plots in addition to goodput plots.
		8. Comment that for BCC the simulation is using the a very advanced state of the art receiver, but for LDPC is just simulating a basic “naïve” receiver.
		9. Comment that both can do more than the basic receiver, but don’t know what the commenter is proposing for LDPC.
		10. Comment using similar tracking period for the two cases
		11. Comment to simulate using block sizes that are statistically representative of the real world and not a fixed block size.
		12. Strawpoll
			1. Do you agree to add the following text into Section 3 of SFD? “11bd shall support a BCC mode with no Midamble insertion””
			2. Comment that this should be the same as 11p BCC
			3. Comment that this should be the same as 11bd as far as toneplan
			4. Comment that 11bd toneplan requires a different interleaver
			5. Comment that 11bd is inclusive of 11p MCSs, so why do we need this
			6. Comment that the 11bd extra MCSs and extra subcarriers provide more throughput and new technologies like multi antenna can also be useful
			7. Comment that 11bd BCC is a third mode that fits between 11p BCC and 11bd LDPC and unnecessary
			8. Comment that for a radio that supports 11ac there may be overlap, but for a 11p+11bd only product don’t assume it can inherit those features of 802.11ac standard.
			9. Commenter supports BCC with 48 carriers (same as 11p). Unsure about the added complexity of BCC with the new number of subcarriers in 11bd. Would like to see more investigations on this aspect.
			10. Comment that 256QAM 5/6 rate isn’t a valid rate in 11ac
			11. Y:5/N:8/A:many

**Motions**

1. **Presentation 802.11-19/0514r4**
	1. Motion #17:
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “11bd supports round-trip-time (RTT) ranging for 10 MHz and 20 MHz bandwidth PPDUs.”
		3. Mover: Stephan Sand
		4. Second: Ioannis Sarris
		5. No discussion
		6. Result: Motion passes unanimously
	2. Motion #18
		1. Move to include the following text to section 3 in 11bd SFD “BPSK DCM modulation is used to achieve lower sensitivity. For a BPSK DCM modulated OFDM symbol, the subcarriers in the second frequency segment is modulated by the rotated version of the signal modulated on the corresponding DCM subcarrier in the first frequency segment.
		2. 
		3. Where NSD is defined for DCM which is half of 𝑁\_𝑆𝐷^(𝐷𝐶𝑀=0).”
		4. Mover: Jianhan Liu
		5. Second: Dongguk Lim
		6. No discussion
		7. Result: Motion passes unanimously
	3. Motion #19
		1. Discussion whether its any PPDU or 11p PPDU. Comment about 10MHz or any channel width.
		2. Reminder that the mover needs to be an IEEE 802.11 voting member.
		3. Move to include the following text to section 3 in 11bd SFD:
		4. “ 11bd shall support adaptive repetition of 11p PPDU when operating on OCB broadcast mode in 10MHz bandwidth.
		5. The signaling of the adaptive repetition is TBD.
		6. The time between repeated 11p PPDUs is TBD.”
		7. Mover: James Lepp
		8. Second: Dongguk Lim
		9. Discussion: does time between mean time gap or time interval? This is TBD.
		10. Result: Y16/N0/A11
	4. Motion #20
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “In an 11bd PPDU, the RATE field shall be set to the value representing 3 Mb/s in the 10 MHz channel spacing column of Table 17-6 (Contents of the SIGNAL field.”
		3. Mover: Dongguk Lim
		4. Second: Hongyuan Zhang
		5. No discussion
		6. Result: Motion passes unanimously
	5. Motion #21
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “NGV-SIG is located right after the RL-SIG in 11bd PPDU.”
		3. Mover: Dongguk Lim
		4. Second: Hongyuan Zhang
		5. No discussion
		6. Result: Motion passes unanimously
	6. Motion #22
	7. Comment for clarification about what this means. Response is enhanced mode CSMA/CA. Comment that “mode of channel access” is a term taken from the already existing FRD. Question whether this means we need an additional channel access mode, we already have one, do we need another? Comment that a different term should be used. Text is edited on screen and motion made as follows.
		1. Move to include the following text to section 2.1 in 11bd FRD:
		2. “The 802.11bd amendment shall improve transmission reliability under congested communication environment compared to IEEE Std 802.11™-2016 operating in 5.9 GHz band.”
		3. Mover: Hanseul Hong
		4. Second: Ronny Kim
		5. No discussion
		6. Result: Motion passes unanimously
	8. Motion #23
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “11bd PHY shall define only one PPDU format.”
		3. Mover: Rui Cao
		4. Second: Jianhan Liu
		5. No discussion
		6. Result: Motion passes unanimously
	9. Motion #24
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “The preamble of 11bd PPDU shall include repeated LSIG symbol after LSIG.”
		3. Mover: Rui Cao
		4. Second: Dongguk Lim
		5. No discussion
		6. Result: Motion passes unanimously
	10. Motion #25
		1. Move to include the following text to section 3 in 11bd SFD:
		2. “ -11bd PPDU shall boost L-STF by x1dB when data portion is modulated with BPSK or BPSK with DCM, with x1 > 0, and x1 value TBD.
		3. - 11bd PPDU shall boost L-LTF by x2dB when data portion is modulated with BPSK or BPSK with DCM, with x2 > 0, and x2 value TBD.”
		4. Mover: Rui Cao
		5. Second: Jianhan Liu
		6. No discussion
		7. Result: Motion passes unanimously
	11. Motion #26
		1. Move to include the following text to section 3 in 11bd SFD
		2. “11bd supports two spatial streams for unicast transmissions as an optional feature.”
		3. Mover: Rui Cao
		4. Second: Dongguk Lim
		5. No discussion
		6. Result: Motion passes unanimously
2. **Use Cases Document 802.11-19/01342**
	1. Discussion
		1. Comment on lack of KPIs
		2. Suggestion that members contribute such content to the document
	2. Motion on the TGbd Use Cases Document
		1. Move to accept 11-19/1342r0 as the baseline of TGbd use case document
		2. Moved: Bahar Sadeghi
		3. Second: James Lepp
		4. No discussion
		5. Motion passes unanimously
	3. Motion on updated use cases
		1. Move to adopt the following to the document 11-19/1342r0 11bd use cases:
		2. - Add the text to the “4. Infrastructure Applications” slide of 11-19/1342r0 as proposed in slide 7 of document 11-19/0840r2
		3. - add the “V2V See-through” use case on slide 15 of document 11-19/0840r2 Moved Hiroyuki Motozuka
		4. Second: Bahar Sadeghi
		5. No discussion
		6. Motion passes unanimously

**Timeline discussion**

1. Chair suggests to keep the timeline unchanged and update this at the September meeting.
2. No discussion

**Teleconference plan**

1. Chair proposal:
	1. Aug 6 10am
	2. Aug 20 6pm
	3. Sep 3 10am
	4. Oct 8 6pm
2. Discussion
	1. Chair has talked to 1609 liaison officer and a joint teleconference is not needed at this time
	2. Comment that teleconferences havn’t been a useful tool to advance the work so far
	3. Comment that members are concerned to present on the calls because they’d be disadvantaged in the f2f meetings. Chair suggests that presentations from the conf calls will be given priority.
	4. Comment that this is all about coming together and getting to consensus
	5. No objection to the teleconference plan
	6. Question about how many sessions we expect for the September meeting.
	7. Response 5 sessions including one split with 2 rooms in parallel.

**Technical Presentations**

1. Presentation 802.11-19/1158r0
	1. Discussion:
	2. What layer should this be handled?
	3. Could be in L2 of 802.11 or this could be an upper layer feature.
	4. Comment that this doesn’t include MAC layer buffering and retransmission, ACK is used for other purposes.
	5. Question about making this dependant on traffic load. How do you account for the presence or lack of feedback
	6. Comment you don’t benefit from feedback of more than a certain number of other devices. Don’t need feedback from too many
	7. Can you piggyback the acknowledgement from the other broadcasts already being transmitted. Could it be part of the BSM for example?
	8. If you do it in 802.11 it’s a baseline for ETSI and SAE variants
	9. Comment it improves reliability of broadcast.
	10. Comment haven’t simulated performance. Need to sort out range and reliability
	11. Comment that 3GPP PC5 doesn’t have HARQ feedback in R14, but may in R17 and later
	12. Support for the idea, but it looks like higher layer.
	13. Comment that if 3GPP adds this in network layer, then a “network agnostic” upper layer may benefit from this.
	14. Comment that ACK might not be the right term for the feedback given
	15. Comment about what is the content of the feedback sent, just the MAC address, or include RSSI or alternatively use an upper layer identifier (non-MAC address/identifier)
	16. Comment about transmission range vs congestion of the blockack
	17. Strawpoll 1: Should 802.11bd define feedback of received MAC addresses decoded in a BlockAck variant?
	18. Y6/N2/A23
	19. Strawpoll 2:
	20. A:1/B:9/None:0/Abstain:many

**Closing Report**

1. Chair presentation of draft closing report 802.11-19/1334r0
	1. Editorial updates made on screen as members review the contents of the slides.
	2. Number of presentations updated to 19.
	3. No Discussion
2. No other business
3. Chair adjourned at 5:55pm.

**Next Meetings of IEEE 802.11bd Task Group:**

Teleconferences:

August 6 10 am ET

August 20 6pm ET

September 3 10am ET

October 8, 6pm ET

Face to face:

Hannoi Marriott, September 15, 2019

**Notes:**

Document numbers referenced (e.g. 802.11-19/0000r0) are available on IEEE Mentor: <https://mentor.ieee.org/802.11/documents>