IEEE P802.11
Wireless LANs

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| NGV SGTeleconference Minutes June 2018 |
| Date: 06-26-2018 |
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Abstract

This document contains minutes from NGV SG teleconferences in June 2018.

Rev 0: Minutes from NGV SG teleconference on 12th of June, 2018.

Rev 1: Minutes from NGV SG teleconference on 26th of June, 2018 added.

**Teleconference on Tuesday, June 12th, 2018, 20:00 – 22:00 (ET)**

**Agenda:**

1. Call meeting to order

2. Patent policy and meeting rules

3. Agenda setting and secretary appointment

4. Attendance: send email to the chair or the secretary

5. Presentations

1) 11-18/1072r1, Proposed NGV Use Case Document (Onn Haran):

<https://mentor.ieee.org/802.11/dcn/18/11-18-1072-01-0ngv-proposed-ngv-use-case-document.pptx>

2) 11-18/0861r2, IEEE 802.11 NGV SG Proposed PAR (Hongyuan Zhang):

<https://mentor.ieee.org/802.11/dcn/18/11-18-0861-02-0ngv-ieee-802-11-ngv-sg-proposed-par.docx>

6. Adjourn

Please note that teleconferences are bound by the conditions stipulated by the documentation below.  Please review them and bring up any questions/concerns you may have before proceeding with the teleconference:

IEEE Patent Policy - <http://standards.ieee.org/board/pat/pat-slideset.ppt>
Patent FAQ - <http://standards.ieee.org/board/pat/faq.pdf>
LoA Form - <http://standards.ieee.org/board/pat/loa.pdf>
Affiliation FAQ - <http://standards.ieee.org/faqs/affiliationFAQ.html>
Anti-Trust FAQ - <http://standards.ieee.org/resources/antitrust-guidelines.pdf>
Ethics - <http://www.ieee.org/portal/cms_docs/about/CoE_poster.pdf>
IEEE 802.11 Working Group Operations Manual –
<https://mentor.ieee.org/802.11/dcn/09/11-09-0002-16-0000-802-11-operations-manual.doc>

**Chair Bo Sun (ZTE) calls the meeting to order at 20:00 (ET).**

Bo reviewed the IEEE 802 and 802.11 Policy and Procedure, and direct them to the links provided in call for this meeting in case of questions. Bo asks if there is any potentially essential patent that people are aware of and if there are any questions.

No potentially essential patents reported and no questions asked.

Bo goes through the agenda and asks if there is anything that should be added to the agenda. No discussion on the agenda, so the proposed agenda will be used.

Bo appointed Jing Ma (NICT) as the secretary of the NGV SG.

**Presentation:**

**NGV Use Case Template, Onn Haran (Autotalks)**

<https://mentor.ieee.org/802.11/dcn/18/11-18-1072-01-0ngv-proposed-ngv-use-case-document.pptx>

**Discussion**:

(Slide 3)

**Questions/Comments (Q):** The definition of coexistence seems to be asymmetric because it talks about 11p devices not transmitting while the NGV messages are but I think the reverse should also be true. At least on the safety channels the NGV devices had better not transmit on top of 11p messages.

**Answer (A)**: It looks like this is a mistake and I would fix it later.

**Q:** The backwards compatibility only mentions decode, I think transmitter also needs to be mentioned

**A:** okay

(Slide 4)

**Q:** The range requirement that you have there and the 500km/h relative speed of operation, is that distance that you're talking about relative to the amount of time for safety message at that speed? Because that seems like it's not enough range for that speed.

**A:** The “300m” is the number that applies for scenarios today. If we look at the end it doesn't say that for which speed you need to support for which range. So it's kind of a simple definition that the device should be received within 300m.

**Q:** okay but if you're increasing the speed to 500km/h which is an increase. Then the range has to increase the appropriate amount to ensure. In fact, it has to increase even more because you need time for safety message response.

**A:** I think “500 km/h” doesn't present any real use case. So I don't think that 500km/h is coming from the use case perspective, it’s more of a marketing example which are used by people all the time to describe the quality of the standard.

**Q:** I'm still concerned if we're going to be claiming a relative speed at which communication can occur. The communication has to be have some value. It just can't be nonsensical communication. If you're going to communicate at 500km/h, you need a range that makes sense to be communicating at that speed. I'm very confused by that. What's the point of studying it as a spec. Marketing is not a technical reason and this should be a technical spec in my view.

**A:** The idea is what we need even if there's a car driving in 500km/h. There would be inability to detect the message and at the same time to avoid collision. So the minimal requirement is to be able to decode the header and the avoidance issue. I would like to define a range which is just on the header-success rate.

**Q:** Is that range consistent with that speed?

**A:** That range is consistent with all safety application. We don't distinguish between safety applications and say which range is required for which safety application.

**Q:** My calculation says that the 300m range is adequate for 500km/h

**A:** Thank you.

(Slide 5)

**Q:** The requirement to retransmit all received objects from all other vehicles in the area, is that going to be able to be supported once there's a density there and things begin to repeat everything received from everybody else? It seems to me that would tend to grow like a feedback loop go on for infinity and occupy the whole bandwidth.

**A:** So I think the question is how many data as a vehicle would really need. Because also the ability to process all this information is limited. So if for example there are only two vehicles in the road, you would like to get all the information that the other vehicle is sending. But let's assume that we'll be in a different channel the sensor of sharing but that congestion control will be limiting the power of the sensor of sharing, or maybe even skipping some messages. In that scenario, you really don't need all the messages. So it's enough for the vehicle just to receive the information which is shown on your immediate neighbors.

(Slide 6)

**Q:** Does **“**the multi-channel operation” mean a transmission on both the channel or different transmission on multiple channels?

**A:** I meant transmission of two different channels in the vehicle. And actually it also relates to the fact that if a vehicle is transmitting and an infrastructure is transmitting on the same time.

**Q:** Okay, so you mean the one channel is safety Channel and second is non-safety that means there's one channel it's easy to get. And the transmission is pretty secure and the other one is the optional one. Is that what you meant?

**A:** Yes, this is the case today. But in the future that might not be the case. For example, the other channel will be used for automatic driving. I'm not sure that it can be called as non-safety. So maybe this definition is misleading. We can say that both channels are safety channels. So maybe I should add and I change the text to emphasize that the second channel might be safety as well.

**Q:** Is it is it fair to call platooning or other types of autonomous driving communication a safety message even though it is it does affect the safety of the vehicle? Is it the same as a safety message in your definition?

**A:** yeah, I think safety message has a very clear definition this is why I call it safety message. The other message is actually even more impacting the vehicle than the safety message in that sense.

**Q:** Regarding your overall safety I agree with you. But it wouldn't be called a safety message if we call a critical message some kind of critical driving message or something along those lines.

Because I think the safety message is very well defined unless I'm mistaken that we'd want to redefine it

**A:** No

(Slide 8)

**Q:** You mentioned that the larger bandwidth as better accuracy. So for 11p the bandwidth is already 10MHz. Do you expect that for NGV will be larger than 10MHz?

**A:** The assumption is that the channelization are not changed.

**Q:** what's the point here you want to even consider NGV really positioning or not just let you know your position?

**A:** it's could be placed on 11az but understanding if that needed to be some interpretations to be made to NGV

(Slide 10)

**Q:** you mentioned about the requirement to add to antenna diversity. It is that 11p does not support an antenna diversity because 11p is only supported one by one, is it right?

**A:** Yes

**Q:** The 11p is not receiving a signal moderated by using STBC, is that right?

**A:** STBC is not be compatible. It means that if someone is STBC, then existing devices will not be able to receive it.

**Q:** I image the backward compatible mode. I can guess that based on 11p PHY based on already given, but how do you improve that the speed to up to 500km/h or longer range?

**A:** I get the 500 km/h adding it without modification. It should be how to achieve it because it means that what is achievable now will be achievable in the future. I think that was the one aspect we encourage the group to come up with ideas that might be backward compatible. Another option is to coordinate with other groups like ieee 1609 that I might have to select the mode of operation till the whistle application.

**Q:** Application perspective I think become further improve, but regarding the speed of the range

I doubt if the existing PHY can achieve that high. On the other hand, improvement should be included in the potential non-backward compatible mode which you can increase the range or you can be more works well in the high-speed environment. That's the potential benefit by using this new mode in NGV

**A:** The PHY comes to applies also for the non-compatible for sure, and then you know as I will make sure that there it is clear enough this requirement to apply for both

**Q:** At the beginning of your presentation you actually say that you want to also contribute the text to the PAR, right? So is this requirement summary that you would like to contribute to the PAR?

**A:** Yes, because we can discuss this while the PAR would be discussed. For example, the

PAR today define two different modes. One mode for long range and another mode for I think high speed. So I think that we need to go from the use cases and then understand what the PAR should be read it a lot and also it's not necessarily that all the commandments must be written in the PAR. It's not necessarily that all the commandments must be written in the PAR, could be only the high level.

**Q:** So it does mean this is your recommendation at this moment right from your point of view that we can do this three meaning aspects may be in NGV, right?

**A:** Yes

**Q:** In 802.11 when we write the PAR, we actually let you quantify things. So it would be good to know if you have some quantitative value like how long is the longer range is and how high the high throughput is. I understand your intention, but will expect you may have a follow-up presentation on this.

**A:** okay.

**Q:** Based on your definition of backward compatibility, do you believe that the 11ac is backward compatible to 11g?

**A:** No, backward compatibility means that devices would be able to decode each other. And in 11ac, it’s usually done by an access point.

**Q:** Backward compatibility doesn't mean devices can decode each other. It means the future device can decode the past the past device may not necessarily decode the future device. By way of saying that, 11ac and 11p could have been backward compatible but they aren't, because 11ac does not have a 10MHz mode and 11p operates at 10MHz.

And regarding to 1609, the features in 1609 that might be useful. The ability on a packet by packet basis to suggest not necessarily control but suggest power level transmit power level and a modulation coding scheme data rate if you will. So they can send that on to the 1609.4, a request to change the MCS and that could be useful at some point the way to get higher throughput. But you lose range.

And I don't know that you need a migration to a backward compatible mode. You either are going to support in that particular MAC-PHY chip or you're not. I'm fully supportive of the work I just don't want to see it be overly constrained with thoughts of absolutely have to. It would be nice if the next generation chip we're able to decode an 11p signal waveform but making it an absolute requirement may be overly constraining. Think multiple media when you think about ITS devices. They all have multiple medium and it's not just a single 802.11 chip that has to do everything.

And by the way, there's nothing to prevent any 11 P radio from using antenna diversity on receiver.

So I will change the requirements summary I would change it to be what we have to do is meet the requirements of new high bandwidth services. There are 60 other mega Hertz out there to be used.

**A:** If you look at use case 4, this is the exact the case of providing high-speed

**Q:** I just want to make sure we image that backward compatible mode you mean. For example we imagine the up to 500km/h speed operation, you actually include both scenario of 11p device transmitted to NGV device and NGV devices are transmitted to 11p. Also for longer range includes the both scenarios.

**A:** Yes

**Q:** So that means actually 11p device have nothing more to do just follow current 802.11 spec and just remember transmitted point that NGV they count on a input feature and achieve all this this improvement like longer range and higher speed.

**A:** Yes, and also transmit diversity which is missing now in the current definition.

**Q:** Do you have any suggestion or straw poll you want to make in following meeting?

**A:** Yes, I guess in the following meeting I will come with the version that incorporated the comments that existing. And then if there would be no comments, maybe straw poll. If anyone has refinements they can send it to me.

**11-18/0861r2, “IEEE 802.11 NGV SG Proposed PAR”, Hongyuan Zhang (Marvell):**

It’s been presented last f2f meeting and Hongyuan made this updated version based on the comments received last meeting. Bo went through one by one to see all the changes.

**Discussion:**

**Q:** Regarding this mode of longest range and lowest sensitivity level, what is the use case for it?

**A:** I will I believe the conception is with the same rate compared to 11p, NGV can transport in lower sensitivity which means NGV can support longer range at the same rate.

**Q:** Based on this that there are two modes of operation. One mode which is a regular and one mode which is longer range. Or this is one mode that achieves both longer range and higher rate? I'm not sure that there is a need for a mode which is higher range.

**A:** Basically this might be two different modes. For the long range, we think maybe just for connection purpose. You can reach the longest range using the lowest rate which may help in some scenario. Those may not regular basic broadcasting message, basic safety message application but in case other applications.

**Q:** My concern is that every mode introduced some challenges in negotiation interoperability etc so adding more modes adds more complexity to the operation of the system. I think it's desired to minimize the number of mode.

**A:** we are not details here. Simulation shown we can ache double without multiple channel. As to mac throughput, before in 11ac,

**Q:** So your proposal is to remove the whole longer range business?

**A:** yes.

**Q:** When you say at least two times higher throughput than 802.11 operating at 5GHz band at what MCS? We mandatory of 6 and 12, but you can support anything up from there. That's possible and all the way up to 24. So are you thinking that the two times applies to the 6 the 12 or the 24, which one?

**A:** Well thinking that no matter which range when you're operating this channel environment with the high speed up to 250km/h. At least you can achieve double the throughput. For example, you may achieve up to say 12 Mbps using the 11p in our simulation in car to car on number 4 channel. And this new mode with this new PHY, you may achieve double that throughput under the same condition. This is just scope of the part.

**Q:** I think the question is higher throughput can we just define it higher maximum throughput?

**A:** we say simulation meet the

**Q:** I think “higher throughput” is ok. I'm saying is we are not talking about detailed technology here we shall talk. About requirement and the problem the simulation is doing by Marvell that we can achieve the double the rate without using maybe multi-band aggregation for example.

**Q:** So you want to propose to define it achieves a maximum throughput?

**A:** yes. For example 11p support up to 24Mbps and we will have at least one mode that support up to 48Mbps.

**Q:** what's your proposed change or you just type it.

**A:** something like that

(Note: Bo changed the text “2 times higher throughput” to “2 times higher maximum throughput” in the document)

**Q:** Maximum throughput sounds like the throughput in the MCS table. But I was talking about the achievable throughput on the high mobility channel

**A:** They're all right, there maximum sounds more like PHY date rate.

**Q:** If you write like this way, how do you test you meet the PAR in the future?

**A:** Maybe PHY simulation

**Q:** Doesn't have to be simulation I mean you have channel emulators you can. Actually put real equipment on a bench and run a bunch of tests.

**A:** No, at the point you want to prove, there's no hardware ready yet.

**Q:** So we also define something which you see here in the doc “measured at the MAC data service access point”?

**A:** Yes.

**Q:** We are open for other suggestions. Is there any other suggestions other than two times higher? 1.5 times or four times?

**A:** there’s no further comment and it’s no change here.

**Q:** I would suggest that if you want a clear basis to make these simulations or channel of throughput, that if there's a place you want to put the word “maximum”, it would be relative to the 802.11-2016 that is you need operation to know what your 2x higher. Then it would be nice not to have, it would be nice if the PAR didn't leave it open whether you're talking about low or high data rates achievable today. There is more than one data rate supported in the referenced 802.11-2016 in 5.9GHz. There should be a MCS for a reference to maximum or minimum called out relative what we're simulating against. Otherwise you don't know whether you've met the PAR or not.

**Q:** what's the concrete suggestion? We add the maximum here?

**A:** How about “higher maximum data rate” because that's was mentioned about MCS. That is a testable

**Q:** I don't think you need to do it in sub-clause 5.2.b. you just add a reference. It would be much simpler than you change the sentence. You don't need to change the sentence but other looks in explanation in a point what you want to compare it.

**A:** okay.

(Note: based on the suggestion, Bo changes the “higher throughput” to “maximum higher throughput”)

**Q:** I think we need something, for example, in the clause on the next line where it says 802.11-2016 operating in the 5.9GHz band. How about say something like operating at the maximum mandatory MCS in the 5.9GHz band”?

**A:** Okay

(Note: Bo changes the words “802.11-2016 operating in 5.9GHz band” to “802.11-2016 operating at maximum mandatory MCS as defined in 5.9GHz band” in the document)

**Q:** What’s the maximum MCS? I don't know but if the maximum MCS is twice the maximum mandatory MCS then you're done, right? Why are we doing adding the word “mandatory”?

**A:** Well that's not. Because the conditions are the operating up to 250km/h. You may not be able to achieve the maximum mandatory MCS in this channel.

**Q:** There is also the aspect that I don't believe, strictly speaking 802.11p defines a maximum allowable MCS optionally. There are higher rates potentially available. And the other point is that doubling the MCS does not in any way shape or form guarantee that you're going to double the throughput at maximum.

**Q:** This is not as straightforward introducing the high MCS only. It should be doing some extra work to make that high MCS could be operable in such high mobility scenario.

**Q:** why do we mix the speed with throughput? Because if we say that we limit all the performance only to 250km/h, this is not a working point. I mean this is an extreme working point. Nobody we need to support highest to 250km/h. Maybe we can have another condition for it which is not 250km/h.

**Q:** actually in 11p we only have a table for optional enhanced with super performance for those MCS. We do not say what is the mandatory, so it would be confusing.

**Q:** 11p requires support of 6 and 12, but everything else is optional.

**Q:** So actually by a maximum mandatory, we refer to 12Mbps.

**Q:** Then we can add another note for maximal mandatory MCS, in this 2015 is the 12Mbps (QPSK 1/2) right?

**A:** Okay let's make marks here something like that.

**Q:** This requirement is supposed to be measured at 250km/h?

**A:** No, it's not a requirement, it's the scope of the project.

**Q:** which speed to measure the double throughput or you don't want to specify the speed.

**A:** That depends on the channel model.

**Q:** Any other question on this topic are we happy with two times at this point knowing we're saying 2 times 12 which is basically 24 Mbps

**Q:** I think the problem is that it doesn't define anything besides throughput so what is the range?

**A:** we see add that if you keep if you achieve higher throughput in the same condition that also means for the same range you achieve longer range equivalently, I didn't specify number here

**Q:** what is the condition?

**A:** Conditions the high mobility channel up to 250km/h.

**Q:** there's a speed parameter and then there's a range parameter. It seems that we're defining the extremes of both, like 24MHz. First of all why 250km/h? And second would it be better to have a second kind of less aggressive?

**A:** 250km/h is just some target up to minimum. You don't need to read this the number seriously because at the end we'll come up with the channel model that reflect the actual operation. We could use the channel mode whatever channel model to do the evaluation.

**Q:** I think that now it's very confusing and it's better to split the 250km/h to a different paragraph clarify that this is a target and of implementation but this is not the point in which the performance for us to measure at 250km/h.

**A:** So the environment is channel environment has speed of up to 250km/h

**Q:** There should be a couple of paragraphs one discussing data rates under certain conditions which are not 250km/h, and then discussing performance at speeds.

**Q:** So you want add a new paragraph to describe to support to the speed.

**A:** That was the suggestion

**Q:** Look at all the former PAR documents, they never make things so concrete. For example here, already said channel environment has speed up to that include may include all the possibilities already. At least we'll come up with a channel model. So it's that the channel model that we come up with at the end will reflect different scenarios and then we will test we will qualify the performance based on those channel models, right?

**A:** Yes, I agree. In 11ax, we have 20 or even 30. You use the scenarios each requires different requirement but we kept the same paragraph just saying we need to reach some higher throughput for 11ax. I see that is very clear now. So I suggesting we keep the current text here.

**Q:** the longer range mode need more consideration. I don't see now use case.

**A:** So the longer range may need a consideration, right? Maybe then move to make a call.

**Q:** So given that we're almost out of time, what we ought to do is put these changes in the document post it and give people some time to think about it for the next call.

**Meeting is adjourned at 22:00 (ET).**

**List of Attendees:**

|  |  |  |
| --- | --- | --- |
|  | Name | Affiliation |
| 1 | Bo Sun | ZTE |
| 2 | Bahar Sadeghi | Intel |
| 3 | Carl Kain | USDOT |
| 4 | Dongguk Lim | LGE |
| 5 | Edward Au | Huawei |
| 6 | Fygsimon |  |
| 7 | Hongyuan Zhang | Marvell |
| 8 | Hiroyuki Motozuka | Panasonic |
| 9 | Ioannis Sarris |  |
| 10 | Jianhan Liu | MTK |
| 11 | Joseph Levy | InterDigital |
| 12 | Jing Ma | NICT |
| 13 | Lee Armstrong | USDOT |
| 14 | Lisa W | Rohde & Schwarz |
|  | Michael Fischer | NXP Semiconductors |
| 15 | Onn Haran | AutoTalks |
| 16 | Rui Yang | InterDigital |
| 17 | Randy Roebuck | Sirit |
| 18 | Ross Yu | Huawei |
| 19 | Stephan Sand | German Aerospace Center (DLR) |
| 20 | Steve Sill |  |
| 21 | Takenori Sakamoto | Panasonic |
| 22 | Tom Lusco |  |
| 23 | Yujin Noh | Newracom |
| 24 | Yunsong Yang | Huawei |

**Teleconference on Tuesday, June 26th, 2018, 20:00 – 21:00 (ET)**

**Agenda:**

1. Call meeting to order

2. Patent policy and meeting rules

3. Agenda setting and secretary appointment

4. Attendance: send email to the chair or the secretary

5. Presentations

1) 11-18/0861r3, IEEE 802.11 NGV SG Proposed PAR (Hongyuan Zhang):

<https://mentor.ieee.org/802.11/dcn/18/11-18-0861-03-0ngv-ieee-802-11-ngv-sg-proposed-par.docx>

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LoA Form - <http://standards.ieee.org/board/pat/loa.pdf>
Affiliation FAQ - <http://standards.ieee.org/faqs/affiliationFAQ.html>
Anti-Trust FAQ - <http://standards.ieee.org/resources/antitrust-guidelines.pdf>
Ethics - <http://www.ieee.org/portal/cms_docs/about/CoE_poster.pdf>
IEEE 802.11 Working Group Operations Manual –
<https://mentor.ieee.org/802.11/dcn/09/11-09-0002-16-0000-802-11-operations-manual.doc>

**Chair Bo Sun (ZTE) calls the meeting to order at 20:00 (ET).**

Bo reviewed the IEEE 802 and 802.11 Policy and Procedure, and direct them to the links provided in call for this meeting in case of questions. Bo asks if there is any potentially essential patent that people are aware of and if there are any questions.

No potentially essential patents reported and no questions asked.

Bo goes through the agenda and asks if there is anything that should be added to the agenda. No discussion on the agenda, so the proposed agenda will be used.

**Presentation:**

**11-18/0861r3, “IEEE 802.11 NGV SG Proposed PAR”, Hongyuan Zhang (Marvell):**

It’s been updated to reversion 3 based on the discussion in June 12nd conference call. Bo read through doc.0861r3 to lead the discussion without the screen sharing.

**Discussion:**

**(**Bo read through the section 5.2.b. scope of the project to start the discussion**)**

**Q:** Is there any reason that really needs to be in section 8.1? Why not that footnote material be included in paragraph of section 5.2.b?

**A:** The section 8.1 is a fictional explanation notes to some of the items in section 5.2.b. scope of the project. Section 5.2.b is not supposed to have too many text there.

**Q:** I don't see any reference to communication outside the context of a BSS. Is there some reason that is not listed in the PAR? And I think “as defined in 5.9GHz band” could be ambiguous because there’s more than one 5.9GHz band with different rules in the world.

**Q:** Okay, so the first question is you want highlight that and you will also support the BSS infrastructure

**A:** Yeah, I suggest that it be prominently displayed in the scope that this is for 802.11 communication outside the context of a BSS.

**Q:** A good place to put “outside the context of the BSS” would be in the first sentence directly after “vehicles to everything (V2X) communications”, as a clause at the end of sentence, and then start a new sentence “at least one mode……”

**Q:** Okay then what's your suggestion to after "for Vehicles to everything communications"?

**A:** After the "vehicles to everything (V2X) communications", add “, outside the context of a BSS (OCB).” then start a new sentence saying “The amendment will define at least one mode ……”

**Q: “**The amendment will define at least one mode that achieves at least 2 times higher throughput”, something like that?

**A:** Yes, that's what I suggested.

**Q:** I have a couple of questions about the sentence “at least one mode that achieves at least 2 times higher throughput”. First of all, throughput is a metric in bits per second or bytes per second, is that the intention?

**A:** Yes, it is.

**Q:** Okay so I suppose that if we were talking about broadcast packets that are not acknowledged, this would be the number per second of bytes that are successively received and validated by the MAC checksum. If we were talking about unicast packets that have to be acknowledged, this would only be those that successfully received perhaps to a retransmission process and acknowledged, right?

**A:** That is correct.

**Q:** Okay now let me observe that in 802.11p itself, we have the maximum MAC corresponds to 27Mbps. And the maximum mandatory MCS corresponds to 12Mbps. So one could say that even though 802.11p has a mode that already satisfies the requirement, that one mode achieves more than twice the throughput than the maximum mandated MCS.

**A:** I believe we still haven’t meet 2x higher throughput at the higher speed or at the range that we are talking about the 3dB extra sensitivity. It would be a new mandatory mode.

**Q:** I didn’t get the part of sentence that “at least 2 times higher throughput than 802.11-2016 operating at maximum mandatory MCS as defined in 5.9GHz”. So I read that to mean at least 2 times higher throughput than 802.11 P operating at 12Mbps, right?

**A:** Yes, those are defined the operating conditions in the rest of the sentence which is fed up to speeds of 250 km/h and with 3dB lower sensitivity.

**Q:** I view “up to speeds of 250km/h” and “3 dB lower sensitivity” as two independent requirements, not simultaneously operating, because they're two different modes.

**A:** Yes, that is correct. I'm sorry I merged them together.

**Q:** I still think it's through that today is 27Mbps, which is 11p config MCS already meets the requirement. And what we mean by a high mobility channel environment at our speed up to 250km/h which I don't have any reason to believe it couldn't.

**Q:** Are you saying that these goals too low?

**A:** I'm just making an observation. I don't know that I have an opinion about that. But if we wrote a scope that had some goals in it that were already satisfied with the existing standard, would that mean we don't need an amendment.

**Q:** So you mentioned that 11p itself already has one mode that has 2 times higher throughput. But the maximum is the maximum mandatory it says. Then how about we remove the “mandatory”?

**A:** I don't think removing “mandatory” helps. I think that might make it more confusing. At least I need the word “mandatory” that we know what it is we're comparing against.

**Q:** how about something like “one mandatory mode”?

**A:** I don't know if that helps or not.

**Q:** Do we expect this two times higher achievement to be at every distance? at one specific distance? At least one distance? What do we have in mind? So we may need to be a little more precise about how we intend to evaluate, whether the amendment has met this goal.

**A:** I think that PAR is not needed to be very precise. Every technical detail like the text in the draft. In general, like when we were doing 11ac or 11ax, we just mention 4 times throughput, that's it. So I think the current “2x higher throughput” is okay. And it's not mentioning in every scenario you need to reach 2x.

**Q:** If there are two goals listed in this paragraph, and if they're worded in such a way that's unclear, and that reasonably you could interpret them as already being met by other modes within 802.11p. Then it's not so clear that what the value of pursuing this work would be. I think it’s better to make the PAR a little clearer, so that it looks actually to be really attractive as a future evolution path for the automotive community.

**A:** I think that argument is not technical or not even have a conclusion we can do action about it. We are trying to make things to move forward, not just saying because we don't know whether it’s valuable then let's do nothing.

**Q:** PAR discussions in 11ac or 11n or 11ax was really the Wi-Fi community talking to itself, trying to decide among themselves what the Wi-Fi community wanted to do next. I think it would be wise to view this as a different kind of an exercise where the Wi-Fi community trying to convince the automotive community to come together and work on something that's an improvement. So it doesn't help to just bring up what happened in 11ac or 11ax.

**Q:** Thanks for bringing automotive perspective to warn us that we may not be addressing the needs of the community. And actually when we were doing 11ac or 11ax, we have always gone out to the Wi-Fi Alliance or other groups that are review as the user groups for the technology we're developing, to get feedback from that group to make sure that we're on track and we're addressing things in a meaningful way. We should be listening very well to the automotive community feedback on this definitely.

**Q:** I think it’s better to bring technical contributions to discuss whether something is useful or not.

**Q:** Let’s go back to the standard itself. So my understanding on the comments have two parts. One is that 2 times higher throughput. So change the sentence to something like “the amendments defines at least one mandatory mode that achieves at least 2 times higher throughput” may address part of the comments. Does anyone has comments or discussion on this change?

**A:** Given that we cannot see the screen, I will say that we're hearing people’s request and I insist to suggest that we have to act to the range extension. So please also make that into the minute. It's very hard to discuss the PAR language exactly change without seeing it. So I was thinking maybe we should hear about people's argument and leave it to the face-to-face meeting in July to decide it's exactly words.

**Q:** Okay, so we have not changed this revision until the F2F meeting in San Diego. But I just collect what we have discussed. For now there's one proposed to insert an “mandatory” between “one” and “mode”.

And the second, about “2 times higher throughput” we have some specific condition and currently we only have one condition to see in high mobility channel environments and speeds up to 250km/h which is only condition in current document.

**Q:** Did you intend to have it understood that this 2 times throughput could be achieved at least one distance or at one specific distance? Or generally for all distances?

**A:** I think I can answer a little bit about that. I think from hongyuan's previous simulation and the PAR basically what he wrote in the first version, he mentioned that 2 times is for the same distance as the 11p. And when they talk about the range extension, it may not reach 2 times. the 2x is really targeting for the same distance as current 11p's range.

**Q:** But I don't know what that means because 11p communicates over many distances so when you say the current, which does it mean?

**A:** It means under the same scenario, even in the worst scenario for 11p that the current technology will reach 2 times.

**Q:** There are two ways to remove the ambiguity that I'm saying. For example, at X meters the throughput will be at least two times higher. For another example might be at a distance where the packet error ratio for 802.11p is y percent, but at the distance where 802.11p achieves a certain percentage packet error at that distance the throughput will be at least twice as high.

**A:** It seems to me that your example requirements are actually weaker than what we wrote in the current PAR. When we talk about 2 times or 4 times, we talk about typical almost all the scenarios.

**Q:** We don't have a screen sharing today. So we have the change for the first sentence. I will update the first sentence and upload the reversion to the server. But regarding the text “2 times higher throughput”, we will discuss in F2F meeting.

**Meeting is adjourned at 21:00 (ET).**

**List of Attendees:**

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| --- | --- | --- |
|  | Name | Affiliation |
| 1 | Allen D. Heberling  | GenXcomm |
| 2 | Bo Sun | ZTE |
| 3 | John Kenney | Toyota ITC |
| 4 | James Lepp | BlackBerry |
| 5 | Jianhan Liu | MTK |
| 6 | Jing Ma | NICT |
| 7 | Joseph Levy | InterDigital |
| 8 | Michael Fischer | NXP Semiconductors |
| 9 | Stephan Sand | German Aerospace Center (DLR) |