
**IEEE P802.11
Wireless LANs**

**Minutes of 802.11 VTS Study Group
Video Transport Streams
San Francisco, CA
July, 2007****Date:** 2007-07-19**Author(s):**

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Abstract

This document records minutes of the 802.11 VTS study group meeting of July, 2007 in San Francisco, California.

1. Monday Afternoon Session, July 18, 2007

Chair: Ganesh Venkatesan (Intel Corporation)

Secretary: Alex Ashley (NDS Ltd)

1.2. Opening

Chair read the group the IEEE 802 patent policy slides and asked the group if there were any questions or if there were any patents or patent applications that the working group chair should be made aware.

No questions or patent issues were raised.

1.3. Agenda

The chair described the agenda

- Review of IEEE Policies and Procedures, Patent policy, etc.
- Technical Presentations
 - Issues with EDCA/HCCA – Akira Yamada (15 minutes)
- Votes
 - Approve May meeting minutes (07/762r1)
 - Approve Teleconference Meeting minutes (07/1973r4)
 - Teleconferences
 - Request WG to extend VTS SG
- Timeline
- Goals for September
- PAR/5C document review/update/completion (07/1972r3)

The chair requested the group for any modifications to the agenda.

No modifications requested.

The chair requested the group for approval of the agenda.

No objections were raised.

1.4. Issues with EDCA/HCCA

Akira Yamada (NTT DoCoMo Inc) presented document 07/2157r1 which describes some concerns with EDCA and HCCA in relation to video streaming.

Graham Smith (DSP Group): I noticed that the problem you raised with HCCA is due to the lack of inter-AP co-ordination, which I also think is a problem that needs to be solved. I do not agree with your assertion that HCCA is too complex to implement and I also disagree with your assertion that 1% packet error rate is acceptable.

Ed Reuss (Plantronics): The problem with EDCA is larger than the issues with video distribution. Problems occur with any streams that all share the same AC. If VTS were to make a MAC that was somewhere between EDCA and HCCA it should also work for other stream types, such as voice.

Alex Ashley (NDS Ltd): Are you aware of the work in TGv on the subject of inter-AP co-ordination?

Akira: Yes

Rajneesh (Cisco Systems): Do you have any ideas about how to mitigate the issues you raise in your presentation?

Akira: I do not have any suggestions for how to solve these issues.

1.5. Approval of May meeting minutes

Meeting minutes are in document 11-07-762r1.

Motion: “Move to approve the minutes of the Montreal (May 2007) meeting minutes – doc 07-762r2)”

Moved by: Don Schultz

Seconded by: Todor Cooklev

Result: Unanimous

1.6. Approval of Teleconference Meeting minutes

Motion: “Move to approve the minutes of the teleconferences (May – July 2007) meeting minutes – doc 07-1973r5”

Moved by: Todor Cooklev

Seconded by: Don Schultz

Result: Unanimous

1.7. Approval of Teleconference Schedule

Motion: “Move to authorise VTS SG to have Monday weekly teleconferences starting from 2007-07-30 starting at 11:00 AM EDT (60 minutes long)”

Moved by: Graham Smith

Seconded by: Marc Emmelmann

Result: Unanimous

1.8. Timeline

The chair described a timeline plan for VTS SG to complete its PAR and 5 criteria.

- July 2007
 - Work on PAR/5C document
 - SG & WG approval of SG extension
- Between July-Sep 2007
 - Use teleconference time to complete PAR/5C document
 - Review PAR/5C document with 802.1 AVB members
- Sept 2007
 - SG & WG, 802.1AVB approval of PAR/5C
- Nov 2007
 - PAR/5C forwarded to ExCom/NesCom for approval
- Jan/Mar 2008
 - VTS TG formed

1.9. Request WG to extend VTS SG

Motion: “Move to request the IEEE 802.11 Working Group

1. to extend the VTS Study Group through the November 2007 meeting and
2. to forward to the Executive Committee for Approval.”

Moved by Don Schultz
Seconded by Ed Reuss
Result: Unanimous

1.10. PAR/5C document review

The current draft PAR and 5 criteria document is in document 11-07-1972r2.

Leonid Epstein (Metalink): It seems confusing to specify 100Mbps for each video stream.

Ganesh: The idea was to put an upper limit.

Graham: Why was an upper limit defined?

Ganesh: To make uncompressed video out of scope.

Lenoid: 100Mbps would exclude MJPEG.

Graham: What seems to be missing is the use case, as highlighted in the presentation we heard earlier. I think a major challenge is the ability to provide good quality video in the presence of other data and other networks.

Ganesh: Something like this was in a previous version of the PAR. I cannot remember the process by which we removed it, but it will be in the minutes.

Ed: Typically use cases are part of the requirements process once the task group has formed. It is probably not a clear

Rajneesh: What is the problem we are trying to solve? The presentation we had today described systems limitations. What problems need to be solved?

Ganesh: Applications such as HD video in the presence of other traffic and other networks is an example.

Lenoid: I am still very concerned with a limit specified specified in the PAR. It provides an upper limit, but no lower limit. You could meet the requirements of the PAR as it stands by just streaming 100Kbps, which can be achieved with existing amendments.

Don Schultz (Boeing): In the process of moving for the formation of the study group we had several presentations on limitations of 11e.

Shawn: Would using the phrase "up to 100Mbps" be better?

Lenoid: Why the limit? Would we decline a proposal that provided 1Gbps?

Todor: I would like to remove the last sentence in 5.4 as they are generic design guidelines that all amendments should aim for, they are not specific to video streaming.

Alex: I do not agree because the issues for video distribution include its ability to function in the presence of other traffic and with other networks nearby. Spectral efficiency might be an important part of solving this problem.

Andrew Miles (Cisco Systems): I would appreciate a crisp definition of what the problem is that we are trying to solve. I do not think that a good definition has been provided.

Rajneesh: We have said “the quality of video streaming is not great” but what we need to do is identify the problems with the 802.11 MAC.

Andrew: Would HCCA solve the problem?

Graham: Maybe.

Andrew: Has anyone proposed any solutions? This is important for the feasibility section of the PAR.

Lenoid: I think we should define what we mean by video.

Ed: In a previous phone conference we had a presentation on video streaming around a home using 11n equipment. It showed that there was a wide range of behavior between products. I think it shows that 11n is not too far from solving the problem, which speaks towards its feasibility.

Graham: Maybe all the features are available in the MAC, it is a case of “putting it all together”. For video we need zero error rate, otherwise the viewer will see these errors.

Rajneesh: Are you saying “what we need is recommended practice”?

Graham: Maybe

Rajneesh: We should put aside discussion of the PAR and agree on the problem space.

Todor: Inter-layer communication is an example of a feature not currently available.

Andrew: Graham, when you mention zero packet error rate, were you thinking of additional forward error correction?

Graham: No, it could also be using retries.

Andrew: Does that mean that you are talking about providing extra dynamic controls?

Graham: Yes

Ganesh: I would like to go back to Rajneesh’s comment on discussing the problems we are trying to solve.

The chair displays document 07-0742r1, which is his opening presentation from the Montreal meeting.

Rajneesh: I am still not sure of the problem space.

Ganesh: An example would be finer grained control of QoS, as there is only one

Graham: Could you use admission control to solve this problem?

Alex: I do not think that admission control is the answer because once admitted streams are all in the AC and have the same EDCA parameters.

Ganesh: I expect that we have most of the features we need, and I hope that by adding some fairly small additions we can achieve good quality video.

Fhad Pirzada (Dell): I am not sure how going though the problems shown in 07/0742 helps us.

Andrew : I heard earlier that we had a presentation that some equipment was almost able to achieve our requirements, but that other equipment was not. Do we have any ideas about what the differences were that was causing these problems?

Lenoid: The main difference was due to PHYs issues with distance. The lack of aggregation support was also very significant.

Andrew: So if PHYs were perfect and aggregation was supported, we would have what we need?

Lenoid: The 11n MAC adds a much larger jitter (2 to 3 times) than existing 802.11

Andrew: Does HCCA solve this?

Lenoid: No

Rajneesh: I want to see the fundamental problems with the MAC. Maybe there are no problems?

Lenoid: I can give an example: MPEG timestamps have jitter requirements in the order of nanoseconds, but the 11 MAC works at the tens of milliseconds granularity.

Todor: I do not quite agree with the conclusions from the study. The study considered one video stream in a household without other nearby networks. Just because it was almost possible to achieve one HD stream, does not mean that it will work with multiple streams and overlapping traffic.

Andrew: I find it hard to believe that one video channel in clean environment even one stream was not possible.

Michael Loiacono (Siemens): Was it carried out in a shielded room?

Lenoid: No. This does not matter.

Michael: It does matter because of yielding time for fairness. The MAC provides fairness for access to the medium, rather than throughput fairness. It tends towards each stream having the same throughput.

Graham: I think video can be streamed over 802.11, as long everything is right. The major problem is overlapping BSS, as this breaks both EDCA and HCCA.

Andrew: I agree with almost everything you say, except ??? (secretary did not catch the rest – awaiting guidance from Andrew).

Don: The point raised about airtime fairness as opposed to throughput fairness is a good one.

Andrew: I remember that when voice over IP started, we thought that 64Kbps was the minimum we would use. Now we are using 4Kbps and 8Kbps with very good quality. Maybe 802.11 doesn't need to solve the problem because higher layers will improve for us.

Alex: Video encoding techniques such as H.264 are still fairly new and we are still learning how to use all the techniques they give us. I would expect that the current typically deployed bitrates for HD of 20Mbps to drop over time, probably to something like 12Mbps, but I don't see it going down much below this. The other problem we need to consider is delay as there are user interaction issues (e.g. switching from play to fast-forward) that are not tolerant to long delays.

Ed: The video broadcast industry is tending towards greater coding efficiencies but not necessarily robustness to errors.

Ganesh: We will have to leave the discussion here as we are out of time.

Chair recesses the meeting.

2. Minutes for Joint 802.1avb and VTS Study group

July 18th, 2007

Chair: Ganesh Venkatesan (Intel Corporation)
Secretary: Alex Ashley (NDS Ltd)

See document 07/2131r0 for agenda and IEEE 802 governing documentation.

Chair read the group the IEEE 802 patent policy slides and asked the group if there were any questions or if there were any patents or patent applications that the working group chair should be made aware.

No questions or patent issues were raised.

Chair informed the group of the voting and attendance procedures for the study group.

2.2. Agenda

Discussion on the goals for this meeting

Joint VTS SG, 802.1 AVB meeting

Stream reservation protocol summary

802.1q priority tags

802.1 bridge in a 802.11 STA

Response from Darwin to previous presentation

Joint review of the VTS SG PAR/5C document submission

Adjourn

Chair requested unanimous approval of the agenda – no objections were raised.

2.3. Stream reservation protocol summary

Felix Feng (Samsung Electronics) presented a document on the stream reservation protocol. The current draft of the amendment can be found in the 802.1 section of the IEEE document server.

2.4. 802.1q priority tags liaison

The IEEE P802.1 WG chair Tony Jeffree (Consultant) presented a document which is a response to the question from the IEEE P802.11 WG on the proposed modification of 802.1q priority tags within IEEE P802.1 WG.

Norman Finn (Cisco Systems): The eight classes of traffic is never going to be enough for all possible deployment scenarios. Therefore it is not possible to have a fixed table for priority mappings.

Graham Smith (DSP Group): Is it simply the case of needing to know how to map the 802.1q priority level to the 802.11 priority?

Norman Finn: It depends on the mapping. For example if video and voice both get mapped to priority level 5 on the ingress to the network, it is not possible undo this as they are now both the same priority.

Michael: The lesson from this should be to not hard wire anything. Sensible defaults are good, but don't hard wire things because they can change.

2.5. 802.1 bridge in a 802.11 STA

Norman Finn presented document <http://www.ieee802.org/1/files/public/docs2007/avb-nfinn-wireless-bridges-071307.pdf> which describes the case where a device could be an 802.11 STA and also have other connectivity (e.g. 802.3) and have 802.1 bridge functionality.

Andrew Miles (Cisco Systems): What about if we use a model where the bridges and access point are combined? I think they used to call it a remote bridge.

Norman: Now that 802.1q has become so complex, using the remote bridge model is probably no longer practical.

2.6. Wireless Bridge Common Practices

Darwin Engwer (Nortel Networks) presented document 11-07/2233r0 “Wireless Bridge Common Practices”.

Norman: Your proposal seems to be re-inventing source routing. Bridges don't need to keep databases of where each device is on the network. The problem is that this database would get rather large on a reasonable sized network and we would need a protocol to transfer this information. If we use four address routing we can remove the problem of packets reflecting to its source.

?: When using four address format, are you only using unicast?

Darwin: If your destination is a broadcast, the link between the AP and the bridge capable STA is unicast.

Bob O'Hara (Cisco Systems): When a broadcast arrives from the DS, what happens?

Darwin: The AP uses the three address format (SA=its MAC address, DA=wildcard).

Andrew Miles: Wouldn't the AP have to duplicate the broadcast frame using the four address mode?

Darwin: Yes

Andrew: Is this because that using a four address mode would cause problems with legacy equipment receiving frames with four addresses?

Graham: I go by adage “don't take a shower when the plumber is working on the water”. Do we really need to fix the problem of video streaming whilst the network is being reconfigured?

Darwin: A similar problem occurred when we moved from bridges to switches. We were able to fix this in 802.1 twelve years ago.

?: The problem is not bridges and 802.11, the problem is that 802.11 did not properly implement bridging. The problem is within 802.11.

Darwin: It is not useful to “open old wounds”. We have a desire to work together, let's see how we can move forward.

2.7. Joint review of the VTS SG PAR/5C document

Ganesh presented document 07/1972r2, the current PAR and 5 criteria document.

Michael: What I notice seems to be missing how the 802.1 session reservation protocol interoperates with 802.11

?: This could be handled in 802.1 as it has sections for link specific aspects, without the need for it to be in the VTS PAR.

Chair recesses the meeting.