
**IEEE P802.11
Wireless LANs**

Tentative Minutes of the IEEE P802.11 Full Working Group

March 12 - 15, 2001

Marriott Hilton Head, Hilton Head Island, SC

Opening Session: Monday, March 12, 2001

1.1. Introduction

- 1.1.1. Meeting called to order by Stuart Kerry at 1300 hrs. Agenda of 66th session of 802.11 is in doc.: IEEE P802.11-01/114r2
- 1.1.2. Secretary – Tim Godfrey

1.2. Review of 802.11 Organization

1.3. Roll Call

- 1.3.1. The 168 people in the room introduced themselves.

1.4. Objectives for this meeting:

- 1.4.1. TGb – reviewing comments on sponsor ballot
- 1.4.2. TGd – reviewing comments on sponsor ballot
- 1.4.3. TGe – preparing a draft for QoS and Security
- 1.4.4. TGf – prepare first draft for recommended practice
- 1.4.5. TGg – completing selection process, release first draft
- 1.4.6. T Gh – refining initial documents, receiving proposals
- 1.4.7. 5GHz Globalization – interoperating with ETSI and MMAC
- 1.4.8. Radio Regulatory AdHoc – output statements to administrations
 - 1.4.8.1. Note of FCC liaison 6:30 Tuesday evening.
- 1.4.9. Publicity Ad Hoc -
- 1.4.10. WG Chairs Ad-Hocs / Co-Existence

1.5. Review of Schedule

- 1.5.1. Change to Tuesday Morning: add TGg – 8:00 to 10:00

1.6. Review of voting rights, Logistics, etc

- 1.6.1. After this meeting there will be a 10 minute new-member orientation.
- 1.6.2. Access to web site private area granted after attending one meeting.
- 1.6.3. Review of membership

- 1.6.3.1. Currently 468 people are members of the group (in the data base)
- 1.6.3.2. We have 169 voters
- 1.6.3.3. There are 42 nearly voters
- 1.6.3.4. Potential voters: 211
- 1.6.3.5. Aspirant voters: 179
- 1.6.4. Documentation procedure review
 - 1.6.4.1. Primary documentation on servers with wireless access
 - 1.6.4.2. Templates are mandatory, and proper formatting is required.
 - 1.6.4.3. Documents available on server and flash cards one meeting session in advance (AM/PM)
 - 1.6.4.4. New document numbering format 11-01-xxxxrn-TGz-nnnnnnn
 - 1.6.4.5.
- 1.6.5. Attendance book procedure review
 - 1.6.5.1. Now in two books: Blue: Voters, Green: New
- 1.6.6.
- 1.7. Review of Patents and IP Policy**
 - 1.7.1. If you know about any patents or patent applications that may be required to implement the standard, make it known to the working group chair.
 - 1.7.2. See the Document 01/024 on the web site.
 - 1.7.3. IEEE owns copyrights for documents and standards
- 1.8. Review of ExCom business**
 - 1.8.1. Consideration of coexistence and regulatory functions study group
 - 1.8.2. Possibility of splitting TGe PAR into QoS and Security.
 - 1.8.3. Consideration of 5GSG partnership similar to 3G wireless.
 - 1.8.4. SEC is considering Bob O'Hara as recording secretary.
- 1.9. IP Statements received**
 - 1.9.1. TI, AT&T, WiLan,
 - 1.9.1.1. Symbol Technologies - waiting for clarification
- 1.10. Review of Agenda**
 - 1.10.1. No Old Business
 - 1.10.2. No New Business
- 1.11. Approval of Agenda**

1.11.1.	Approved by unanimous consent without objections
---------	--
- 1.12. Review of minutes from Tampa Meeting**
 - 1.12.1. No matters arising from minutes
 - 1.12.2. Minutes approved without objection
- 1.13. Subgroup Updates**

- 1.13.1. TGbCor1 – Carl Andren
 - 1.13.1.1. Passed on Sponsor Ballot, with two comments. They were resolved, so another sponsor ballot will take place in the next two months
- 1.13.2. TGd – Bob O'Hara
 - 1.13.2.1. 802.11D draft 2.0 passed sponsor ballot. 38 for 3 against. There are 55 comments, 32 technical, that need to be resolved this week.
- 1.13.3. TGe – John Fakatselis
 - 1.13.3.1. TGe will begin today at 3:30pm. The goal is for both subgroups to run in parallel and generate a letter ballot by the end of this week.
- 1.13.4. TGf – Dave Bagby
 - 1.13.4.1. Agenda is to deal with comments from the output of last meeting. The goal is to get to a letter ballot this week.
- 1.13.5. TGg – Matthew Shoemake
 - 1.13.5.1. Continue the selection procedure. Procedure is down to the last 3 steps. The first vote will take place tomorrow morning.
 - 1.13.5.2. Other groups will be notified of the voting times. Agenda will be set this evening.
- 1.13.6. TGh – Mika Kasslin
 - 1.13.6.1. Reviewing contributions.
- 1.13.7. 5GSG – Bruce Kraemer
 - 1.13.7.1. First meeting tomorrow with Julius from the FCC. SG will be reviewing the PAR and 5 Criteria. Consideration of intent to form partnership project with ETSI. Reviewing proposals on interworking.
- 1.13.8. Regulatory Ad Hoc – Vic Hayes
 - 1.13.8.1. So far this group has been an Ad Hoc within 802.11. The group has been made permanent. There are ongoing discussions of how the group can work with .11, .15, and .16.
 - 1.13.8.2. Discussion of interaction with FCC at last meeting. Liaison papers will be reviewed again this week.
 - 1.13.8.3. FCC was invited to this meeting. Julius Knapp will attend this meeting and present Tuesday evening. He will also attend various task group sessions.
- 1.13.9. Publicity – Al Petrick
 - 1.13.9.1. Joint between .11 and .15. Working on web site presentation. Finalize a wireless LAN forecast. Coordination of WECA labeling and branding activities. Update on OFDM forum.

1.14. Liaison Updates

- 1.14.1. Liaisons are required to make reports to their sending groups.
- 1.14.2. Described in doc 00/406r2
- 1.14.3. Reports
 - 1.14.3.1. From 802.11 to 802.15 – Bruce Kraemer, Peter Murray, Al Petrick.
 - 1.14.3.1.1. Liaison Report from Bruce Kraemer
 - 1.14.3.1.1.1. 15.1 is in the final stages of approving Bluetooth.
 - 1.14.3.1.1.2. 15.2 is working on coexistence mechanisms. There might be voting
 - 1.14.3.1.1.3. 15.3 is working on high rate PAN standards based on MAC and PHY baselines.

- 1.14.3.1.1.4. 15.4 is working on low rate, now collecting proposals.
 - 1.14.3.2. From 802.11 to 802.16 – Naftali Chayat, John Kowalski.
 - 1.14.3.2.1. No reports currently
 - 1.14.3.3. From 802.11 to ETSI – David Skellern
 - 1.14.3.3.1. No Report
 - 1.14.3.4. From 802.11 to WECA – Jim Zyren
 - 1.14.3.4.1. No Report
 - 1.14.3.5. From 802.11 to P1363 – Glenn Zorn
 - 1.14.3.5.1. No Report
 - 1.14.3.6. From 802.11 to IEEE1394 – Benno Ritter
 - 1.14.4. No Report
 - 1.14.5. Plan for future Liaison roles and responsibilities
 - 1.14.6. We are not getting the most out of our Liaisons, so we are considering changes. We are considering having Liaisons to specific task groups, appointed by the chair.
 - 1.14.7. We hope to get more information.
 - 1.14.8. The chair has the right to change the liaison at his discretion.
 - 1.14.9. We expect the liaisons to give us reports, including briefing our group on any reports given to the groups they are liaison to.
 - 1.14.10. This will be a rules change in the operating rules of 802.11 by the Chair.
 - 1.14.10.1. The chair will have the ability to bestow voting right to the liaisons.
 - 1.14.10.2. There is no dissent to this rules changes
- 1.15. Review of Agenda for Wednesday Joint session**
- 1.15.1. Joint discussion on the subject of the Regulatory SG as an 802 WG.
 - 1.15.1.1. Vic's time in this session will be extended in the agenda.
 - 1.15.2. Presentation from the IEEE1394 TA.
 - 1.15.3. Request for a presentation on requirements for high quality AV transmission in the Joint session.
 - 1.15.4. Approval of Agenda for the Joint .11 / .15 Meeting
 - 1.15.4.1. Amended and Approved as amended, without objections.
- 1.16. Review of Documents and Submissions**
- 1.16.1. Harry Worstell
 - 1.16.2. Up to 160 document this year.
 - 1.16.3. Requests for document numbers require the title and author on a slip of paper given to Harry.
- 1.17. Old Business**
- 1.17.1. None
- 1.18. New Business**
- 1.18.1. None
- 1.19. Announcements**

1.19.1. None

1.20. *New Members Orientation*

1.21. *Agenda notes*

1.21.1. The chair notes that the agenda will go until 11:00PM in the evening for this meeting to accommodate work in TGg, but in the future, the evening adjournment will be at 9:30PM

1.22. *Recess for subgroups*

2. Joint 802.11 / 802.15 Plenary Session, March 14, 2001 13:00

2.1. Opening

2.1.1. The meeting was called to Order by Stuart Kerry.

2.2. Agenda Review

2.2.1. Document 01/114r3

2.2.2. Roll Call Banished

2.3. Announcements

2.3.1. Vic Hayes has a meeting at the Standards Board, his agenda slot will be moved up.

2.3.2. Documentation for Venus server: TO_DOC_KEEPER is not to be used as a working area. A working area will be set up for that purpose with write permission.

2.3.3. Attendance book for 802.11 – The books have not been circulating very well. Please move them along.

2.4. Agenda

2.4.1. Has been pre-approved

2.5. Minutes

2.5.1. Have already been approved

2.6. Old Business

2.6.1. Working Group Activities

2.6.1.1. Social is tonight outside

2.6.2. Forming “Go Team” to set up network for Interim meetings, combination of 802.11 and 802.15 members. Soliciting volunteers.

2.6.3. Issues with room space – TGe will be getting more space since TGg has adjourned for the week.

2.6.4. Review of Interim meetings

2.6.4.1. May 2001 – Orlando meeting is using the 802 structure to support the meeting much like a Plenary. 4 groups .11, .15, .16, .17. Radisson Hotel opposite Disney World. Room Rate is \$129 US per night. Cutoff Date is April 6 2001.

2.6.4.2. September 2001 – Sydney Australia (one international location per year is the intention). Viewpoints on typical costs for travel: The Regent Sydney, A Four Seasons Hotel, Sydney. www.regenthotels.com. Approx \$143 to \$166 per night in US dollars for group rate. 3 days before and 3 days after. Meeting space is complementary. Air Fares 1368 to 1833 US\$. One Month advance. The only downside is a long flight. To facilitate approvals, IEEE will provide letter of rationale. The Host for this meeting is Motorola.

2.6.4.2.1. Sanity Check / Straw Poll: How many are planning to attend? 140 How many cannot attend? 5 How many would prefer an alternative? 5

2.6.4.2.2. The Chairs will proceed with the Sydney Location.

2.6.4.3. General note on future meetings – we will try to spread out the city locations and region. We will identify locations and suggest to this group. We can easily find hosts within the working group for the selected location within our large group.

2.6.5. Review of Financials

2.6.6. Review of Wireless Network Status

2.6.7. Task Group Reports

- 2.6.7.1. 802.11b-cor1 – no work this session because sponsor ballot did not go out. Will take place before the Orlando meeting.
- 2.6.7.2. 802.11 TGd – there has been one meeting. In process of resolving comments. TGd has processed 15 of 32 technical comment, there are 23 editorial comments. Expecting to process all comments. The new draft will be forwarded from the closing plenary to a sponsor recirculation ballot.
- 2.6.7.3. 802.11 TGe – planning to start letter ballots for both subgroups. We will have voting in tomorrow's session to approve the draft.
 - 2.6.7.3.1. 802.11 TGe QoS – We have completed presentation of papers. We have three areas, an extension of DCF, FEC, and the Hybrid Coordination Function HCF. These will come up for vote in the QoS New Business at 4:30 today.
 - 2.6.7.3.2. 802.11 TGe Security – Security has a motion to split TGe into two Task Groups. This will be raised into TGe Thursday. The security worked on new PARs. 166, 167 and 168 are the new PAR related document. The Security text is 018r4. Expecting to take it to letter ballot this meeting.
 - 2.6.7.3.3. TGe Q&A –
 - 2.6.7.3.3.1. When is the vote? TGe full session is tomorrow at 1:00PM.
- 2.6.7.4. 802.11 TGf – A document 01/102r2 has been provided and is on the server. The motion to adopt as draft has been tabled until tomorrow.
- 2.6.7.5. 802.11 TGg – TGg has been continuing the selection process. Final summaries and statements for 3 proposals were done yesterday. Document 01/180 contains the results of today's first down-selection vote. 48% OFDM 43% PDCC 6% MBCK. MBCK was eliminated. A motion was passed to adjourn TGg for this session to look for compromise on the remaining 2 proposals.
- 2.6.7.6. 802.11 TGh – TGh is enhancing the 802.11 MAC and PHY for 5G regulatory acceptance (DFS/TPC). TGh has been reviewing one proposal. Have also met with Julius Knapp of the FCC.
- 2.6.7.7. 802.11 5GSG – the intent is to get to a single global standard for 5GHz WLAN. The group has decided to create an intermediate step – interworking – to allow data exchange between the systems. The study group has not changed into a task group, so it has voted to continue the Study Group until the July 2001 Plenary. The group has prepared a 5 Criteria and PAR, which has been updated. They were approved within the study group. The documents are on the server as document 172 and 172. They will be voted on in the closing plenary tomorrow.
 - 2.6.7.7.1. Q&A
 - 2.6.7.7.1.1. Normally the study group would expire at this meeting. There will be motions to extend? Yes it will be made in today's 802.11 WG. A separate step is to forward the PAR and 5 criteria.
 - 2.6.7.7.1.2. The 802.11 Chair has had discussions with Jamshid and Jim Carlo on the "one standard" concept. They are going to also involve ETSI/BRAN.
- 2.6.7.8. Publicity Committee – Joint .11 and .15. Focused on WLAN forecast update. A motion was passed to have the staff of the IEEE investigate conducting their own survey. WECA coordination between 802.11. It has been observed that 802.11b has been termed WiFi exclusively in the market. A motion was passed to have the liaison from 802.11 to WECA

- communicate that some reference to 802.11b be kept in products and collateral.
- 2.6.7.9. 802.15.1 – First letter ballot received back. 46:4:1. 96% affirmation. 377 comments, 100 technical. Comment resolution in process. 3 of the 4 no votes will change to approve today. Will seek a recirculation.
- 2.6.7.10. 802.15.2 – Coexistence. In selection process for a coexistence mechanism. Have selected collaborative mechanism, will later select non-collaborative mechanism. Have had Julius Knapp in the meetings for consultation.
- 2.6.7.10.1. Q&A
- 2.6.7.10.1.1. Is there any conclusion on adaptive hopping?
There are going to pursue an NPRM – FCC is heading in that direction.
- 2.6.7.11. 802.15.3 – High Rate. Just approved a baseline draft standard. Still working with issues with contention free part of frames. Draft will be ready for WG ballot in May or July. Perhaps to Sponsor Ballot with .1. Working with 802.11 for liaisons. Currently only in 2.4GHz band, but will move to 5GHz in the future. Wanting to create coexistence model.
- 2.6.7.11.1. Q&A
- 2.6.7.11.1.1. How is liaison proceeding? 802.11E is ready to go to ballot. When will this work start? No liaison is in place yet. Only common membership.
- 2.6.7.12. 802.15.4 – Low Rate. There were a series of applications presented, resulting in criteria matrix. Call to propose has closed with 10 responses. 9 still in the running. The week has been spent hearing overviews of the proposals. Will be preparing a comparison criteria and voting process for selection this week.
- 2.6.8. Official “thank you” to Julius Knapp of the FCC for his participation and input this week.
- 2.6.9. Review of Radio Regulatory
- 2.6.9.1. Report in document RR 01/008
- 2.6.9.2. The regulatory Ad Hoc has been working to become a permanent group. It should be a standing committee for regulatory matters in each WG. Credit for attendance will go back to the WG. There will be no separate membership. Group will have an inter-meeting charter.
- 2.6.9.3. Using the COMMIT motion to enable activities.
- 2.6.9.4. Fixed meeting plans on all three WG agendas.
- 2.6.9.5. Wireless Technical plenary to be scheduled at a time when no other wireless regulatory related committees are scheduled.
- 2.6.9.6. Preparing a position statement to send to FCC for responses. Motion to send out will be on Thursday.
- 2.6.9.7. Document 180 and 181 were withdrawn.
- 2.6.9.8. Developed 6th criterion for wireless PARs. Passed 4:00, 2:0:0 and 2:0:0 Will be brought to the wireless WGs for approval.
- 2.6.9.9. Motion – to submit a document (11-01-095r2) proposing a rules change for adding a sixth criterion to the 802 operating rules to the SEC. When all three wireless working groups have approved the submission.
- 2.6.9.9.1. Moved Vic Hayes
- 2.6.9.9.2. Second Michael Fischer
- 2.6.9.9.3. Point of order – document is not on server
- 2.6.9.9.4. Motion postponed until Thursday.
- 2.6.9.9.4.1. No Objection
- 2.6.10. Joint Coexistence Task Group recommendation

- 2.6.10.1. A superset of 802.15.2. Still in organizational phase. There are unlicensed band standards activities in 802.11, 802.15, and 802.16. We need to address inter-WG coexistence issues.
- 2.6.10.2. It will be voted on in ExCom to form a study group. A new PAR or TAG will be proposed.

2.6.10.3. Motion – to form an 802 level study group on wireless coexistence, reporting to the 802 executive committee.

- 2.6.10.3.1. Moved Jim Lansford
 2.6.10.3.2. Second Steve Shelhammer
 2.6.10.3.3. Motion ID 263
 2.6.10.3.4. Discussion

- 2.6.10.3.4.1. How do you see this interrelating with the work of 802.15.2? The 802.15.2 PAR is specific to 802.15.1 and other technologies. This would be a forum for any wireless standards. There would be liaisons from each group.
- 2.6.10.3.4.2. Does this actually create the study group? No, we informed ExCom on Monday, and we will take it back to them on Thursday. This is for the approval of .11 and .15.
- 2.6.10.3.4.3. What is the position on the technical work that could be done by this group – would it have oversight over 802 WGs? Would there be veto power over 802 standards? That is not expected. It will make recommendations to ExCom, and they will make the decisions.

- 2.6.10.3.5. Vote on the motion (802.11): Passes 65:3:8
 2.6.10.3.6. Vote on the motion (802.15): 23:0:2

- 2.6.11. Announcement – the 4:00PM TGe/Sec has been moved to Indigo. The 802.11 TGe/QoS is in A&B.
- 2.6.11.1. Other announcements to be posted.
- 2.6.12. IEEE 1394 Trade Association
- 2.6.12.1. Peter Johansson
- 2.6.12.2. 802.11 document 01/181r0
- 2.6.12.3. Looking to 802.11E as a wireless transport for IEEE 1394 for AV and other applications.
- 2.6.12.4. Need to support arbitrary connectivity between wired IEEE1394 and wireless. Investigating approach and scope of work. Analogous to HiperLAN convergence layer. Define a bridge between 1394 and 802.11
- 2.6.12.5. IEEE 1394 Trade Association has scoped a project to accomplish these goals.
- 2.6.12.6. Needs Isochronous data, reliable QoS, perhaps FEC.
- 2.6.12.7. Q&A
- 2.6.12.7.1. Are you coordinating with other groups? There will be a study group formed to work on transmission of high quality AV?

2.7. **New Business**

2.7.1. Requirements for high quality AV transmission

- 2.7.1.1. John Kowalski
- 2.7.1.2. 802.11 document 01/159r0
- 2.7.1.3. AV was designed for Isochronous, contention-free environments. Tight control of parameterized QoS.
- 2.7.1.4. These things are being addressed in 802.11E.

- 2.7.1.5. There is a requirement that the transmitter know the receiver buffer characteristics, thus tight jitter requirements.
- 2.7.1.6. Recommends that a Study Group be formed to recommend practices for AV transmission over 802.11.
- 2.7.1.7. Q&A
 - 2.7.1.7.1. Comment: These requirements have been included in 802.15.3 call for applications.
 - 2.7.1.7.2. If .11 and .15 can accommodate 1394, what else do you need to do? That is not demonstrated yet – however you may have specific protocol developments independent of 1394.
 - 2.7.1.7.3. Are there any issues that are not being addressed by 802.11? off-line

2.8. Adjourn Joint 802.11 / 802.15 session

3. 802.11 Plenary Session, March 14, 2001 15:30

3.1. Opening

- 3.1.1. Called to order by Stuart Kerry at 15:30
- 3.1.2. Agenda as approved in first session
 - 3.1.2.1. Approved without objection

3.2. Announcements

- 3.2.1. Communication Design Conference Oct 1st to 4th.
 - 3.2.1.1. Looking for abstracts on Home Networking Design. Papers on QoS
 - 3.2.1.2. Al Petrick is the Chair. Abstracts due 3 week of March
- 3.2.2. In the July IEEE magazine there will be an overview article on wireless standards.

3.3. Renewal of 5GSG

- 3.3.1. Background – Two step approach, first an “InterWorking” approach, then a single global standard.
- 3.3.2. The PAR and 5 Criteria were not completed on schedule, so the SG needs to be renewed until the next plenary.
- 3.3.3. There has been unanimous approval in the study group.

3.3.4. Motion – that we request the 802 Executive Committee to extend the 5GSG through the next 802 plenary meeting to be held in July 2001.

- 3.3.4.1. Moved Bruce Kraemer
- 3.3.4.2. Motion ID 264
- 3.3.4.3. Discussion

- 3.3.4.3.1. Was a PAR forwarded for tonight’s ExCom? No, the SG will expire tomorrow unless we pass this motion.
- 3.3.4.3.2. Has anyone assessed the level of effort? What about other things coming into the band? The member bodies have complete control over the MAC and PHY definitions, with agreement to participate in harmonization. The scope is big enough to merge three known standards, but the group is not looking to add others (such as 15.3).

3.3.4.4. Vote on the Motion (procedural): Passes 74:6:4

3.4. Requirements for High Quality AV Transmission

- 3.4.1. Background – there has been substantial discussion since the joint meeting. Two requests:
 - 3.4.1.1. Is it possible to form an 802. level group for radio consumer equipment.
 - 3.4.1.2. Within that group, an 802.11a group to work on the text.
- 3.4.2. A motion will not be made in this group.

3.5. Announcement – Documentation

- 3.5.1. A Working Area has been created in TO_DOC_KEEPER called GROUP_SHARED_AREA. Do not submit or present documents without document numbers.

3.6. Recess for Subgroups

4. 802.11 Closing Plenary Session, March 15, 2001

4.1. Opening

- 4.1.1. Call to Order at 3:30PM by Stuart Kerry
- 4.1.2. Operating on the agenda as approved Monday.

4.2. Agenda review – document 01/114r3

4.3. Motion - to suspend the rules and not adjourn until we have addressed every topic, and move the QoS TGe subject to the top of the agenda.

- 4.3.1. Moved John Fakatselis
- 4.3.2. Point of order – motion deals with two independent issues and is out of order.
- 4.3.3. Discussion

4.4. Move to modify the agenda to make the time to adjourn to be immediately after all subjects on the adopted 802.11 agenda have been addressed.

- 4.4.1. Moved Dave Bagby
- 4.4.2. Second Michael Fischer
- 4.4.3. Point of Order – there wasn't time to allow a second to the original motion. Yields.
- 4.4.4. Discussion

- 4.4.4.1. This is trying to make it smoother. We just ran out of time in the previous session. That is all this intended to do.
- 4.4.4.2. In favor of this motion , call the question.
- 4.4.4.3. No Objection

- 4.4.5. Vote on the motion: Passes 65:2:7

4.5. Motion to suspend the rules and make TGe QoS to the top of the agenda for our discussion today.

- 4.5.1. Moved John Fakatselis
- 4.5.2. Second Michael Fischer
- 4.5.3. Discussion

- 4.5.3.1. Against the motion because it put the subject absolutely first, and is likely to eat the most time. Would like to get to the other business.
- 4.5.3.2. In favor, because there is important work to do.
- 4.5.3.3. Against the motion, there is no danger in running out of time, there is no reason to change the order.
- 4.5.3.4. Parliamentary Enquiry – It has been noted that this is debatable.

- 4.5.4. Vote on the motion (2/3): passes 60:11:9

4.6. TGe QoS Discussion

- 4.6.1. Point of order – the motion we just passed was for discussion. No motions can be made. Suggest that there is a best way to handle this. These motions should be made in new business.
- 4.6.2. Accepts the comment. The intent was to bring motions. Will yield to anyone
- 4.6.3. No further Discussion.

4.7. Announcements

- 4.7.1. Update reports by March 21st.
- 4.7.2. Agendas for May meeting by April 21
- 4.7.3. Chairs meetings April 9, April 30
- 4.7.4. Web site posting will be by April 13th
- 4.7.5. Document list update
 - 4.7.5.1. 204 documents in 2 sessions.
 - 4.7.5.2. We have opened an area on the server for working documents. Documents should be removed by the end of the day? This is not for member use, but for the chairs. This is on trial basis.
 - 4.7.5.3. The timing on the agenda is for the Chairs purpose in moving the meeting ahead.

4.8. Reports from subgroups

- 4.8.1. TGb report
 - 4.8.1.1. Has not contacted IEEE for recirculation ballot yet.
- 4.8.2. TGd report
 - 4.8.2.1. Report in document 01/190. Minutes in 195.
 - 4.8.2.2. Resolved 55 comments, 32 technical, 31 resolved, 1 withdrawn. All editorial comments were accepted.
 - 4.8.2.3. Motion – to adopt the comment resolutions in document “11-01-189r0-D-802.11D Sponsor Ballot 1 Comment Resolutions”.

4.8.2.3.1.	Moved Bob O’Hara
4.8.2.3.2.	on behalf of TGd
4.8.2.3.3.	No discussion
4.8.2.3.4.	Vote: Passes 55:0:4
 - 4.8.2.4. Document 802.11d-D3.PDF is the output document
 - 4.8.2.5. Moved that 802.11d Draft 3 (file 802-11d-D3.pdf) be forwarded for sponsor recirculation ballot

4.8.2.5.1.	Moved Bob O’Hara
4.8.2.5.2.	on behalf of TGd
4.8.2.5.3.	no discussion
4.8.2.5.4.	Vote: Passes 64:0:5
 - 4.8.2.6. Moved that the 802 SEC be requested to grant conditional approval to forward 802.11d-D3 to REVCOM for approval, once the recirculation ballot is successfully concluded.

4.8.2.6.1.	Moved Bob O’Hara
4.8.2.6.2.	on behalf of TGd
4.8.2.6.3.	No Discussion
4.8.2.6.4.	Vote: 66:0:4

- 4.8.2.7. The no voters have all changed their votes to “approve”
- 4.8.2.8. No discussion
- 4.8.2.9. On behalf of 802.11, we wish Bob the best luck for his approval in ExCom

4.8.3. TGe report

- 4.8.3.1. Approved four motions on the Security subgroup, and two motions from the QoS Subgroup.

4.8.3.2. Motion: TGe Security sub group formally requests that the TGe PAR be separated into Security and the remainder of TGe

- 4.8.3.2.1. Moved John Fakatselis
- 4.8.3.2.2. on behalf of TGe
- 4.8.3.2.3. No Discussion
- 4.8.3.2.4. Vote – 75:1:3

4.8.3.3. Move to forward documents 01/166, 01/167, and 168 to Standards Board for approval.

- 4.8.3.3.1. Moved John Fakatselis
- 4.8.3.3.2. on behalf of TGe
- 4.8.3.3.3. No Discussion
- 4.8.3.3.4. Vote – 70:1:2

4.8.3.4. Move that document 01/018r4 be adopted as the TGe Security draft text.

- 4.8.3.4.1. Moved John Fakatselis
- 4.8.3.4.2. on behalf of TGe
- 4.8.3.4.3. Discussion

4.8.3.4.3.1. If this passes, the document will have a name? Will it be Security Draft D1? What will be the name of the forwarded draft.

4.8.3.4.3.2. Amendment

- 4.8.3.4.3.2.1. Dave Bagby
- 4.8.3.4.3.2.2. Seconded John F.

4.8.3.4.4. Amend to: Move that document 01/018r4 be adopted as the TGe Security draft text as D1.0.

4.8.3.4.4.1. Question called on the amendment, no objection.

4.8.3.4.4.2. Vote on the amendment: 66:0:2

4.8.3.4.4.3. Second to the motion as amended: Michael Fischer.

4.8.3.4.5. Vote on the main motion as amended: Passes 67:0:4

4.8.3.5. Move to conduct a WG letter ballot to forward document TGe Security draft D1.0 to Sponsor Ballot under the new PAR in document 01/166, subject to the approval of the PAR.

- 4.8.3.5.1. Moved John Fakatselis
- 4.8.3.5.2. Second Michael Fischer
- 4.8.3.5.3. No Discussion
- 4.8.3.5.4. Vote: Passes 78:1:1

4.8.3.6. Motion to adopt the HCF proposal by adopting the text changes from submission 01/110r0.

- 4.8.3.6.1. Moved John Fakatselis

- 4.8.3.6.2. on behalf of TGe
- 4.8.3.6.3. No Discussion
- 4.8.3.6.4. Vote: Passes 63:2:6

4.8.3.7. Motion to adopt document 120r3 as the draft text for clause 7.5.

- 4.8.3.7.1. Moved John Fakatselis
- 4.8.3.7.2. on behalf of TGe
- 4.8.3.7.3. No Discussion
- 4.8.3.7.4. Vote: 62:2:4

4.8.4. TGf report (in document 192)

4.8.4.1. On behalf of TGf, to adopt doc 01/102r2 as the initial draft of 802.11F

- 4.8.4.1.1. Dave B
- 4.8.4.1.2. on behalf of TGf
- 4.8.4.1.3. No discussion
- 4.8.4.1.4. Vote: passes 61:0:5

4.8.4.2. Move to conduct a working group letter ballot to forward the 802.11F draft D1 to sponsor ballot.

- 4.8.4.2.1. Dave B
- 4.8.4.2.2. on behalf of TGf
- 4.8.4.2.3. Discussion

- 4.8.4.2.3.1. Comment that we want to get this to letter ballot, there are particular places for voters to comment, so it is not expected to pass the first time.
- 4.8.4.2.3.2. How many letter ballots are expected to come out of committee this week? How many will we have in parallel? We are all members and have the responsibility to review and vote. The time for ballots may be doubled.

- 4.8.4.2.4. Vote: Passes 66:0:1

4.8.4.3. Goals for May – processing comments for letter ballot. Consideration on how to go forward with 802.11E support as a second phase.

4.8.4.4. Discussion

- 4.8.4.4.1. Congratulations to the TGf Group.

4.8.5. TGg report

4.8.5.1. The TGg session adjourned on Wednesday and gave the final report then.

4.8.6. TGh report (document 199)

4.8.6.1. Chair goes to Al Petrick for a minute, and then Al has to leave the meeting. The Chair then goes to Harry Worstell.

4.8.6.2. Discussed requirements, reviewed 3 proposals.

4.8.6.3. Motion – to close the proposal submission period for TGh on April 14, 2001.

- 4.8.6.3.1. Mika K
- 4.8.6.3.2. on behalf of TGh
- 4.8.6.3.3. Discussion

- 4.8.6.3.3.1. Does this do anything? Since there is no meeting in session on that day? We had a motion to close before, but we wanted to speed up the process.
- 4.8.6.3.3.2. There are a very small number of people participating? The meetings had 20 to 25 people. Most

of the people were non-voters. This is new business and new participants.

4.8.6.3.4. Vote: 51:0:7

4.8.6.4. Future plans and objectives – will release final CFP, complete steps 4-6 in selection process. Will review proposals, select the mechanisms, and create a draft.

4.8.6.5. Final Discussion

4.8.6.5.1. How are you dealing with regulatory issues and whether this is acceptable? Not as a group.

4.8.7. 5GSG Report

4.8.7.1. Working towards a single global standard for 5GHz. Were not able to promote the SG to a task group, the SG was requested to be extended.

4.8.7.2. Next meeting at BRAN 23 in Sophia Antipolous

4.8.7.3. Working on an interim interworking proposal. International effort from many different standards organizations.

4.8.7.4. Have reviewed various proposals for interworking.

4.8.7.5. Looking for a name for the second phase of a single global standard. Similar in concept for 3GGP. Detailed progression to global standard, and convergence architectures.

4.8.7.6. Move that we accept the PAR document (172) and present it to the 802 Executive Committee for approval.

- 4.8.7.6.1. Moved Bruce Kraemer
- 4.8.7.6.2. on behalf of 5GSG
- 4.8.7.6.3. No Discussion
- 4.8.7.6.4. Vote: passes 41:8:17

4.8.7.7. Move that we accept the 5 criteria document (173) and present it to the 802 Executive Committee for approval.

- 4.8.7.7.1. Moved Bruce Kraemer
- 4.8.7.7.2. on behalf of 5GSG
- 4.8.7.7.3. Discussion

- 4.8.7.7.3.1. What about the 6th criteria? It hasn't been approved yet, but this PAR answers the spirit of coexistence.
- 4.8.7.7.3.2. The 6th criteria is also about regulatory approval? Yes, we address these rules as well. Some of this work is done in TGh also.

4.8.7.7.4. Vote: passes 42:6:13

4.8.8. Radio Regulatory Report

4.8.8.1. Report on the network at Hilton Head

4.8.8.2. Regulatory – objectives to establish regulatory as permanent group with charter.

4.8.8.3. Successful visit of FCC Julius Knapp.

4.8.8.4. Move to submit document proposing a rules change for adding a 6th criterion to the 802 operating rules (11-01/095r2 / 15-01/71r1 / 16-01-??) to the SEC, when all three wireless working groups have approved the submission

- 4.8.8.4.1. Moved Vic Hayes
- 4.8.8.4.2. Discussion

4.8.8.4.2.1. Have any of the other WGs made a decision? 802.15 has tabled this motion

- 4.8.8.4.2.2. 095r2 is not on the server. 802.16 would like to split this into two different criterion. This needs more discussion among the wireless chairs.
- 4.8.8.4.2.3. There is no document number for 802.16? Not yet. The promised to put it on their agenda today.
- 4.8.8.4.2.4. This or something like it is necessary. There are multiple standards being developed for the same radio bands. Supports this.
- 4.8.8.4.2.5. Supports the idea, but the it has not been thought through with the other groups as a total concept. We need to consider the administrative issue before we move ahead.
- 4.8.8.4.2.6. What about groups that already exist? No effect. This cannot be retroactive.

4.8.8.4.2.7.

4.8.8.5. Move to postpone this motion to the opening plenary of the May meeting, and empower the May meeting to take action.

- 4.8.8.5.1. Moved Vic Hayes
- 4.8.8.5.2. Second John F
- 4.8.8.5.3. Discussion

4.8.8.5.3.1. Point of Order – two independent subjects in the motion. Should be ruled out of order. There is no provision to empower the body.

4.8.8.5.3.2. Chair rules that it is out of order.

4.8.8.5.3.3. Return to the original motion

4.8.8.6. Move to postpone the consideration of this motion until the May 2001 meeting.

- 4.8.8.6.1. Stuart Kerry
- 4.8.8.6.2. John Fakatselis
- 4.8.8.6.3. No Discussion
- 4.8.8.6.4. Vote: passes 42:1:11

4.8.8.7. Objectives – submit position papers, work on permanent committee, and 6th criterion.

4.8.9. Publicity Committee Report – document 201

4.8.9.1. completed objectives – wireless LAN forecast, calendar, WECA coordination.

4.8.9.2. Motion – to empower the publicity committee chair(s) to investigate having the IEEE staff conduct market research on 802.11a/b and Bluetooth/802.15 unit forecast.

- 4.8.9.2.1. Moved Al Petrick
- 4.8.9.2.2. Discussion

- 4.8.9.2.2.1. No approval, just investigate? Yes.
- 4.8.9.2.2.2. They do market surveys on their own.

4.8.9.2.3. Vote: Passes 52:0:4

4.8.9.3. WECA branding and labeling – need to keep the reference to IEEE 802.11b in products and reporting.

4.8.9.3.1.

4.8.9.4. Move that the liaison to WECA from 802.11 communicate our recommendation to continue making references to IEEE 802.11b in WiFi certified products, announcements, and other WECA communications

- 4.8.9.4.1. Moved Al Petrick
- 4.8.9.4.2. Discussion

- 4.8.9.4.2.1. Is there a possibility that 802.11-2002 will re-publish to eliminate suffix letters such as "a" and "b".
Motion to amend the motion to:
- 4.8.9.4.2.2. Peter E
- 4.8.9.4.2.3. Stuart K
- 4.8.9.4.2.4. Vote on the amendment. Passes 39:0:5

4.8.9.4.3. Motion as amended:

4.8.9.5. Move that the liaison to WECA from 802.11 communicate our recommendation to continue making references to IEEE 802.11 in WiFi certified products, announcements, and other WECA communications

4.8.9.5.1. Discussion on the motion

- 4.8.9.5.1.1. Who is the liaison from 802.11 to WECA? Jim Zyren.
- 4.8.9.5.1.2. We are saying the marketing organization we don't like their name? We shouldn't make a statement to WECA.
- 4.8.9.5.1.3. The intention was to substitute WiFi for 802.11b since it is not easy to remember.
- 4.8.9.5.1.4. The IEEE wants to see IEEE 802 promoted. WECA should involve IEEE.
- 4.8.9.5.1.5. Concur that IEEE needs further involvement with WECA. The identity of the standard is important.
- 4.8.9.5.1.6. At the last WECA meeting, the board said they want more use of WiFi and less of 802.11b. They want to get the WECA brand for 802.11a out before 802.11a becomes well known.
- 4.8.9.5.1.7. It sound like WECA is doing something else. Thus we should do this to maintain our standard's identity.
- 4.8.9.5.1.8. This is about marketing and promoting the product, not credit for the standard. WECA and IEEE are mutually beneficial.
- 4.8.9.5.1.9. Agreement with the preceding
- 4.8.9.5.1.10. Call the question

4.8.9.5.1.10.1. Dave B

4.8.9.5.1.10.2. Gary Spies

4.8.9.5.1.11. Vote on calling the question: 62:2:3

4.8.9.5.2. Vote on the motion: passes 35:20:8

4.8.9.6. Continue working on the web site, forecast, document.

4.8.9.7. The chair returns to Stuart Kerry

4.9. *Liaisons*

4.9.1. Personnel

4.9.1.1. Peter Johansson will be the liaison for 802.11 ↔ P1394.1.

4.9.1.2. Tim Blaney will be the liaison for 802.15 TG2 ↔ 5GSG

4.9.1.3. Mary Duvall will be liaison for 802.15 TG3 ↔ TGe

4.9.1.4. James Gilb will be liaison for 802.15 TG3 ↔ TGg

4.9.2. Liaison Reports

4.9.2.1. None present

4.10. *Old Business*

4.10.1. None from any subgroups

4.11. *New Business*

- 4.11.1. TGb –none
- 4.11.2. TGd – none
- 4.11.3. TGe

4.11.3.1. Motion to complete the HCF proposal by adopting the text changes for clause 9 from submission 01/110r1 for inclusion in the 802.11e-QOS draft D0.1

- 4.11.3.1.1. Moved Michael Fischer
- 4.11.3.1.2. Second Greg Chesson
- 4.11.3.1.3. Discussion

4.11.3.1.3.1. This is brought forward because of procedural issues. The material from clauses 5,6,7, and 10 has already been adopted in TGe QoS, in TGe. The clause 9 was not in that motion due to time limits. The motion was therefore split. This concerns the HCF as already presented in document 109r2 and other documents.

4.11.3.1.3.2. In favor of this motion. This is a valuable function that will benefit the process to have all the text.

4.11.3.1.3.3. Concern about when the document was available. In clause 9.10 last paragraph, there is something that wasn't discussed before.

4.11.3.1.3.4. That is a re-statement of something that is already in the standard in 9.3 second paragraph. This was not discussed since it has been around since 1993.

4.11.3.1.3.5. Are there any new things? Suggest that we let it go to letter ballot. Do not believe that there is anything fundamentally new. Cannot go into this at this time.

4.11.3.1.3.6. Are there any new items in the document?

4.11.3.1.3.7. The HCF facilities have been analyzed by the 1394 community, and support what it offers.

4.11.3.1.3.8. To repeat for those not in TGe QoS. This is not a final decision. We are trying to complete the process. We need a starting point to start converging. Without this key item we cannot go to letter ballot. We will proceed to the balloting process. There is no competing proposal for this mechanism. If anything comes up, we can deal with it

4.11.3.1.3.9. Only new issue is in 9.10.3 which is flagged as an open issue.

4.11.3.1.4. Call the question

- 4.11.3.1.4.1. John F
- 4.11.3.1.4.2. Vic Hayes
- 4.11.3.1.4.3. Vote on call the question: Passes 59:3:4

4.11.3.1.5. Vote on the motion : passes 61:1:4

4.11.3.2. Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1

- 4.11.3.2.1. Moved Greg Chesson
- 4.11.3.2.2. Seconded Frank Howley
- 4.11.3.2.3. Discussion

4.11.3.2.3.1. In favor of this motion. We have been working on the EDCF proposal for the past year. This is the result of a large amount of work.

4.11.3.2.3.2. Against the motion, since experiments have identified problems with DCF mechanisms. It seems like guarantees cannot be made for QoS. Believes that HCF already covers these issues. Don't believe we need any additional complexity.

4.11.3.2.3.3. In favor of this motion. It has been developed with multiple independent simulations. It is designed to work in conjunction with HCF.

4.11.3.2.3.4. With respect to anomalous effects, these simulations were done with the same simulator we use. There are reasons to think the fault is not in the MAC. The EDCF extensions should not be deprecated because of speculative problems. Just as the HCF mechanism, the EDCF is also being considered now because of procedural issues. This proposal has provable means for distinguishing traffic classes, and is applicable in a wide range of QoS applications. It is complementary to HCF.

4.11.3.2.3.5. Is this motion intended to only include the normative text? There has been confusion about the word normative. The intent is to incorporate only the normative text.

4.11.3.2.3.6. Move to amend to:

4.11.3.2.4. "Move to adopt the EDCF proposal by incorporating only the normative text from document 01/131r1 into the 802.11e-QOS draft D0.1

4.11.3.2.4.1. Moved Dave B

4.11.3.2.4.2. Second John

4.11.3.2.4.3. No discussion

4.11.3.2.4.4. Vote on the amendment: 64:1:7

4.11.3.2.5. Motion on the floor:

4.11.3.3. "Move to adopt the EDCF proposal by incorporating only the normative text from document 01/131r1 into the 802.11e-QOS draft D0.1"

4.11.3.3.1. Discussion

4.11.3.3.1.1. The "capture effect" was debated in 1993 in 802.11. In January this body voted on a down selection, but then they were merged. We adopted an EDCF placeholder. Was surprised to find three competing proposals. How does this resolve the compromise of January?

4.11.3.3.1.2. Clarification about HCF: It is a member of the class of Point Coordinator. It sits on the DCF. The HCF will work over DCF or any EDCF proposed. There is not a great deal of significance is whether there should be an EDCF. The answer is yes. It is needed for IBSS, for one. Of the proposals we went into the week with, this is the only one that presented a motion to adopt. For whatever reason, this was on the agenda. It is better that going forward with nothing.

4.11.3.3.1.3. In favor of the motion. It is a useful mechanism. The HCF had to invent a new channel access mechanism since the current DCF can't do that. The EDCF allows an opportunity to simplify the HCF. The HCF cannot work in an IBSS. If QoS is needed in an IBSS, EDCF is needed.

4.11.3.3.1.4. There were really two proposals. We found that VDCF and TCMA had a lot of commonality for access. The fact that they are merged should increase confidence. The results are credible due to independent simulations.

4.11.3.3.1.5. We don't expect this go through letter ballot unscathed. We need convergence and a draft get that for us.

4.11.3.3.1.6. Call the question

4.11.3.3.1.6.1. Amar

4.11.3.3.1.6.2. Greg C

4.11.3.3.1.6.3. No Objections

4.11.3.3.1.6.4. Vote on calling the question. Passes 51:4:4

4.11.3.3.2. Vote on the motion: Passes 52:4:9

4.11.3.4. The Chair moves to Al Petrick

4.11.3.5. Move that the TGe-QoS Draft D0.1 be submitted for working group letter ballot for approval to forward to sponsor ballot as TGe draft D0.2, after the editor incorporates the motions approved by the 802.11 plenary regarding text for inclusion to the TGe draft.

4.11.3.5.1. Moved John Fakatselis

4.11.3.5.2. Second Michael Fischer

4.11.3.5.3. Discussion

4.11.3.5.3.1. Asking for a ruling if this is in order due to the four hour rule.

4.11.3.5.3.2. The chair rules it is out of order.

4.11.3.5.3.3. Point of Information. Document 331r1 802.11 operating rules is it in force? Has it been approved? No it does not have to be approved it is the ruling of the chair.

4.11.3.5.3.4. Based on those rules, this motion is out of order.

4.11.3.5.3.5. Is it possible to suspend or modify the rules at this point?

4.11.3.5.4. Move that the four hour rule.....

4.11.3.5.4.1. Parliamentary enquiry – there was an error in interpreting the rule.

4.11.3.5.5. The chair retracts the ruling, and the motion is in order.

4.11.3.5.5.1. We move back to the motion on the floor:

4.11.3.6. Move that the TGe-QoS Draft D0.1 be submitted for working group letter ballot for approval to forward to sponsor ballot as TGe draft D0.2, after the editor incorporates the motions approved by the 802.11 plenary regarding text for inclusion to the TGe draft.

4.11.3.6.1. Discussion

4.11.3.6.1.1. This doesn't say that the letter ballot will be before the next meeting. When should we expect the letter ballot?

4.11.3.6.1.2. The editor says within 1 to 2 weeks. The number of steps is small.

4.11.3.6.2. Vote on the motion: Passes 49:1:3

4.11.4. TGf - none

4.11.5. TGg - none

4.11.6. TGh - none

4.11.7. 5GSG - none

4.11.8. Regulatory - none

4.11.9. Publicity - none

4.12. *Open Discussion*

4.12.1. None

4.13. *Adjourn*

Attendance list for the meeting held at **Marriot Hilton, Hilton Head, SC**

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Dr. Tomoko Adachi ()	nonvoter	100	+81 44 549 2283	Toshiba	tomo.adachi@toshiba.co.jp
Dr. L Enrique Aguado (Enrique)	voter	90	+44 113 233 2004	Supergold Communication, Ltd	enrique@supergold.com
Mr. Masaaki Akahane (Masa)	aspirant	15	+81 3 5795 5420	Sony Corporation	akahane@wcs.sony.co.jp
Mr. Richard Allen (Dick)	voter	90	+1 408 974 5265	Apple Computer Inc.	rallen@apple.com
Mr. Keith Amann (Keith)	voter	100	+1 303 440 5330	Spectralink	kamann@spectralink.com
Mr. Dov Andelman ()	nonvoter	75	+972 9 743 9701ext. 377	hLAN	dova@hlan.com
Mr. Merwyn Andrade ()	voter	90	+1 408 526 4628	Cisco Systems Inc.	mandrade@cisco.com
Mr. Carl F. Andren (Carl)	voter	100	+1 321 724 7535	Intersil Corporation	candren@intersil.com
Dr. Butch Anton	voter	100	+1 408 551 0800	hereUare Communciations, Inc.	butch@hereuare.com
Mr. Takashi Aramaki ()	aspirant	100	+81 468 40 5165	Panasonic	Takashi.Aramaki@yrp.mci.mei.co.jp
Mr. Larry Arnett ()	nonvoter	100	+1 408 774 3179	Mitsubishi Electric & Electronics USA, Inc.	larnetta@ieee.org
Mr. Geert Awater ()	aspirant	90	+31 30 276 3575	Woodside Networks	awater@woodsidenet.com
Mr. David Bagby	voter	100	+1 408 326 3762	3Com Corporation	david_bagby@3com.com
Mr. Jay Bain (Jay)	voter	100	+1 256 922 9229	Time Domain	jay.bain@tdsi.com
Mr. Steve Bard ()	nonvoter	90	+1 503 264 2923	Intel Corporation	steve.bard@intel.com
Mr. Gil Bar-Noy ()	aspirant	100	+972 9 743 9701 ext 200	hLAN	gilb@hlan.com
Mr. Kevin M. Barry (Kevin)	voter	100	+1 516 244 4345	SITA	kevin.barry@sita.int
Dr. Anuj Batra (Anuj)	voter	100	+1214 480 4220	Texas Instruments Incorporated	batra@ti.com
Mr. Joe Battelle ()	nonvoter	100	+1 650 230 3622	Netschools Corp	joeb@netschools.net
Mr. Bob Beach (Bob)	voter	100	+1 408 528 2602	Symbol Technologies Inc.	bobb@sj.symbol.com
Mr. Dennis Beaudoin ()	nonvoter	15	+1 214 480 3287	Texas Instruments	dbeaudoin@ti.com
Mr. Randolph Beltz ()	nonvoter	100	+1 603 337 5206	Enterasys.	rbeltz@enterasys.com
Ms. Mathilde Benveniste ()	nearly voter	100	+1 973 761 0988	AT&T Labs	benveniste@att.com
Mr. Don Berry (Don)	voter	100	+1 425 936 8418	Microsoft	donbe@microsoft.com
Mr. Peter Beucher ()	nonvoter	85	+1 255 922 9229 x6421	Time Domain	peter.beucher@timedomain.com
Mr. Timothy Blaney ()	nonvoter	90	+1 530 478 5606	Commcepts	tim@commcepts.net
Mr. Jan Boer (Jan)	voter	100	+31 30 609 7483	Agere Systems, Nederland	janboer@agere.com
Ms. Liza Boland ()	aspirant	90	+1 914 945 6189	Philips Research	liza.boland@philips.com
Mr. Jerrold L. Bonn (Jerry)	voter	100	+1 508 490 1771	Raytheon Company	jerrold_bonn@res.raytheon.com
Mr. Rocky Bridges ()	nonvoter	80	+1 408 727 7995	Advanced Broadband Communications, Inc.	rockyb@advbroadband.com
Mr. Ronald Brockmann (Ronald)	voter	100	+31 30 229 6081	Intersil N.L. B.V.	ronald.brockmann@nwn.nl
Mr. Robert Brummer ()	aspirant	75	415 558 4709	Dolby Laboratories Inc	rdb@dolby.com
Mr. Richard Bulman, Jr. ()	aspirant	100	+1 305 858 9615	Umbrella Capital	rdbmob@worldnet.att.net

Sunday, April 01, 2001

Page 1 of 8

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Mr. Kevin Burak ()	voter	100	508 261 4726	Motorola	Kevin.Burak@Motorola.com
Dr. Alistair G. Buttar ()	voter	100	+41 22 7991 243	Motorola	alistair.buttar@motorola.com
Mr. Dominick Cafarelli ()	voter	90	973 709 2004	Sniffer Technologies	dominick_cafarelli@nai.com
Mr. Colum Caldwell (Colum)	voter	90	+353 1 677 9555	Supergold Communication, Ltd	colum.caldwell@supergold.com
Mr. Clyde Camp ()	nonvoter	15	+1 610 878 5778	InterDigital Communications Corporation	clyde.camp@interdigital.com
Mr. Bill Carney ()	voter	85	+1 707 521 3069	Texas Instruments	bcarney@ti.com
Mr. Michael Carrafiello	voter	100	978 684 1552	Enterasys Networks, Inc	carrafie@enterasys.com
Mr. Pat Carson (Pat)	voter	90	+1 408 467 5218	TDK Corporation of America	pcarson@tdktca.com
Mr. Joan Ceuterick ()	nonvoter	90	+1 858 677 9967	National Semiconductor Corporation	joan.ceuterick@nsc.com
Dr. Kuor-Hsin Chang ()	nonvoter	75	+1 408 861 9550	Rainmaker Technologies, Inc.	kuorhsin@rainmakertechnologies.com
Mr. Hung-Kun Chen ()	aspirant	75	+886 3 553 9128	IPC Taiwan Laboratories	hkchen@inprocomm.com
Dr. James Chen ()	nonvoter	90	+1 408 773 5290	Atheros Communications	jamesc@atheros.com
Dr. Kwang-Cheng Chen ()	aspirant	90	+886 2 2363 5251 Ext 246	National Taiwan University	chenkc@cc.ee.ntu.edu.tw
Mr. Brian Cheng ()	voter	100	+ 1 613 592 2122	Mitel Corporation	brian_cheng@mitel.com
Dr. Greg Chesson ()	voter	100	+1 408 773 5258	Atheros Communications, Inc.	greg@atheros.com
Mr. Alan Chickinsky ()	nonvoter	100	+1 703 633 8300	TASC	achickinsky@tasc.com
Dr. Sunghyun Choi (Sunghyun)	voter	100	+1 914 945 6506	Philips Research	sunghyun.choi@philips.com
Mr. Patrick Chokron ()	nonvoter	30	+1 978 250 0770 ext. 17	Enrichnet Inc.	ieeee@enrichnet.com
Mr. Ken Clements (Ken)	voter	100	+1 408 353 5027	Innovation on Demand, Inc.	Ken@InnovationOnDmnd.com
Dr. John T. Coffey ()	voter	100	+1 707 284 2224	Texas Instruments	coffey@ti.com
Mr. Craig Conkling (Craig)	voter	90	+1 408 474 5306	Philips Semiconductors, Inc.	craig.conkling@philips.com
Dr. Todor Cooklev ()	aspirant	90	+1 781 687 0682	Aware, Inc.	tcooklev@aware.com
Mr. David Crosbie ()	nonvoter	90	+1 781 272 0134	Bluesocket	davidc@bluesocket.com
Mr. Barry Davis ()	voter	100	+1 503 264 7287	Intel	barry.r.davis@intel.com
Mr. Rolf De Vegt ()	nonvoter	80	+1 650 780 5846	Woodside Networks	rolf@woodsidenet.com
Mr. Wim Diepstraten (Wim)	voter	100	+31 30 609 7482	Agere Systems, Nederland	wdiepstraten@agere.com
Mr. Roger Durand ()	nonvoter	100	+1 603 337 5170	Enterasys.	rdurand@enterasys.com
Mr. Mary DuVal ()	nonvoter	100	+1 972 575 2330	Texas Instruments Incorporated	m-duval@ti.com
Mr. Dennis Eaton ()	voter	100	+1 321 729 4178	Intersil Corporation	deaton@intersil.com
Mr. Peter Ecclesine (Peter)	voter	100	+1 408 527 0815	Cisco Systems Inc.	petere@ieee.org
Mr. Richard Eckard (Dick)	voter	100	+1 781 466 2780	Verizon Communications	dick.eckard@verizon.com
Mr. Jon Edney ()	aspirant	90	+44 1223 423 123	Nokia	jon.edney@nokia.com
Mr. Darwin Engwer (Darwin)	aspirant	100	+1 408 495 7099	Nortel Networks Inc.	dengwer@nortelnetworks.com
Mr. Noam Eshel ()	nonvoter	85	+972 9 766 7377	Commprize	noame@commprize.com
Mr. Javier Espinoza (Harvey)	voter	100	+1 408 467 5230	TDK Corporation of America	hespinoza@tdktca.com
Mr. Steven Ettles ()	nonvoter	90	+1 650 230 6665	Fantasma Networks	settles@fantasma.net
Mr. John Fakatselis (John)	voter	100	+1 407 729 4733	Intersil Corporation	jfakat01@intersil.com

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Mr. Asa Falavade ()	nonvoter	90	+1 908 668 7774	Dynawave Inc.	asakalavade@yahoo.com
Dr. Lars Falk ()	aspirant	100	+46 40 10 51 33	Telia Research AB	lars.p.falk@telia.se
Dr. Weishi Feng ()	aspirant	90	+1 408 222 1922	Marvell Semiconductor	wfeng@marvell.com
Mr. Andres Fernstedt ()	nonvoter	100		Odd Labs	venture@postcapitalist.org
Mr. Matthew James Fischer (Matt)	voter	100	+1 408 543 3370	BroadCom Corporation	mfischer@broadcom.com
Mr. Michael Fischer (Michael)	voter	100	+1 210 614 4096	Choice Microsystems	mfischer@choicemicro.com
Mr. Jason Flaks	voter	80	+1 415 558 0373	Dolby Laboratories Inc	jsf@dolby.com
Mr. Kenji Fujisawa ()	voter	100	+81 3 5795 8507	Sony Corporation	fujisawa@sm.sony.co.jp
Mr. Marcus Gahler (Marcus)	voter	100	+1 425 825 1770	NextComm, Inc.	mgahler@nextcomminc.com
Mr. Pierre Gandolfo (Pierre)	nonvoter	100	+1 408 525 2336	Cisco Systems, Inc.	pgandolf@cisco.com
Mr. James Gardner ()	nonvoter	80	+1 650 780 5858	Woodside Networks	jamesgardner@woodsidenet.com
Mr. Atul Garg (Atul)	voter	100	+1 408 991 5755	Philips Semiconductors	atul.garg@philips.com
Mr. Al Garrett ()	nonvoter	100		Intersil Corporation	agarrett@intersil.com
Dr. Vala Ghazi ()	nonvoter	90	+1 206 675 9918	Cadence Design Systems, Inc.	vafa@cadence.com
Mr. Amar Ghori (Amar)	voter	100	+1 916 939 9400	Sharewave Inc.	amar.ghori@sharewave.com
Mr. Tim Godfrey (Tim)	voter	100	+1 913 706 3777	Intersil	tgodfrey@choicemicro.com
Mr. Craig Gostin ()	aspirant	100	+1 315 445 5820	Sensis Corporation	craig@sensis.com
Dr. Steven D. Gray (Steven)	voter	100	+1 972 894 4422	Nokia Research Center	steven.gray@nokia.com
Mr. Evan Green (Evan)	voter	90	+1 503 264 8456	Intel Corporation	evan.r.green@intel.com
Mr. Gary Green ()	nonvoter	100	+1 408 943 2664	Cypress Semiconductor	gwg@cypress.com
Mr. Patrick Green ()	voter	85	+1 408 749 4948	Advanced Micro Devices	patrick.green@amd.com
Mr. Kerry Greer ()	aspirant	90	+1 321 308 6618	SkyCross	greerk@skycross.com
Dr. Rajugopal Gubbi ()	voter	100	+1 408 543 3470	BroadCom Corporation	rgubbi@broadcom.com
Mr. Srikanth Gummadi	aspirant	90	+1 707 284 2209	Texas Instruments	sgummadi@ti.com
Mr. David Halasz (David)	voter	100	+1 330 664 7389	Cisco Systems, Inc	dhala@cisco.com
Dr. Steve D. Halford ()	voter	100	+1 321 729 5130	Intersil Corporation	shalford@intersil.com
Mr. Steven Hall ()	nonvoter	30	+1 858 453 9100	Silicon Wave	shall@siliconwave.com
Mr. Steven Hall ()	aspirant	45	+1 858 453 9100	Silicon Wave	shall@siliconwave.com
Dr. Christopher J. Hansen (Chris)	voter	100	+1 408 543 3378	BroadCom Corporation	chansen@broadcom.com
Mr. Frank Hanzlik ()	nonvoter	65	+1 503 681 8600	Mobilian Corporation	frank.hanzlik@mobilian.com
Mr. Yasuo Harada (Yasuo)	voter	100	+ 81 6 6900 9177	Matsushita Electric Industrial Co. Ltd.	yasuo@isl.mei.co.jp
Dr. Amer A. Hassan ()	nearly voter	100	+1 425 705 9590	Microsoft	amerh@microsoft.com
Mr. Victor Hayes (Vic)	voter	100	+31 30 609 7528	Agere Systems, Nederland	vichayes@agere.com
Dr. Chris Heegard (Chris)	voter	100	+1 707 521 3062	Texas Instruments	heegard@ti.com
Mr. Robert Heile (Bob)	voter	100	+1 508 222 1393	GTE Internetworking	bheile@ieee.org
Mr. Jerry Heller ()	aspirant	100	+1 954 752 7520	Umbrella Technology	hellerhai@aol.com
Dr. Garth Hillman ()	voter	100	+1 512 602 7869	AMD	garth.hillman@amd.com
Mr. Christopher Hinsz	voter	100	+1 408 528 2452	Symbol Technologies Inc.	chinsz@sj.symbol.com

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Mr. Jin-Meng Ho (Jin-Meng)	voter	100	+1 214 480 1994	Texas Instruments	jinmengho@ti.com
Mr. Maarten Hoeben (Maarten)	voter	100	+31 30 229 6083	Intersil B.V.	maarten.hoeben@intersil.co
Mr. Michael Hoghooghi ()	nonvoter	100	+1 561 739 2309	Motorola	emh002@email.mot.com
Mr. Wim Houtum ()	nonvoter	100	+31 40 27 22631	Philips Semiconductors	Wim.van.Houtum@philips.com
Mr. Frank P Howley, Jr (Frank)	voter	100	+1 408 773 5205	Atheros Communications, Inc.	fhowley@atheros.com
Mr. Robert Y. Huang (Bob)	voter	100	+1 201 358 4409	Sony	robert.huang@am.sony.com
Mr. John Hughes ()	voter	100	+1 408 528 2636	Symbol Technologies Inc.	jhughes@sj.symbol.com
Mr. David Hunter ()	nonvoter	100	+1 408 955 4665	Sony US Research Laboratories	david.hunter@am.sony.com
Mr. David Hytha ()	aspirant	15	+1 858 453 9100	Silicon Wave	dhytha@siliconwave.com
Mr. Yasuhiko Inoue ()	nonvoter	100	+81 468 55 1172	NTT Corp	yinoue@ansl.ntt.co.jp
Mr. Ishii Ishii (Kirk)	aspirant	75	+1 408 988 4515	JVC	kirk@jvclub.com
Mr. Hong Jiang ()	nonvoter	90	+1 908 581 4432	Dynave Inc.	hong_c_jiang@yahoo.com
Mr. Peter Johansson ()	voter	100	+1 510 527 3926	Congruent Software, Inc.	pjohansson@acm.com
Mr. VK Jones ()	aspirant	90	+1 650 780 5848	Woodside Networks	vkjones@woodsidenet.com
Mr. Bobby Jose ()	nonvoter	100	+1 916 939 9400 x3241	Sharewave Inc.	bobby.jose@sharewave.co
Dr. Srinivas Kandala (Sri)	voter	100	+1 360 817 7512	Sharp Laboratories of America,	srini@sharplabs.com
Mr. Kevin Karcz	voter	90	+1 603 862 1008	University of New Hampshire	kjk@unh.edu
Mr. Mika Kasslin (Mika)	voter	100	+358 40 525 8932	Nokia Research Center	mika.kasslin@nokia.com
Mr. Stuart J. Kerry (Stuart)	voter	100	+1 408 474 7356	Philips Semiconductors, Inc.	stuart.kerry@philips.com
Dr. Jamshid Khun-Jush (Jamshid)	voter	100	+49 911 5217 260	Ericsson Eurolab Deutschland GmbH	jamshid.khun-jush@eed.ericsson.se
Mr. Ryoji Kido (Ryoji)	voter	100	+81 92 852 1873	Kyushu Matsushita Electric Co., Ltd.	kido@tr.kme.mei.co.jp
Mr. Joonsuk Kim ()	aspirant	100	+1 408 543 3455	BroadCom Corporation	joonsuk@broadcom.com
Mr. Ken Kimura (Ken)	voter	100	+1 201 271 3039	Panasonic	kenkimur@bellatlantic.net
Mr. Duncan Kitchin (Duncan)	voter	100	+1 503 264 2727	Intel Corporation	duncan.kitchin@intel.com
Mr. Julius Knapp ()	nonvoter	65	+1 202 418 2468	FCC	jknapp@fcc.gov
Mr. Roger Knobbe ()	nonvoter	90	+1 310 737 1661	Network Associates, Inc.	Roger_Knobbe@nai.com
Mr. George Kondylis ()	aspirant	100	+1 408 543 3473	BroadCom Corporation	kondylis@broadcom.com
Dr. John M. Kowalski (John)	voter	100	+1 360 817 7520	Sharp Laboratories of America	kowalskj@sharplabs.com
Mr. Bruce P. Kraemer (Bruce)	voter	100	+1 407 729 5683	Intersil Corporation	bkraemer@intersil.com
Dr. A. S. Krishnakumar ()	nonvoter	80	+1 908 508 0668	Freewire Networks, Inc.	ask@freewirenetworks.co
Mr. Thomas E. Krueger (Tom)	voter	100	+1 425 825 1770 ext 107	NextComm, Inc.	tkrueger@nextcomm.com
Mr. Joseph Kubler ()	nonvoter	85	+1 303 442 1850	Intermec	joe.kubler@intermec.com
Dr. Thomas Kuehnel ()	aspirant	100	+1 609 951 2981	NEC USA, Inc.	kuehnel@cclrl.nj.nec.com
Dr. Geng-Sheng Kuo (Geng-Sheng)	aspirant	75	+886 2 8661 7453	National Chengchi University	gskuo@ieee.org
Mr. David S. Landeta (David)	voter	100	+1 407 729 5540	Intersil Corporation	dlandeta@intersil.com

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Dr. Jim Lansford (Jim)	aspirant	75	+1 405 377 6170	Mobilian Corporation	Jim.Lansford@mobilian.com
Mr. Peter Larsson ()	aspirant	100	+46 8 764 14 30	Ericsson Radio Systems AB	peter.larsson@era.ericsson.se
Mr. Onno Letanche ()	voter	100	+31 30 6097 454	Agere Systems	oletanche@agere.com
Mr. David Levy ()	nonvoter	100	+972 4 959 4005	FireMedia Communications	david.levy@fire-media.com
Mr. Quinn LI ()	nonvoter	90	+1 973 316 6072	Broadcom Corporation	quinnli@broadcom.com
Mr. Sheung Li ()	voter	100	+1 408 773 5295	Atheros Communications	sheung@atheros.com
Mr. William Li ()	voter	100	+1 510 647 1250 ext 28	ComSilica, Inc	wli@comsilica.com
Mr. Yunxsin Li ()	nonvoter	80	+61 2 9666 0536	Motorola	yunxin.li@motorola.com
Dr. Jie Liang ()	voter	85	(214) 480-4105	Texas Instruments Incorporated	liang@ti.com
Mr. Fuyun Ling ()	nonvoter	85	+1 858 658 4251	Qualcomm Inc.	fling@qualcomm.com
Dr. Jay Livingston ()	nonvoter	80	+1 303 484 6684	Cirrus Logic	jayl@colorado.cirrus.com
Mr. Titus Lo ()	nonvoter	90	+1 425 825 1770	NextComm, Inc.	titus.lo@ieee.org
Mr. Peter Loc ()	nonvoter	100	+1 408 222 1951	Marvell	ploc@marvell.com
Mr. Ralph Lombardo, Jr. ()	voter	100	+1 978 684 1339	Digital Networks	lombardo@dnp.com
Mr. Willie Lu ()	nonvoter	85	+1 408 501 6591	Infineon, Inc.	willie.lu@infineon.com
Mr. Robert Lyle ()	aspirant	75	+1 760 710 3074	Ellipsis Digital Systems	ryle@ellipsisdigital.com
Mr. Scott MacLean ()	nonvoter	90	+1 732 817 2851	Avaya Communications	smaclean@avaya.com
Mr. Mac Mahesh ()	aspirant	100	+1 201 348 7210	Panasonic	maheshm@panasonic.com
Mr. Douglas Makishima (Doug)	voter	90	+1 925 460 1929	ParkerVision, Inc.	doug@d2d.com
Mr. Stefan Mangold ()	aspirant	85	+49 241 88 90 340	ComNets	stefan.mangold@comnets.rwth-aachen.de
Mr. Emmanuel Marchaisnonvoter ()	100	+1 303 464 6729		Cirris Logic, Inc.	marchaie@colorado.cirrus.com
Mr. Leslie A. Martin ()	voter	100	+1 319 295 3692	Rockwell Collins	lamartin@collins.rockwell.com
Mr. Brian Mathews ()	aspirant	90	+1 321 259 0737	AbsoluteValue Systems	brian@linux-wlan.com
Mr. Mark Mathews ()	nonvoter	85	+1 321 259 0737	AbsoluteValue Systems	mark@linux-wlan.com
Mr. Conrad Maxwell ()	nonvoter	100	+1 949 483 7819	Conexant Systems, Inc.	conrad.maxwell@conexant.com
Mr. Gary McCoy ()	nonvoter	90	+1 978 684 1362	Digital Networks	gamccoy@dnp.com
Mr. Bill McFarland (Bill)	voter	100	+1 408 773 5253	Atheros Communications	billm@atheros.com
Mr. Pratik Mehta ()	voter	90	+1 512 723 6214	Dell Computer Corporation	Pratik_Mehta@Dell.com
Mr. Robert Meier ()	voter	100	+1 330 664 7850	Cisco Systems, Inc	rmeier@cisco.com
Dr. Klaus Meyer ()	aspirant	100	+49 351 277 6063	AMD	klaus.meyer@amd.com
Mr. Robert Miller (Bob)	voter	100	+1 973 236 6920	AT&T Labs	rrm@att.com
Mr. Reiner Mim (Reiner)	voter	100	+1 408 731 2768	Proxim Inc.	rmim@proxim.com
Mr. Partho Mishra ()	aspirant	100		Woodside Networks	parthomishra@woodsidenet.com
Mr. Wataru Mizutani ()	aspirant	90	+1 408 260 2630	Hitachi Cable America, Inc.	mizu@si.hitachi-cable.com \$
Mr. Brett Monello ()	aspirant	90	+1 503 681 8600	Mobilian Corporation	brett.monello@mobilian.com
Mr. Leo Monteban ()	aspirant	90	+31 30 609 7526	Agere Systems, Nederland	monteban@agere.com
Mr. Tim Moore (Tim)	voter	100	+1 425 703 9861	Microsoft	timmore@microsoft.com
Mr. Trevor Moore ()	nonvoter	100	+32 497 1026 75	Alcatel	trevor.moore@alcatel.be
Dr. Paul Moose ()	nonvoter	100	+1 408 727 7995	Advanced Broadband Communications, Inc.	paulm@advbroadband.com

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Dr. Masahiro Morikura	nonvoter	100	+81 468 55 1172	NTT Corporation	morikura@ansl.ntt.co.jp
Mr. Willem Mulder ()	aspirant	100	+31 30 609 7504	Agere Systems, Nederland	wmulder@agere.com
Mr. Peter Murray	voter	100	+1 908 232 9054		pmurray99@home.com
Mr. Andrew Myles ()	voter	100	+61 2 8874 5410	Cisco Systems	andrew.myles@cisco.com
Mr. Marco Naeve ()	voter	30	+1 414 449 7270	Eaton Corporation	marconaeve@eaton.com
Dr. Ravi Narasimhan ()	voter	80	+1 408 522 2315	Marvell Semiconductor, Inc.	ravin@marvell.com
Mr. Dan Nemits ()	aspirant	90	+1 707 284 2275	Texas Instruments	dnemits@ti.com
Mr. Ron Nevo ()	nonvoter	100	+1 503 681 8600	Mobilian Corporation	ron.nevo@mobilian.com
Mr. Ron Nevo ()	aspirant	90	+1 503 681 8600	Mobilian Corporation	ron.nevo@mobilian.com
Dr. Chiuu Ngo ()	aspirant	100	+1 914 945-6475	Philips Research	chiu.ngo@philips.com
Mr. Paul Nikolich (Paul)	nonvoter	75	+1 781 684 8487	Broadband Access Systems	p.nikolich@ieee.org
Mr. Gunnar Nitsche ()	voter	100	+49 351 808 0054	Systemonic AG	Gunnar.Nitsche@systemonic.de
Mr. Erwin R. Noble (Erwin)	voter	90	+1 408 617 4768	Philips Components	erwin.noble@philips.com
Mr. Denis Noël ()	nonvoter	90	+32 16390607	Philips Consumer	D.Noel@philips.com
Mr. Gerard Nourry ()	nonvoter	75	+1 613 998 2842	Enrichnet	gerardnourry@ipunwired.co
Mr. Tzvetan D. Novkov (Tzvetan)	voter	100	+1 847 635 3247	Toko America Inc.	tnovkov@tokoam.com
Mr. Ivan Oakes ()	aspirant	100	+44 1223 421025	Tality	ifo@tality.com
Dr. Timothy O'Farrell ()	voter	100	+1 353 1 677 9555	Supergold Communication, Ltd	tim.ofarrell@supergold.com
Mr. Bob O'Hara (Bob)	voter	100	+1 (408) 986-9596	Informed Technology Inc.	bob@informed-technology.com
Mr. Vladislav Oleynik ()	aspirant	100	+1 919 932 3310	Umbrella Technologies, Inc.	uti@umbtech.com
Mr. Dirk Ostermiller (Dirk)	voter	90	+1 801 984 5878	Micro Linear	dirko@xmission.com
Mr. Cedric Paillard ()	nonvoter	75	+1 613 234 2046	IceFyre Semiconductor Inc.	cpaillard@icefyre.com
Mr. Mike Paljug (Mike)	voter	100	+1 321 729 5528	Intersil Corporation	mpaljug@intersil.com
Mr. Roger Pandanada	nonvoter	80		MOS Corporation	rogerp@ieee.org
Mr. Subra	voter	85	+1 408 721 8216	National Semiconductor Corporation	tps@lan.nsc.com
Parameswaran (Subra)				Sharewave Inc.	greg.parks@sharewave.co
Mr. Gregory Parks (Greg)	voter	100	+1 916 939 9400 X3211		
Mr. Sebastien Perrot ()	nonvoter	90	+33 2 99 27 3965	Thomson Multi Media	perrots@thmulti.com
Mr. Al Petrick (Al)	voter	100	+1 407 829 4440 x	ParkerVision	apetrick@d2d.com
Mr. Douglas Prendergast ()	aspirant	100	+1 613 246 3566	Mitsubishi	dprender@pcicanda.com
Mr. Ron Provencio (Ron)	voter	90	+1 707 284 2232	Texas Instruments	ronp@ti.com
Mr. Ali Raissinia ()	aspirant	100	+1 650 780 5847	Woodside Networks	ali@woodsidenet.com
Mr. Yaron Rashi ()	nonvoter	90	+972 0 8924 100	Infineon Technologies	rashi@infineon.com
Dr. David Reed (E.)	voter	30	+1 720 304 9050	Channel Technology	daver@channel-tech.com
Mr. Ivan Reede (Ivan)	voter	100	+1 514 620 8522	AmeriSys Inc.	i_reede@amerisys.com
Dr. Stanley A. Reible (Stan)	voter	90	+1 978 589 9853	Oak Wireless	reible@compuserve.com
Mr. Jim Richards ()	nonvoter	85	+1 256 922 9229 x6364	Time Domain	Jim.richards@timedomain.com
Mr. David Richkas ()	voter	100		Intel	dave.richkas@intel.com
Mr. Maximilian Riegel (Max)	voter	100	+49 89 722 49557	Siemens	maximilian.riegel@icn.siemens.de

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Mr. Carlos A. Rios (Carlos)	voter	100	+1 408 326 2844	LinCom	riosc@lincom.com
Mr. Benno Ritter ()	voter	100	+1 408 474 5115	Philips Semiconductors	Benno.Ritter@philips.com
Mr. Matt Ronning ()	nonvoter	100	+1 480 650 7406	Sony Electronics	matt.ronning@am.sony.com
Mr. Jon Rosdahl ()	voter	100	+1 801 984 5866	Micro Linear Corporation	jrosdahl@ieee.org
Mr. Rob Roy ()	voter	100	+1 503 681 8600 Ext 225	Mobilian Corporation	rob.roy@mobilian.com
Mr. Adam Ruef ()	nonvoter	85	+1 972 994 4933	MobileStar	aruef@mobilestar.com
Mr. Carl Ruzycski ()	aspirant	80	+1 978 250 0770	EnrichNet, Inc	cruzycki@enrichnet.com
Mr. Gunnar Rydnell (Gunnar)	voter	100	+46 31 344 63 20	Ericsson Mobile Data Design AB	gunnar.rydnell@erv.ericsson.se
Mr. Henry Saam	voter	85	+1 858 523 2314	Magis Networks, Inc.	hsaam@magisnetworks.com
Mr. Kenichi Sakusabe	nonvoter	100	+81 3 5435 3698	Sony Corporation Semiconductor Network Company	sakusabe@mosk.semicon.sony.co.jp
Dr.-Ing. Peter Schramm (Peter)	nonvoter	75	+49 911 5217 360	Ericsson Eurolab Deutschland GmbH	Peter.Schramm@eedn.ericsson.se
Mr. Sid Schrum (Sid)	voter	100	+1 919 463 1043	Texas Instruments	sschrum@ti.com
Mr. Baker Scott ()	nonvoter	15	+1 720 304 9050	Channel Technology	bakers@channel-tech.com
Mr. Michael Seals ()	nonvoter	90	+1 321 724 7172	Intersil Corporation	mseals@intersil.com
Mr. M.R. Shajan ()	nonvoter	100	+65 872 9030	Centre for Wireless Communications	mrshajan@cw.cwc.nus.edu.sg
Dr. Donald Shaver ()	aspirant	100	+1 214 480 4349	Texas Instruments Incorporated	shaver@ti.com
Mr. Rick Shaw ()	nearly voter	85	+1 801 984 5862	Micro Linear	rick_shaw@networld.com
Mr. Matthew Sherman (Matthew)	voter	100	+1 973 236 6925	AT&T Labs	mjsherman@att.com
Dr. Matthew B. Shoemake (Matthew)	voter	100	+1 214 761 6987	Texas Instruments Incorporated	shoemake@ti.com
Dr. William Shvodian (Bill)	voter	75	+1 703 749 0230 x7129	XtremeSpectrum	bshvodian@xtremespectrum.com
Mr. Thomas Siep (Tom)	voter	75	+1 972 480 6786	Texas Instruments	siep@ti.com
Dr. Aman Singla ()	aspirant	100	+1 408 773 5272	Atheros Communications	aman@atheros.com
Dr. Kazmierz Siwlak (Kai)	nonvoter	15	+1 256 922 9229	Time Domain	kai.siwak@timedomain.com
Dr. David Skellern (David)	voter	100	+61 2 8446 1004	Cisco Systems	skellern@cisco.com
Mr. Donald I. Sloan (Don)	voter	90	+1 330 664 7917	Aironet Wireless Communications Inc.	dons@cisco.com
Mr. Kevin Smart ()	voter	85	+1 801 984 5865	Micro Linear Corporation	keltypack@networld.com
Dr. Essam Sourour ()	nonvoter	75	+1 760 710 3048	Ellipsis Digital Systems	esourour@ellipsisdigital.com
Mr. Gary Spiess (Gary)	voter	100	+1 319 369 3580	Intermec Technologies Corp.	gary.spiess@intermec.com
Mr. Geetha Srikantan ()	nonvoter	90	+1 510 249 0944	ComSilica, Inc	geetha@comsilica.com
Ms. Dorothy V. Stanley (Dorothy)	aspirant	90	+1 630 979 1572	Lucent Technologies, Inc.	dstanley@lucent.com
Dr. Adrian Stephens ()	voter	100	+44 771 276 3448	Mobilian Corporation	adrian.stephens@mobilian.com
Ms. Susan Storma ()	aspirant	90	+1 407 659 5365	Mesh Networks	sstorma@meshnetworks.com
Dr. Takuma Tanimoto ()	nonvoter	90	+1 408 433 1990	Hitachi Semiconductor (America) Inc.	takuma.tanimoto@hsa.hitachi.com
Mr. Larry Taylor ()	aspirant	90	+1 650 230 6605	Fantasma Networks	ltaylor@fantasma.net
Dr. John Terry (John)	voter	90	+1 972 894 5742	Nokia Research Center	john.terry@nokia.com
Mr. Yossi Texerman ()	voter	100	+972 9 743 0161 ext 309	hLAN	yossit@hlan.com

<i>Full name</i>	<i>status</i>	<i>att. %</i>	<i>phone</i>	<i>company</i>	<i>e_mail</i>
Mr. Jerry A. Thrasher (Jerry)	aspirant	85	+1 859 825 4056	Lexmark International, Inc	thrasher@lexmark.com
Mr. Katsumi Tokuyama ()	nonvoter	75	+81 3 3552 1101	KeyStream	tokuyama@keystream.co.jp
Mr. Allen Tsai ()	nonvoter	90	+1 510 249 0944	ComSilica, Inc	allen@comsilica.com
Dr. Chih C. Tsien (Chih)	voter	100	+1 858 385 4317	Intel	chih.c.tsien@intel.com
Mr. Khaled Turki ()	voter	100	+1 214 480 6908	Texas Instruments	khaled@ti.com
Mr. Toru Ueda ()	aspirant	100	+81 743 65 4529	Sharp Corporation	ueda@slab.tnr.sharp.co.jp
Mr. Naoki Urano ()	aspirant	100	+81 743 65 0987	Sharp Corporation	urano@slab.tnr.sharp.co.jp
Dr. Richard van Nee ()	aspirant	90	+31 30 276 3575	Woodside Networks	vannee@woodsidenet.com
Dr. Madan Venugopal	nonvoter	90	+1 510 249 0944	ComSilica, Inc	madan@comsilica.com
Mr. Alex Vereshchak ()	nonvoter	100	+1 919 932 3310	Umbrella Technologies, Inc	aver@umbtech.com
Mr. Marv Vis ()	aspirant	90	+1 303 464 6657	Cirrus Logic, Inc.	mvis@colorado.cirrus.com
Mr. Tim Wakeley (Tim)	voter	90	+1 916 785 1619	Hewlett Packard	tim_wakeley@hp.com
Dr. Jesse R. Walker (Jesse)	voter	100	+1 503 712 1849	Intel Corporation	jesse.walker@intel.com
Mr. Thierry Walrant ()	voter	100	+1 408 617 4676	Philips Consumer Electronics	thierry.walrant@philips.com
Mr. Christopher Ware ()	nonvoter	100	+ 61 2 4221 5317	Telecommunications & Information Technology	chris@titr.uow.edu.au
Dr. Fujio Watanabe ()	voter	100	+358 7180 37348	Nokia Research Center	fwatanabe@ieee.org
Mr. William Watte ()	nonvoter	15	+32 15 20 95 75	M-TEC Wireless	william.watte@mtcgroup.com
Mr. Mark Webster (Mark)	voter	100	+1 321 724 7537	Intersil Corporation	mark.webster@intersil.com
Mr. Lim Wei Lih ()	nonvoter	100		Panasonic Singapore	wllim@psl.com.sg
Dr. Mathew Welborn ()	voter	90	+1 703 749 0230	XtremeSpectrum	mwelborn@xtremespectrum.com
Mr. Menzo Wentink (Menzo)	voter	100	+31 30 225 97 52	Intersil B.V.	mwentink@intersil.com
Mr. Michael Wilhoyte ()	aspirant	80	+1 707 289 2242	Texas Instruments	wilhoyte@ti.com
Mr. Dave Willard ()	aspirant	90	+1 561 739 2705	Motorola	engr85@email.mot.com
Mr. Steven D. Williams (Steven)	voter	90	+1 503 264 2043	Intel Corporation	steven.d.williams@intel.com
Mr. Tim Williams ()	nonvoter	100		Beach Technology	timawill@pacbell.net
Dr. Simon Wilson (Blake)	nonvoter	90	+1 905 501 3786	Certicom	sblakewilson@certicom.com
Mr. Kim Won ()	nonvoter	15		Network Associates	kwon@nai.com
Mr. David Wooten ()	nonvoter	90	+1 858 613 5502	Wooten	wd@cypress.com
Mr. Harry Worstell (Harry)	voter	100	+1 973 236 6915	AT&T Labs	hworstell@att.com
Ms. Liwen Wu ()	voter	100	+1 408 853 4075	Cisco Systems, Inc.	liwwu@cisco.com
Mr. Jung Yee ()	nonvoter	100	+1 613 234 2046	IceFyre Semiconductor Inc.	jyee@icefyre.com
Mr. Charles You ()	nonvoter	75	+1 908 665 1200 Ext 26	Merl	cjy10@merl.com
Mr. Albert Young (Albert)	voter	100	+1 408 326 6435	3Com Corporation	albert_young@3com.com
Mr. Chris Zegelin	voter	90	+1 408 528 2667	Symbol Technologies Inc.	chrisz@sj.symbol.com
Dr. Ephi Zehavi (Ephi)	aspirant	90	+972 4 959 4010 ext 110	Mobilian Corporation	ephi.zehavi@mobilian.com
Mr. Arnoud Zwemmer	aspirant	100	+31 30 229 60 84	Intersil Corporation	arnoud.zwemmer@intersil.com
Mr. Jim Zyren (Jim)	voter	100	+1 407 729 4177	Intersil Corporation	jzyren@intersil.com

**IEEE P802.11
Wireless LANs**

Minutes of TGd for March 2001 session

Date: March 15th, 2001
Author: Chris Zegelin
Symbol Technologies
Phone: (408) 528-2667
e-Mail: chrisz@sj.symbol.com

Called to order 4pm Monday

Chair : Bob O'Hara Secretary : Chris Zegelin

Reviewed agenda... approved by unanimous consent

Ballot Summary... Need recirculation ballot as goal for this meeting.

Document 01/119 = comments... new format for comments... more workable

Propose going through technical required comments first.

Adjourned at 4:20pm for comment resolution work groups.

Called to order 8:15am Thursday

Moved: To adopt comment resolutions in document 11-01-189r0-D-802.11D
Sponsor Ballot 1 Comment Resolutions

Chris Zegelin, Bob O'Hara

Unanimous consent

Moved: That 802.11d Draft 3 (file: 802.11d-D3.pdf) be forwarded for sponsor
recirculation ballot.

Bob O'Hara, Chris Zegelin

Unanimous consent

Moved: that the 802 SEC be requested to grant conditional approval to forward
802.11d-D3 to REVCOM for approval, once the recirculation ballot is
successfully concluded.

Bob O'Hara, Chris Zegelin

Unanimous consent

Move to adjourn at 8:45am

**IEEE P802.11
Wireless LANs**

**Minutes of 802.11 Task Group E
MAC Enhancements**

Pre-Plenary Interim

Marriott Hilton Head, Hilton Head Island, SC

Date: March 12, 2001
Author: Tim Godfrey
Intersil
Phone: 913-706-3777
Fax: 913-664-2545
e-Mail: tgodfrey@intersil.com

1. Monday Morning – QoS Interim Session

1.1. Secretary

1.1.1. Tim Godfrey

1.2. Call to order

1.3. Opening

1.3.1. Review of agenda

1.3.2. Call for papers to be presented this session

1.3.2.1. *Security Status (Jesse Walker)*

1.3.2.2.

1.3.3. Approval of agenda

1.3.3.1. *Approved without objection*

1.4. Schedule Review

- 1.4.1. **Original plan was to start balloting in January.**
- 1.4.2. **We are supposed to deliver standard for ExCom approval in September. The goal of this week is to start the ballot process. We will have to circulate the draft within the working group.**
- 1.4.3. **We need 75% approval technically, but traditionally, we want approval in the 90% or more.**
- 1.4.4. **Then the ballot goes to the sponsor group – typically less objections, but sometimes they are difficult to close.**
- 1.4.5. **Security Group expects to be ready to go to ballot at the end of this week. It is primarily an editing issue.**
 - 1.4.5.1. *General agreement on this from the security side.*
- 1.4.6. **QoS issues**
 - 1.4.6.1. *Completing EDCF selection*
 - 1.4.6.2. *Proposers –*
 - 1.4.6.2.1. *There is a lot to do, but if we come to a decision, we could have a draft for ballot.*
 - 1.4.6.2.2. *If the text to go into the draft is ready to be voted on is ready this week, we could incorporate it into the draft after this meeting.*
 - 1.4.6.3. *FEC discussions*
 - 1.4.6.3.1. *Will it be possible to complete this work in the week? Yes – it seems likely, as far as having baseline text.*
- 1.4.7. **If the comment resolution goes smoothly, we have a chance to complete the standard this year.**
- 1.4.8. **There will be a formal update of the schedule on Thursday.**

1.5. Discussion on PAR Split

- 1.5.1. **The Security and QoS work could need to separate into two task groups if either group gets ahead of the other.**
- 1.5.2. **We don't want to delay either effort.**
- 1.5.3. **We would prefer to keep them together to keep the balloting process simpler.**
- 1.5.4. **Comments**
 - 1.5.4.1. *How would we manage potential inter-relations between the two sections on the overall MAC.*
 - 1.5.4.2. *Concern that a small number of members have participated in Security. The full TGe should review the work, if it is split, security might not get sufficient review.*
 - 1.5.4.3. *Some vendors might implement security in an independent way. We shouldn't delay security too long.*
 - 1.5.4.4. *Security could be a market breaker if we don't get it out soon enough.*

1.6. Status report from Security sub-group

1.6.1. Status of TGe S Draft Text 01/147 Jesse Walker

- 1.6.1.1. *Draft document was edited during interim meeting in Seattle.*
- 1.6.1.2. *Current version is R3*
- 1.6.1.3. *Review of comment resolved in this latest version*
- 1.6.1.4. *Open Issues*
 - 1.6.1.4.1. *Deauthentication with enhanced security?*
 - 1.6.1.4.2. *Interaction of replay protection with QoS – how can replay protection be accomplished without hurting QoS through re-ordering.*
 - 1.6.1.4.3. *Request to remove legacy authentication mechanisms – need to clarify.*
 - 1.6.1.4.4. *Multicast key distribution mechanism*
 - 1.6.1.4.5. *Patent infringements on Offset Codebook Mode*
- 1.6.1.5. *Discussion*
 - 1.6.1.5.1. *Where is Rev 3 text? The document has been sent to Harry last week. It was posted on the reflector. It will be on the server here.*

1.7. Discussion of technical risk

- 1.7.1.1. *Security – additional topics?*
 - 1.7.1.1.1. *None*
- 1.7.1.2. *QoS – topics for discussion*
 - 1.7.1.2.1. *None*
- 1.7.1.3. *Is there any information on the FEC topic available?*
 - 1.7.1.3.1. *There is a presentation, but it was intended for the main meeting time. Some of the principles are not here yet. It would be good to update everyone, including the security group. It can be presented again in the QoS Subgroup*
- 1.7.2. **Presentation of “Frame FEC Formats for 802.11e”, 01/112r1, John Kowalski**
 - 1.7.2.1. *Clarification of Security IV header – it is inside the FEC wrapper.*
 - 1.7.2.2. *Discussion*
 - 1.7.2.2.1. *There was some discussion that FEC really belongs in the PHY, but the PAR limited that. Why do we want the extra complexity of doing it in the MAC. The overhead is only 20-30K gates. Doing it in the MAC makes it applicable to all PHYs.*
 - 1.7.2.2.2. *Would this be an option in TGe? Yes.*
 - 1.7.2.2.3. *Is the FEC algorithm efficient for all PHYs? What about the existing OFDM PHY coding? If the error rate for a packet in 802.11a is 10e-5, then the convolutional encoder in the 11a PHY shouldn't have bursty errors. The MAC has block error coding to improve on that further. With serious degradation, about 2% BER, it stops working.*

- 1.7.2.2.4. *If it isn't present, what happens to QoS? Transmission of high quality video will be impaired. There are other proposed schemes, all have their pros and cons. Retransmission will not be good enough, even at .11a.*
- 1.7.2.2.5. *What are the benefits for streaming audio and voice? Voice is already robust, but CD Audio would benefit for FEC also?*
- 1.7.2.2.6. *How does the FEC overhead compare to just using a lower PHY rate? That is a subset of the larger question of the interaction of PHY rate with the overall QoS mechanism. We need to address this in the signaling.*
- 1.7.2.2.7. *FEC has 5% overhead as opposed to down switching rates which is about 20% of bandwidth.*

1.7.3. Any other topics on the agenda?

- 1.7.3.1. *None*
- 1.7.3.2. *Recess for registration etc.*
- 1.7.3.3. *After the break, we will reconvene and see if any topics or papers have become available. If there are then none, we might adjourn the interim early.*

1.8. Second Session

1.8.1. Opening

- 1.8.1.1. *Review of Interim Session Status*
- 1.8.1.2. *Following agenda specific for this interim session*

1.8.2. Questions from first session

- 1.8.2.1. *No Questions*

1.8.3. Technical issues related to QoS or Security

- 1.8.3.1. *None*

1.8.4. Papers for presentation at this time?

- 1.8.4.1. *None*

1.8.5. Any other business for this session

- 1.8.5.1. *None*

1.8.6. Review of TGe agenda for rest of week

- 1.8.6.1. *Thursday full TGe will be decision making session.*
- 1.8.6.2. *Throughout the week, we will have discussion topics, but no motions.*
- 1.8.6.3. *Motions will be deferred until the Thursday Session. We will cover old business (from previous sessions) and then New Business. (motions for this week)*
- 1.8.6.4. *Motions should be submitted to the chair in advance of that session.*
- 1.8.6.5. *After all the motions have been handled, we will have a schedule update to assess our progress and plan.*
- 1.8.6.6. *Any motions in the task group may be forwarded to the WG Closing Plenary session on Thursday.*

1.8.6.7. Any final business for this group?

1.8.6.8. *None*

1.8.7. Adjourn Interim meeting

**IEEE P802.11
Wireless LANs**

**Minutes of 802.11 Task Group E
MAC Enhancements**

Marriott Hilton Head, Hilton Head Island, SC

Date: March 12 – 15, 2001

Author: Tim Godfrey
Intersil
Phone: 913-706-3777
Fax: 913-664-2545
e-Mail: tgodfrey@intersil.com

1. Monday Afternoon – Full TGe Session

1.1. Secretary

1.1.1. Tim Godfrey

1.2. Call to order

1.2.1. Meeting called to order at 3:30PM by John Fakatselis

1.3. Opening

1.3.1. Review of Agenda

1.3.1.1. *Two full TGe sessions. Today and Thursday afternoon*

1.3.1.2. *New motions are reserved for new business at end of week.*

1.3.1.3. *Detailed technical discussions will take place in subgroups – QoS and Security, in parallel*

1.3.1.4. Agenda

1.3.1.4.1. Monday

1.3.1.4.1.1. Policies and procedure overview

1.3.1.4.1.2. Subgroup Status

1.3.1.4.1.2.1. TGe Security

1.3.1.4.1.2.2. Editor report

1.3.1.4.1.3. Call for papers

1.3.1.4.1.4. Presentation of Papers

1.3.1.4.2. Thursday

1.3.1.4.2.1. Old Business

- 1.3.1.4.2.2. New Business
- 1.3.1.4.2.3. Motions for Plenary
- 1.3.1.4.2.4. Next meeting Objectives

1.3.2. Discussion on Agenda

- 1.3.2.1. *Where is the agenda for the subgroups? They will approve their own agendas.*

1.3.3. Adoption of agenda

- 1.3.3.1. *Agenda adopted without objection*

1.4. Policies

1.4.1. Description of process

- 1.4.1.1. *Bob O'Hara, Parliamentarian*
- 1.4.1.2. *How to come to consensus on a number of proposals. The procedure in the past has been to loosely use Roberts Rules. Since the last meeting, we have decided to be more strict on applying Roberts Rules, specifically when motions can be made.*
- 1.4.1.3. *Those times are in Old Business and New Business.*
- 1.4.1.4. *Except for certain privileged motions, motions to adopt will not be in order during or after presentations.*
- 1.4.1.5. *Motions made except during new business may be ruled out of order.*
- 1.4.1.6. *During new business, Motions may be made. 75% approval is needed to adopt text into the draft.*
- 1.4.1.7. *The main decisions will be made on Thursday.*

1.4.2. Discussion

- 1.4.2.1. *The total time for debate on these motions is only 2 hours on Thursday. Implore that people with big differences work them out before the full TGe meeting on Thursday. (in the subgroups)*
- 1.4.2.2. *Supposing we have competing and/or complementary text to adopt. What happens in the case of none or more than one getting selected? The goal is to get something into the draft. The only way to determine the consensus is to have a vote. The chair recognizes individuals making motions. Also motions can be provided in writing to the secretary. Such motions would be added to the agenda in new business, before recognizing members from the floor.*
- 1.4.2.3. *If the motion is obsolete by the time it is made, it can be discarded by the lack of a second.*
- 1.4.2.4. *Roberts rules drives the group to make decisions.*
- 1.4.2.5. *By adopting a certain text theoretically makes another motion on the same topic out of order, although arguments could be made to adopt something else that is different in some way. It is still possible to adopt contradictory text, that has to be dealt with.*

- 1.4.2.6. *Would a motion to strike the contradictory parts be in order? Yes, but there are rules regarding having draft text published a session before. Specifically listing the text to be deleted.*
- 1.4.2.7. *Does the group have the flexibility to work to find consensus outside of the strict procedure? A motion to move to a committee of the whole for free discussion, which then generates a report to the task group.*
- 1.4.2.8. *The discussion topic times on the agenda are also for that purpose.*
- 1.4.2.9. *If we do adopt contradictory text, the next point to address the issue is at the letter ballot.*
- 1.4.2.10. *If we don't get to letter ballot at the end of this week, what would prevent a motion to rectify the issues at the next meeting? Nothing- we could do that.*

1.4.3. Review of previous policy motions

- 1.4.3.1. *Review of Motion 2 passed in January.*
- 1.4.3.2. *Basically, the exact text for a motion to adopt must be submitted ½ day in advance of making a motion to adopt.*
- 1.4.3.3. *Discussion*
 - 1.4.3.3.1. *How will members find the material for review? It will be posted to the server. The question is how will we know if it is relevant? Members need to review submissions and determine for themselves.*
- 1.4.3.4. *How many new members? Over 30, quite a few.*

1.4.4. Voting rights

- 1.4.4.1. *Review of 802.11 policy and rules for voting rights.*

1.4.5. Debates

- 1.4.5.1. *The chair has discretion to give the floor. As a courtesy, non-voters are recognized for debate. Non-voters should ask a voter to make motions, though.*
- 1.4.5.2. *Review of special motions – point of order, parliamentary enquiry, etc.*

1.5. Status

1.5.1. Overall TGe Status

- 1.5.1.1. *Our objective is to start the letter ballot by the end of this week.*
- 1.5.1.2. *We will need to approve the text, then the editor will put together the draft for the letter ballot.*
- 1.5.1.3. *It doesn't seem to be an unrealistic goal.*
- 1.5.1.4. *If either subgroup gets significantly ahead of the other, we will consider splitting the PAR into two task groups, with independent letter ballots.*
- 1.5.1.5. *Discussion*

1.5.1.5.1. *It isn't necessary to split the PAR for letter ballot, only sponsor ballot. We could hold split letter ballots if the 802.11 WG approves.*

1.5.2. TGe QoS status

1.5.2.1. *We will have presentations for the four proposals. Hopefully we will end up with compete draft text for QoS.*

1.5.2.2. *There have been a number of teleconferences on both the EDCF proposals, as well as the HCF proposal. There is also a submission and proposal on FEC.*

1.5.3. TGe Security

1.5.3.1. *00/419 is the security submission. The text is 01/018. The plan is to go to letter ballot. We will go from Rev 3 to Rev 4.*

1.5.3.2. *Between meeting, the Security group held an ad-hoc meeting in Seattle. There has been a lot of publicity on Security based on the UC Berkeley report. One of the authors attended.*

1.5.4. Discussion on subgroups reports

1.5.4.1. *How do all the alternatives relate to where we are at? Requests a contrast and comparison for each of the proposals. Would like a general presentation of the QoS schemes under consideration. Presenters should start off with such a high level background for new members.*

1.5.4.2. *The Security and QoS subgroups are very different in size. How do we manage the voting when the groups are combined? This is why we want interaction between interested members between meetings. We have had a lot of interaction between meeting on reflectors and teleconferences. The process itself (letter ballot) is very thorough, and allows all to participate.*

1.5.5. Editor's Report: Status of the Draft

1.5.5.1. *The draft has not changed since we adopted 0.1 in Monterey. There were no subsequent motions to adopt any changes.*

1.5.5.2. *The way to get a draft to review and forward is to follow the procedure we have adopted: Showing what is to be added and/or deleted by clause and subclause.*

1.5.5.3. *The draft will have to be moved to Framemaker after this meeting.*

1.5.5.4. *Graphics may need to be modified with the help of the submitters.*

1.5.5.5. *A number of clauses have pending editorial cleanups that should be considered.*

1.5.5.6. *Discussion*

1.5.5.6.1. *What is the most current draft? There is a version of the draft based on 360r2. There have been several Rev's since then posted to the draft area of the web site.*

- 1.5.5.6.2. *Will the document be available in PDF? Yes, and there is a free FrameMaker viewer, but PDF is the best choice for distribution.*
- 1.5.5.6.3. *PDF is acceptable for draft? Yes, it is how they ballot them.*

1.6. Call for Papers

1.6.1. Discussion

- 1.6.1.1. *This sets the remaining agenda.*
- 1.6.1.2. *Is this for just the Full TGe or for the subgroups? It is for everything – Full, QoS, or Security. We want to consider all papers that might be presented this week.*

1.6.2. Papers

- 1.6.2.1. *Greg Chesson 132r1, 133, QoS*
- 1.6.2.2. *Mathilde B 144r1, 145r2 QoS*
- 1.6.2.3. *Sid Schrum 139, 37r1, 163 QoS*
- 1.6.2.4. *Michael Fischer 109r2, 110, 122 (non presented), 123, 124 (non essential) QoS*
- 1.6.2.5. *John Kowalski 121r1 QoS*
- 1.6.2.6. *Duncan Kitchen ??? QoS*
- 1.6.2.7. *Matt Sherman ??? QoS*
- 1.6.2.8. *Greg Parks ??? QoS*
- 1.6.2.9. *Jesse Walker 147 Sec*
- 1.6.2.10. *Carlos Rios ??? Sec*
- 1.6.2.11. *Bob Beech ??? Sec*
- 1.6.2.12. *Michael Fischer (Draft Text Editorial Cleanup. Presentation for Adoption Motion).*
- 1.6.2.13. *Chris Hansen ??? QoS*
- 1.6.2.14. *Wim Diepstraten ??? QoS*

1.6.3. Discussion

- 1.6.3.1. *Are any papers outside the subject of the draft scope of EDCF, HCF, or FEC?*
 - 1.6.3.1.1. *Document 123 and 124 are on signaling – establishing reservations for bandwidth. This area is insufficiently specified for Sponsor Ballot, and must be addressed before then. We have some holes in the annexes (MIB, formal description, and PICS).*
 - 1.6.3.1.2.
- 1.6.3.2. *What if someone was interested in investigating if the MAC was capable of transporting IEEE1394? There is no special procedure for proposing a solution to address this. However it could be ruled outside the scope of our PAR and therefore out of order.*
- 1.6.3.3. *Suggestion that document 147 be presented to the full TGe subgroup. There was an opportunity to present it earlier.*

- 1.6.3.4. *The editorial clean-up cannot be presented now, because it is not ready.*

1.7. Presentations of Papers (relevant to both subgroups)

- 1.7.1. None

1.8. Recess for Subgroups

2. Monday Evening – QoS Session

2.1. Opening

2.1.1. Called to order at 6:30PM

2.1.2. Review of Agenda

- 2.1.2.1. *Overview of policy and procedural items*
2.1.2.2. *Editors update*
2.1.2.3. *Call for Papers*
2.1.2.4. *Presentation of papers*
2.1.2.5. *Recess at 11:00PM*

2.1.3. Discussion on Agenda

- 2.1.3.1. *In the past if a submission was made and assigned in a subgroup, it could be passed in the subgroup and then passed up to the whole task group? Defer to procedure discussion.*
2.1.3.2. *16:30 to 17:30 Wednesday is the only time for new business? No, there is more time Thursday.*
2.1.3.3. *Is it necessary to go to 11:00PM? We can decide to adjourn earlier.*

2.1.4. Adoption of Agenda

- 2.1.4.1. *Agenda adopted without objection*

2.2. Status

2.2.1. The goal is to have a draft approved that is ready for working group ballot at the end of the week.

- 2.2.1.1. *Motions rejected here can be raised again in TGe, and in the WG.*
2.2.1.2. *This group can make motions and vote on them; we forward them to TGe, which forwards them to 802.11. We need to submit motions in advance.*
2.2.1.3. *We will take written motions for this subgroup.*
2.2.1.4. *We will wait until Wednesday afternoon for technical motions, continuing into Thursday as needed.*
2.2.1.5.
2.2.1.6.

2.3. Policies and Procedures

2.3.1. Discussion

- 2.3.1.1. *If a motion is made and carries in the QoS Subgroup by 75%. What then happens in the full WG session on Thursday. The Chair of the subgroup is responsible to make the motion in the full TGe group and the WG.*

2.4. Editors Update

- 2.4.1. **There have been questions about the rule about not replacing the clause. It is a “myth” – it is not a matter of rules, but of editing style. The TGe editor will discuss this with and IEEE editor. We may be able to replace clauses, which will make the draft easier to read.**

2.5. Call for Papers

- 2.5.1.1. *Greg Chesson 132r1, 133, QoS*
 2.5.1.2. *Mathilde B 144r1, 145r2 QoS*
 2.5.1.3. *Sid Schrum 139, 37r1, 163 QoS*
 2.5.1.4. *Michael Fischer 109r2, 110, 123, 124 (non essential) QoS*
 2.5.1.5. *John Kowalski 121r1 QoS*
 2.5.1.6. *Duncan Kitchen ??? QoS*
 2.5.1.7. *Matt Sherman 157 QoS*
 2.5.1.8. *Greg Parks ??? QoS*
 2.5.1.9. *Michael Fischer (Draft Text Editorial Cleanup. Presentation for Adoption Motion) 122 (non presented),.*
 2.5.1.10. *Chris Hansen ??? QoS*
 2.5.1.11. *Wim Diepstraten ??? QoS*

2.5.2. Discussion

- 2.5.2.1. *Get numbers, and have submission on server in time.*
 2.5.2.2. *The editorial cleanup will be done as D0.1-clause6r2 7r1 10r2*
 2.5.2.3. *We have 3 hours tonight,*
 2.5.2.4. *Time allocation:*
 40 *Greg Chesson 132r1, 133, QoS*
 60 *Mathilde B 144r1, 145r2 QoS*
 90 *Sid Schrum 139, 37r1, 163 QoS*
 40 *Michael Fischer 109r2, 110,*
 20 *Michael Fischer 123 124*
 20 *John Kowalski 121r1 QoS*
 20 *Duncan Kitchen ??? QoS*
 20 *Matt Sherman 157 QoS*
 20 *Greg Parks ??? QoS*
 20 *Michael Fischer (Draft Text Editorial Cleanup. Presentation for Adoption Motion).*
 20 *Chris Hansen ??? QoS*

- 20 Wim Diepstraten ??? QoS
- 40 Steve Williams "1394 over 802.11" QoS
- 430 min
- 7.17 hours

2.5.2.5.

2.5.3. Order for presentation

2.5.3.1. DCF Papers

- 2.5.3.1.1. Greg , Mathilde, Sid,

2.5.3.2. FEC

- 2.5.3.2.1. John, Chris

2.5.3.3. HCF

- 2.5.3.3.1. Michael, Greg

2.5.4. Last call for papers

- 2.5.4.1. *The agenda will be followed strictly. This is the only opportunity for new papers.*

2.5.4.2. New Paper

- 2.5.4.2.1. Steve Williams, XXX "1394 over 802.11" QoS

2.5.5. Closure of call for papers

2.6. Presentation of Papers

2.6.1. Greg Chesson, document 01/132r1

2.6.1.1. DTBS-TCMA-VCDF presentation

- 2.6.1.1.1. *VCDF should be viewed as essentially the same as a proper subset of TCMA*
- 2.6.1.1.2. *They are both a modern version of DTBS, proposed in 1994.*
- 2.6.1.1.3. *The proposers believe and intend for VDCF to be license free and royalty free. There is plentiful prior art.*
- 2.6.1.1.4. *Uses same state machine as DCF.*
- 2.6.1.1.5. *Document 131 contains proposed normative text.*
- 2.6.1.1.6. *Simulation in public Berkeley NS2*
- 2.6.1.1.7. *Multiple queues and parallel state machines.*
- 2.6.1.1.8. *Two controls – contention window, and Inter-Frame Space.*
- 2.6.1.1.9. *Review of simulation results.*
- 2.6.1.1.10. *Proposal maintains simple arithmetic and simple random number generation.*

2.6.1.2. Questions

- 2.6.1.2.1. *How are the control mechanism different than TCMA? The proposals are similar – we will try to merge them. These are all recipes for the same thing.*
- 2.6.1.2.2. *Is there a packet size in the simulations? It is in document 133. The sizes represent the traffic.*
- 2.6.1.2.3. *The notation QIFS(0) means what? QIFS(0) is DIFS. Anything beyond that is slots.*

- 2.6.1.2.4. *In slide 9 there is a latency graph with very high values. Yes that slide is for legacy DCF to show it is unacceptable. In the QIFS(2) case.*
- 2.6.1.2.5. *Question about lack of IP? The question was re-phrased to be less definitive. What level has it been verified? Who would we not need to get a license from?*
 - 2.6.1.2.5.1. *Chair intervenes and recommends that we not get into IP issues. This presentation is not an IP statement. Formal IP statements need to be provided by companies that are involved. IP statements have been received from AT&T, TI, and Symbol.*
- 2.6.1.2.6. *Statements will be provided ASAP from the presenter's company.*
- 2.6.1.2.7. *What about the re-orderable service class? It still requires a specific traffic category.*
- 2.6.1.2.8. *What happened to the contention offset mechanism? In the ECA proposal in Monterey, NDO, QIFS were the same thing. We tried to prove CO did something, but couldn't. It was dropped because it was not effective.*
- 2.6.1.2.9. *What are the parameters for the 2-priority examples? What are the parameters for 4 priorities? The search space for all parameters and all loads is huge. If it was searchable, you could find optimal parameters. Instead, we try to find the interaction of parameters with load. This is work to be done.*
- 2.6.1.2.10. *The offsets and differentiation by offset are part of VCDF since November. This was dropped when the UAT was adopted. How is that related to the effectiveness? We hoped to find CW effected bandwidth, and CO effected latency, but actually they were mixed.*

2.6.2. Jin Meng Ho, et al, Document 01/139

- 2.6.2.1. *"Presentation for proposed P-DCF Contention Access Enhancement"*
 - 2.6.2.1.1. *P-DCF uses one backoff counter per station. Doesn't need to determine internal collision.*
 - 2.6.2.1.2. *P-DCF Separates external behavior (medium access) from internal behavior (selection from queues)*
 - 2.6.2.1.3. *P-DCF obeys DIFS usage for legacy DCF*
 - 2.6.2.1.4. *Use of LFSR to generate pseudorandom integer.*

2.6.3. Khaled Turki, Document 01/137r1

- 2.6.3.1. *Review of simulation results for P-DCF*
 - 2.6.3.1.1. *20 streams, 15 stations, bi-directional streams*

2.6.4. Sid Schrum, Document 01/163

- 2.6.4.1. *P-DCF proposal summary*
 - 2.6.4.1.1. *Consideration of implementation complexity.*
 - 2.6.4.1.2. *Is there a simple way to implement this proposal. Hardware or software can be traded off.*
- 2.6.4.2. *Discussion*

- 2.6.4.2.1. *Is Jin Meng's IFS the same as Sid's NDO? No, we don't use IFS for differentiation. The proposal doesn't use an NDO (non decrementing offset)*
- 2.6.4.2.2. *Were simulations showing that increasing DIFS increases delay? Yes.*
- 2.6.4.2.3. *TCMA does residual backoff scaling. It does not have binary exponential doubling. There will not be jitter and delay.*
- 2.6.4.2.4. *What makes you think V-DCF cannot be implemented with one counter? It as shown in Tampa. You still have to compare all the backoff counters and select the smaller one.*
- 2.6.4.2.5. *Discussion of numbers used in the V-DCF example. The CWmin was too large, yielding poor results. There needs to be two categories of CWmin and various QIFS to get a range of accesses.*
- 2.6.4.2.6. *If you use the maximal length sequence generator, do you have whiteness? Is it a uniform distribution? Is it correlated from sample to sample? That could be a problem with respect to collisions? The answer is a much longer LFSR is used as the generator. This issue is taking out numeric block rather than a bit stream. There is correlation from number to number. The proposers don't believe it is a problem.*
- 2.6.4.2.7. *The proposal says it is the same state machine as the DCF. It is different. The state machine is a lot more than a backoff counter. The intention was that the backoff counter is the same.*
- 2.6.4.2.8. *In Khaled's presentations, slide 19, the delays are very small. The aggregate offered traffic was 6Mbps with the full bandwidth is 11Mbps. It seems like the differences to Legacy are minimal, because the offered load is too low.*
- 2.6.4.2.9. *Comment – drawing a random number in software has a problem, first power issues, other issue is that the backoff time can otherwise be used for other useful processing. It is a short-sighted implementation. This is offered as an option, but dedicated silicon might be better. Legacy equipment would have limited resources for this calculations. The perception is that there are no alternatives that are nice to implement.*
- 2.6.4.2.10. *Between the measured medium collision and idle time and the update, there is a delay? Binary exponential backoff has greater delay though. But in a bursty environment a simulation is needed to model the adaptation. Was it done? Yes*
- 2.6.4.2.11. *On Page 10, the TCPP update is based on time of collision – what is that? If energy is detected, but cannot be decoded.*

3. Tuesday Morning – QoS Session

3.1. Opening

3.1.1. Session called to order 13-Mar-01 at 10:30AM

3.1.2. Notes from the chair

- 3.1.2.1. *We have 5 hours of presentations remaining, and 6.5 hours of meeting time. The remaining time will be used for debate on the proposals.*
- 3.1.2.2. *During Q&A session, each person should limit themselves to two questions. Additional questions will need a subsequent entry on the queue.*
- 3.1.2.3. *We will try to limit discussion to three minutes per questions*

3.2. Presentation of papers

3.2.1. Mathilde Benenviste, Document 01/144r1

- 3.2.1.1. *An E-DCF Proposal Using TCMA*
 - 3.2.1.1.1. *Overview of TCMA proposal*
 - 3.2.1.1.2. *Simulation results*

3.2.2. Mathilde Benenviste, Document 01/145r2

- 3.2.2.1. *E-DCF with Backoff Adaptation to Traffic*
 - 3.2.2.1.1. *Adaptation to traffic by adapting the contention window sizes. Roughly based on the number of active sessions.*
 - 3.2.2.1.2. *Compared to p-persistent CSMA, BAT does not add any delay jitter upon scaling.*
 - 3.2.2.1.3. *Scaling factors are determined by stations and AP, not just APs, resulting in less overhead.*
 - 3.2.2.1.4. *One EDCF proposal will be TCMA, the BAT proposal will be moved as a separate option on top of TCMA.*
- 3.2.2.2. *Discussion*
 - 3.2.2.2.1. *Could TCMA increase contention within the same traffic category? The extra delay of a slot after DIFS does not hurt overall performance. Delay goes down in the higher priority classes.*
 - 3.2.2.2.2. *Is the AP permitted to set a maximum window? There is no formal restriction as far as the proposal is concerned.*
 - 3.2.2.2.3. *Have you tried to isolate how much UAT contributes to QoS as compared to persistence? In the case of different persistence with the same UAT, there was differences.*
 - 3.2.2.2.4. *How do you do power management? Is it distributed? The distributed adaptation helps with power management. In distributed monitoring, doesn't it require every device to monitor all the time, and thus never go into*

power save? A station doesn't have to listen all the time. If it is going to sleep, it doesn't care anymore.

- 3.2.2.2.5. *Some high priority stations can use PIFS? Doesn't that cause contention with HCF? If you have HCF with legacy, they will collide as well. How can you avoid floating point in the persistence factor? Shifting and masking? Yes that is acceptable.*
- 3.2.2.2.6. *A contention based transfer is not NAV protected. But the slide shows some things that are? (in slide 11). A good CRC is success, in both cases with or without RTS/CTS NAV protection. Why use that definition? That is an abbreviated definition. The normative text is currently incompatible with DCF – is it intended to be compatible with HCF. Will need to work it offline.*
- 3.2.2.2.7. *The proposal seems like a superset of VDCF? Yes. Then what are the added features and complexity added?*
 - 3.2.2.2.7.1. *On slide 6, the X parameter, corresponds to contention offset.*
 - 3.2.2.2.7.2. *The field T – limit of transmit lifetime, to get rid of stale packets.*
 - 3.2.2.2.7.3. *The persistence factor, which is specific to certain classes. Enables further differentiation*

3.3. Recess

4. Tuesday Afternoon – QoS Session

4.1. Opening

- 4.1.1. Called to order 13-Mar-01 at 1:00PM**
- 4.1.2. Any new papers?**
 - 4.1.2.1. *Steve Williams, document 164*
- 4.1.3. Chair notes that any motions to accept resulting from papers must be supplied in advance.**
- 4.1.4. The draft text must also be submitted ½ day in advance.**
- 4.1.5. Consideration of proposal will begin tomorrow.**

4.2. Presentation of Papers

- 4.2.1. John Kowalski, Document 01/121r1**
 - 4.2.1.1. *Requirements for MAC level FEC*
 - 4.2.1.1.1. *Needs to provide a reduction in BER*
 - 4.2.1.1.2. *Must be interoperable with non-FEC devices*
 - 4.2.1.1.3. *Must not send up errored frames to higher layers.*
 - 4.2.1.1.4. *MAX MPDU is not increased, thus usable payload is reduced to 2080.*
 - 4.2.1.1.5. *Delayed ACK must be used due to turnaround time issues.*

4.2.1.2. Discussion

- 4.2.1.2.1. *How do you prevent multicast or broadcast FEC encoded frames from being sent to legacy? Not use FEC for those frames. That may not be a good thing, though.*
- 4.2.1.2.2. *Why is the ICV not included in the header also? Why not increase the first block to include ICV? Could have gone either way, but this decreased overhead. Would the same formats also apply to multi and unicast? Would like to, but first need to solve the multi/unicast issues. Delayed ACK is also an issue.*
- 4.2.1.2.3. *Is this code systematic? Yes. Couldn't legacy stations read through the code? No, they cannot interpret the frame format. What about interleaving? Not certain that there is a need for interleaving, but would consider if shown a benefit.*
- 4.2.1.2.4. *Why choose a particular FEC at the MAC, when there are results that show that RS might interact with the coding in the 11a PHY? There is concern over the concatenation of coding. Would burst errors mitigate the MAC FEC? It is important to have a good PHY. If it can adapt, you will incur very little loss. There is a trade off between*
- 4.2.1.2.5. *How much improvement in dB do you really get from this coding? No simulation so far, but analysis indicates under benevolent conditions you see benefit. The concern is to simulate the effects of concatenated codes, which typically give reduced benefit*
- 4.2.1.2.6. *The issue of the MAC SAP does not apply if you want to present frames through and MLME SAP. This has been done before. To what extent do you believe that the FEC is reasonable to use in lieu of acknowledgement? Can we use parameterized QoS to approach minimum jitter and latency. The ARQ alone is insufficient. Because of the 11a PHY, delayed acknowledgement would be preferable. Even without delayed ack, there is a substantial reduction in error rate.*

4.2.2. Michael Fischer, Document 109r2

4.2.2.1. HCF Frame Exchange and NAV Details

- 4.2.2.1.1. *HCF is essential for reducing conformance levels and unifying frame exchange rules.*
- 4.2.2.1.2. *HCF must be adopted now, because it would be impossible to achieve through comments on ballots.*
- 4.2.2.1.3. *This proposal comes from various suggestions to simplify the baseline proposal.*
- 4.2.2.1.4. *Presentation of the overview of the proposal, frame encodings, the need for QoS Null frames, the use of Autonomous Bursts, etc.*

4.2.2.2. Discussion

- 4.2.2.2.1. *On the slide on autonomous burst, the NAV setting is based on both stations being able to hear the Poll? What if they can't? Do Polls have to be sent on the basic rate? Clause 9.3 says any frame containing a CF-Poll has to be*

sent at the basic rate. It does need to apply here also. These types of frames are essentially control functions. RTS/CTS under HCF is always allowed before an MPDU or an MMPDU.

- 4.2.2.2.2. Today under PCF, and EPCF, the buffered group address frames sent after the beacon are SIFS separated. If there are CFPs colliding, there is a high probability they will be lost, since there is no CCA. By changing to PIFS, this problem is alleviated.
- 4.2.2.2.3. Within a TXOP, after a non-response, the idle time is PIFS.
- 4.2.2.2.4. If a station gets a TXOP, sends a frame, and doesn't get an ACK, it loses control of the medium? Yes, but the coordinator could give back a TXOP.
- 4.2.2.2.5. If the TXOP could be lost after one lost frame, then this is a problem. The station can re-send after PIFS with something else, but not necessarily retry the non-responding frame.
- 4.2.2.2.6. Is there a requirement for a CC and CI per DTIM interval? If an ESTA has something you want a TXOP for, it could build a QoS null and contend under DCF, or you could send an RR in a CC. If you don't know when you get a CC, it will cause all the traffic to be sent in the contention period. The CC segregates the contention for request from the contention for DCF data. Perhaps a capability bit is needed to specify that CCs will be sent.
- 4.2.2.2.7. Is there a requirement for beacon interval? It has not changed. It does add the requirement that ESTAs not transmit across TBTT.
- 4.2.2.2.8. For Bcast and Mcast, there is no mitigation for overlap at the receiver? Could you use a multipoll to eliminate the need to poll every node? What is the efficiency difference? We could use multipoll in this context?
- 4.2.2.2.9. The multipoll could be moved to the beginning of the DTIM period and thus use schedule? Schedule frame has been eliminated since it is not compatible with BSS overlap. If the traffic is periodic, with defined polling rate and jitter bound, hence the equivalent of schedule is available.
- 4.2.2.2.10. With schedule frames, notes can transmit every interval without a poll? Discussion of schedule frames is not germane to HCF. It is not there. It had to be eliminated because of reliance on absolute time. It is yet another coordination function.
- 4.2.2.2.11. On Slide 19, figure at bottom: Can NAV setting go on beyond what is shown? No, this is a TXOP, not a frame. Can the duration field go beyond a TXOP + DIFS? The duration field contains the TXOP, but not the DIFS.
- 4.2.2.2.12. Given that CCI looks like a wart, wouldn't it be appropriate to just use EDCF for that instead? It should be made in a ballot comment. An access priority should be reserved for control in that case.

4.2.2.3. *Point of order – was this presentation available in time?*

4.2.2.3.1. *The requirement is that text for inclusion in the draft must be available ½ day in advance. Substantial proposals should be available one week in advance. Currently we don't have a motion to include HCF. The presentation itself is in order.*

4.2.2.3.2. *The chair rules that it is in order.*

4.2.2.3.3. *The chair requests that the text corresponding to this presentation be submitted immediately due to the complexity.*

4.3. Recess for break

4.4. Opening

4.4.1. Call to order at 3:30PM

4.4.2. Announcements

4.4.2.1. *Coordination of TGe Agenda with TGg voting plans.*

4.5. Presentation of Papers

4.5.1. Matthew Sherman, Document 01/157

4.5.1.1. Proposed ERTS & ECTS Mechanisms

4.5.1.1.1. *Based on document 01/097. Has been reduced to key changes with near term usefulness.*

4.5.1.1.2. *Proposed normative text in 01/130.*

4.5.1.1.3. *Proposal to make groups of stations cease transmitting. Has developed a way to set and reset the NAV of any station. This presentation focus on setting the NAV.*

4.5.1.1.4. *Tries to use existing frame formats as much as possible.*

4.5.1.1.5. *Proposed modification of usage for RTS and CTS frames, using addresses as qualifier for duration field.*

4.5.1.2. Discussion

4.5.1.2.1. *Does 802.11 have a loopback function? No. Then how do you transmit a CTS to yourself? You can't You can just do it inside the MAC.*

4.5.1.2.2. *This seems to be abusing multicast addresses. How can you force a station to be part of a multicast group? Why not use reserved addresses? The assignment of multicast addresses is beyond the scope of 802.11, but it doesn't preclude it. Agrees that it is unconventional.*

4.5.1.2.3. *Wouldn't a multicast RTS cause a mass collision of CTS's ? The multicast address is in the sender address, not the receiver, so it goes only to one station, which then responds as a multicast. Could there be a range of well known multicast addresses that could be used for this purpose? See 802.0.*

- 4.5.1.2.4. *There are concerns about special treatment of the NAV in certain cases. Does this require any special processing of the NAV? No more than in 360r2. It is consistent with that. A new message type must be treated as a legacy message type.*
- 4.5.1.2.5. *In the existing 802.11, it says the station updates the NAV only when the frame is not addressed to the station? This could be clarified in Annex C. There is a compare of the MAC address, but after checking for group addresses. So the legacy NAV will not be updated from a directed frame.*
- 4.5.1.2.6. *For BSS overlap mitigation, in slide 15, who should be listening to BSS1? RTS CTS is already proposed for use in the contention period.*
- 4.5.1.2.7. *Straw poll – how many support adding this to the draft? About 15 would support, none are against.*

4.5.2. Steve Williams, Document 164

- 4.5.2.1. *1394 requirements on 802.11E QoS*
 - 4.5.2.1.1. *To make a case to meet the needs of 1394 in 802.11E – what are the issues.*
 - 4.5.2.1.2. *1394 market opportunity for consumer electronics and home networking.*
 - 4.5.2.1.3. *1394 Trade Association is working on wireless bridging of 1394, currently HiperLAN and wanting to support 802.11.*
 - 4.5.2.1.4. *Review of 1394 architecture. Plesiochronous data delivery service – not phase locked, thus over time there is frame slippage.*
 - 4.5.2.1.5. *1394 is a tree topology with peer to peer connection.*
 - 4.5.2.1.6. *1394 is a self-reorganizing bus (Isoc Resource manager) 125uS cycles, using up to 80% of the bandwidth.*
 - 4.5.2.1.7. *1394 Bridging – connecting clusters of 1394 equipment across wireless. Timing must be propagated from one 1394 bus to another.*
 - 4.5.2.1.8. *Microsoft trials with 802.11 ad hoc networks. QoS will be needed in 802.11 IBSS.*
 - 4.5.2.1.9. *The goal is to get HDTV across and 802.11 link. 24Mbps requirement.*
- 4.5.2.2. *Discussion*
 - 4.5.2.2.1. *Comment that Ad Hoc has not been considered. There is a difference between an Ad Hoc and an IBSS. The only issue is dynamic creation of a coordinator. An IBSS isn't the only way to do an ad-hoc network.*
 - 4.5.2.2.2. *Is it possible to achieve the needed level of timing preservation across the wireless network to meet the objectives? The clocking in the wireless domain is irrelevant – what is important that the 1394 clocks are phase locked throughout the network. The net cycle master might be located in either the wireless or wired domain. You can't phase lock clocks over a wireless links?*

It has been done to 100ppm. You can use the 1uS global time reference of the wireless LAN.

- 4.5.2.2.3. *Comment on slide 15 – if we have an FEC, it should be as efficient as a re-transmit.*
- 4.5.2.2.4. *Is it possible to give a sense of direction for the nature of how 1394 would be encapsulated over 802.11? There is an effort to standardize the approach 1394 takes toward all wireless medium. There are no specifics for 802.11. There have been debates. What are the approaches?*
 - 4.5.2.2.4.1. *Bandwidth allocation between 802.11 and 1394*
 - 4.5.2.2.4.2. *Do you use IP or not?*
- 4.5.2.2.5. *Statement from 1394 TA. Consider 802.11 as a wireless medium that is friendly for transporting 802 as well as other types of traffic at the MAC level. 1394 requirements are not the same as Ethernet. Presentation at joint 802.11/15 session.*
- 4.5.2.2.6. *What are the reach vs rate for 1394? 4.5M up to 400Mbps. 1394b up to 3.5G over optical glass.*
- 4.5.2.2.7. *Is there another candidate for a transport stream over wireless? We are talking about a convergence layer to let 1394 talk to other 1394 over wireless. Also bridging network (IP) over 1394. Take Offline.*
- 4.5.2.2.8. *If you want to do this you need EPCF. Does the EPCF meet the needs? Not qualified to compare the proposals yet. A coordinated function is required, but beyond that, unknown.*

4.6. Final Consideration on EDCF

4.6.1. Chair's notes

- 4.6.1.1. *At the end of the week we need to have a new draft, and would like to start a letter ballot.*
- 4.6.1.2. *Each concept to be introduced needs a 75% vote to be put into the draft.*
- 4.6.1.3. *In the case of DCF it is harder. There are 3 alternatives. It would be very undesirable to have none get 75%. Urges the group to select the preferred approach. All three of them are very strong, but we have to pick one, with 75% support.*
- 4.6.1.4. *To help the process, we discussed having straw polls today at the end of this discussion.*
- 4.6.1.5. *The voting members will give us an indication of their support. This will help us pick one and only one.*
- 4.6.1.6. *To give structure to the discussion, allocate 5-10 minutes to each proposals for questions and statement. Equal time will be given to each. 5 to 10 minutes for straw poll.*
- 4.6.1.7. *We have pending questions.*

4.6.2. General discussion

4.6.2.1. *What has been done about Capture in 802.11b? Has anyone done any more investigation? Yes, more measurements have been done, and could not reproduce the results. Stations that are further away got less bandwidth.*

4.6.3. VDCF final statements and questions

4.6.3.1. *To compare VDCF with TCMA – they have the same core. TCMA is a superset. There is less shared technology with P-DCF. There is a bridge between p-DCF and the Contention window – there is a conversion between probability and contention window.*

4.6.3.2. *VDCF has the intention that all proposers have the intention to have no royalties or fees.*

4.6.3.3. *If equal simulations, they are all in the same relative band. They are biased to make them look different. Adaptation does provide some improvement, but not substantially.*

4.6.3.4. *Especially since all these mechanisms are going to be used with HCF for the guaranteed applications.*

4.6.3.5. Questions

4.6.3.5.1. *Can this support Voice over IP? They can all support VoIP. None is a lot better.*

4.6.3.5.2. *TCM has 3 new added functions – any comments on those? If those could be separated as features with separate discussions to evaluate their return on investment, that would be good.*

4.6.4. p-DCF final statements and questions

4.6.4.1. *Belief that it is not more complex than VDCF to implement.*

4.6.4.2. *Regarding compatibility, the issue is interoperability. Simulations show interoperability.*

4.6.4.3. *Suggest that adaptation is powerful, and piggybacks on beacons.*

4.6.4.4. *Understands that IP cannot be discussed. There might be IP in any proposal that is unknown at this time.*

4.6.4.5. Questions

4.6.4.5.1. *How does it work with few stations and light load? There is not that much differentiation. Is there a small penalty / overhead?*

4.6.4.5.2. *Is there information compared to TCMA? The comparison was to V-DCF. There is some on QIFS of TCMA.*

4.6.4.5.3. *Explain how the extra slot changes the result? There is something wrong with the simulations? We have high confidence.*

4.6.5. TCMA final statements and questions

- 4.6.5.1. *Adaptation can help substantially. It can be done in the AP exclusively. The standard should not address what adaptation algorithm is used.*
- 4.6.5.2. *Have presented a simple scaling algorithm using backoffs, which does not introduce delay jitter.*
 - 4.6.5.2.1. *Not part of TCMA, though.*
- 4.6.5.3. *Agrees with VDCF that UAT's provide robust differentiation. Has shown results in OpNet*
- 4.6.5.4. *TCMA is the simplest approach that will give what you want.*
- 4.6.5.5. *TCMA can be backward compatible with legacy. Persistence factors helps with adaptation.*
- 4.6.5.6. *Questions*
 - 4.6.5.6.1. *Do you believe that others can simulate in OpNet?*
Yes
 - 4.6.5.6.2. *Some user scenarios were defined in Monterey?*
Everyone did simulate against those scenarios.
 - 4.6.5.6.3. *Are you willing to give up the simulation model?*
Yes.
 - 4.6.5.6.4. *Will TI give up their model? Don't Know.*

4.7. Straw Poll on EDCF proposals

4.7.1. Introduction

- 4.7.1.1. *This is not a binding vote to see where we are, and where the proposals stand.*
- 4.7.1.2. *Voting Members Only*
- 4.7.1.3. *Two Rounds.*
 - 4.7.1.3.1. *First round - Vote for only one, plus abstain.*
 - 4.7.1.3.2. *Second Round, same thing, eliminating the weakest proposal.*

4.7.2. Round 1 – All three proposals

- 4.7.2.1. *VDCF – 25*
- 4.7.2.2. *P-DCF – 9*
- 4.7.2.3. *TCMA – 9*
- 4.7.2.4. *Abstain – 8*

4.7.3. Second Round is withdrawn due to tie for 2nd place.

4.8. *Recess until 10:30AM Wednesday*

5. Wednesday Morning – QoS Session

5.1. Opening

5.1.1. Call to order at 10:30AM

5.1.2. Announcements

5.1.2.1. *Schedule for today 10:30 to 12:00*

5.1.2.2. *TGe will recess for the TGg vote at 11:30AM*

5.1.3. Review of Presentation of Papers

5.1.3.1. *Are any papers that were not ready yesterday, now ready to present?*

5.1.3.1.1. *Wim Diepstraten – Presentation Withdrawn*

5.1.3.1.2. *Duncan Kitchin – Presentation Withdrawn*

5.1.3.1.3. *Chris – Ready to present*

5.2. Presentation of Papers

5.2.1. Chris Hansen, Document 01/148

5.2.1.1. *Interleaving for Reed Solomon Coding*

5.2.1.1.1. *Interleaving spreads burst errors across multiple RS codewords, increasing maximum correctable burst length.*

5.2.1.1.2. *Interleaver to be inserted between RS Encoder and symbol mapping on TX.*

5.2.1.1.3. *Simulations were done with a burst error channel model.*

5.2.1.2. *Discussion*

5.2.1.2.1. *What is the correct document number? 148 is the agenda.*

5.2.1.2.2. *How does this work with the various PHYs? The PHYs are actually giving us symbol errors, that appear as burst error. If you look at 802.11a at the highest rate, there are a large number of bits in a symbol. The general answer is that interleaving helps more as the burst length is longer.*

5.2.1.2.3. *It is important to have an intact MAC header on the air so non-FEC devices can still set their NAV. Yes, the header is not interleaved.*

5.2.1.2.4. *Is the frame padded? How do you keep track of the actual MPDU length? Longer frames have more interleaving. But if padding is used, you have to tell the MAC how much it is? There is no padding.*

5.2.1.2.5. *But what about a prime length MSDU? The padding issue needs more study. There is no answer currently.*

5.2.1.2.6. *There are other ways to approach this problem – before the next meeting, can we look at alternatives? What*

are the limits of the PHY to mitigate the need for interleaving? Could interleaving be done at a higher layer?

- 5.2.1.2.7. *Does this result in the inability to work with small packets? There needs to be more scenarios in the simulation. That's a valid point, will work on that.*

5.3. Announcement

5.3.1. There will not be another vote in TGg. It has been decided to recess TGg for the week.

5.3.1.1. Discussion

- 5.3.1.1.1. *What does this imply? The intention is to vote at the next meeting in May. TGg has stopped at step 19, round 1.*
- 5.3.1.1.2. *The vote to stop TGg was 47:15:6*

5.4. Call for any other papers

5.4.1. None

5.5. Continuing discussion

5.5.1. Call for any new motions to be submitted in writing to Secretary.

5.5.2. HCF

- 5.5.2.1. *Is the HCF Normative text on the server? Yes, it was uploaded last night. It meets the ½ day advance requirement.*
- 5.5.2.2. *The motion to adopt HCF will be delayed until the last TGe QoS session.*

5.5.3. EDCF

- 5.5.3.1. *Chair Invites representatives from the three proposals come forward for 20-30 minutes Q&A.*
- 5.5.3.2. *In the January meeting we were ready to downselect, but there was a merger. Now we are back to 3 proposals? How does p-DCF correspond to ECF? The joint proposal eliminated some redundant material. There was a translation of PP values to use the p-DCF.*
- 5.5.3.3. *How does the p-DCF diverge from the joint proposal? The joint proposal allowed for a VDCF approach (CWs). That is not in p-DCF.*
- 5.5.3.4. *VDCF provides good enough QoS. After looking at VDCF submissions – couldn't find any delay improvement over legacy DCF.*
- 5.5.3.4.1. *There have been 11Mbps PHY experiments. There wasn't a need to demonstrate the same algorithms at all PHY rates.*
- 5.5.3.4.2. *The observed difference in delay between VDCF and legacy is shown in doc 132. there is a difference in the style of plot, though. It was less confusing due to the messiness of the legacy DCF.*

- 5.5.3.4.3. *Because TCMA has removed the offset from the EDCF parameter set, that addresses the same issue- it enables the differentiation for priority classes.*
- 5.5.3.5. *There is a simulation of 10, 20, and 30 stations. It was an extreme overload, which shows large latency in the 30 station case. This was done to show that the mechanisms do work under overload.*
- 5.5.3.6. *Stations with high priority are prevented from using a backoff of 0 to prevent interaction with PIFS.*
- 5.5.3.7. *Has anyone run simulations with mixed data rates and FH PHYs? VDCF: FH, No – Different data rates, yes. There are a wide variety of packet sizes which has a similar effect of a mixed data rate simulation. TCMA: No for FH, Mixed: No, other PHYs, No. p-DCF, No, No, No.*
- 5.5.3.8. *The queuing mechanisms will prevent starving of a lower class? VDCF: correct, TCMA: true.*
- 5.5.3.9. *Within a traffic class, is it possible for a packet to starve other packet of the same class? VDCF: The queues go into backoff after a collision. Nothing would cause you to drop a packet, except retry limit. TCMA: the TX lifetime alleviates the congestion of backed up queues. P-DCF: does allow lower priority traffic to go out.*
- 5.5.3.10. *Has the IP issue with VDCF changed at this time? No, neither have our intentions.*
- 5.5.3.11. *Chair's Note : IP statements have been filed and are available on the server. We cannot doubt their validity. We are not going to make interpretations.*

5.6. Closing

5.6.1. Review of pending motions

5.7. Recess

6. Wednesday Afternoon – QoS Session

6.1. Opening

6.1.1. Called to order at 4:00PM

6.1.2. Count of voting members in the room: 62 voters.

6.2. Old Business

6.2.1. Approval of Minutes from Monterey

6.2.1.1. Approved without objection

6.2.2. Preparation for announced New Business agenda items

6.2.2.1. How many people have motions for new business in QoS? At least 3.

6.2.2.2. *If there are any un-submitted motions, please submit them in writing before 4:30*

6.2.3. Resume EDCF discussion queue from previous session:

- 6.2.3.1. *The VDCF simulations show a 36Mbps PHY? Yes. The slides show a CWmin of 31, which is for 802.11b. Why? It could have been 15. How do the priorities map to CWmin? It is whatever we set it to. The ones that work best, using QIFS, they used two values 15 and 31. There are no legacy DCF traffic in most simulations. A few do. CWmin of 31 for some low priority traffic.*
- 6.2.3.2. *Is the highest priority the same as legacy? No, it is at one slot difference between high priority and legacy. The proposal is for the editor to chose the most appropriate language to express the concept of priority over legacy DIFS.*
- 6.2.3.3. *In the case of a residual backoff, the minimum value is 1. When you have a UAT of PIFS, and a residual backoff of 1, it is a higher priority than legacy.*
- 6.2.3.4. *How much would you decrease the CWmin? It is a function of the amount of contention.*
- 6.2.3.5. *Some media access delays are in the order of seconds? No, it is less than 10mS for high priority. What about the others? This is an overload situation – lower classes have to wait. The intent is to show the robustness.*
- 6.2.3.6. *VDCF – wants to point out that VDCF and TCMA simulations show multiple second access delays because in an extreme overload situation, higher priority traffic can get through at the expense of lower priority.. It depends on policy setting. It can also be configured to allow more fairness between priority levels.*
- 6.2.3.7. *p-DCF – We have been working to improve DCF, not build something on top of it. The simulations of the VDCF and TCMA are not conclusive.*
- 6.2.3.8. *In the current standard, it is possible to have an MPDU transmit and fail. Another MPDU can be pulled from the queue in that case. Is it the case that VDCF requires only one packet outstanding from a queue? The proposal has one set of state per queue. The 802.11 standard does not prohibit having multiple sets of state per queue. Could there be blocking of packets at the same priority level? Possibly unless you keep state per flow. We want to no preclude that behavior.*
- 6.2.3.9. *Do you also refer to in an AP that a packet can block a packet to another station? Yes. Be reminded that the standard allows re-ordering in access points. It is done today.*
- 6.2.3.10. *There were some presentations of “capture effect” in DCF. How has this been addressed in the existing*

proposals? VDCF – we have done testing in this area, and could not reproduce any “capture effect”. Instead we found some effect due to near / far distance from AP differences.

- 6.2.3.11. *Given that a station is disadvantaged by distance, wouldn't it not get fair access to the channel? Doesn't that make it harder to make a fair system for bandwidth allocation? P-DCF: we have not seen a precise explanation for the mechanism. P-DCF provides a good chance of overcoming this because it is memoryless. Frames that fail are not disadvantaged. TCMA: This has been looked into a bit. It is not reproducible. The results may not be valid. It is not necessarily a problem with the 802.11 MAC, but perhaps higher layers.*
- 6.2.3.12. *Author of Sydney Paper. Chris Wade University of Wollongong.*

6.3. New Business

6.3.1. Motion - I move that the normative text for the EDCF function be incorporated into the 802.11e draft standard D0.1 using normative text taken from documents 01/117r1 and 01/131 according to the editing instructions contained in document 01/178.

6.3.1.1. *Moved Greg Chesson*

6.3.1.2. *Seconded Mathilde Benveniste*

6.3.1.3. *Discussion*

6.3.1.3.1. *There were problems with the original standard with SDL? The editing is referring to a state diagram, not SDL.*

6.3.1.3.2. *Concern about normative text being available. There are technical changes being proposed? We are referencing two sets of normative text, plus editing instructions. They have all been available, according to the rules.*

6.3.1.3.3. *What if there were incompatibilities in the merge? The instructions exactly define what is to be done. The editor confirms that the instructions are complete and adequate.*

6.3.1.3.4. *Are frame formats resolved? There are no specific instructions for them. It says make corresponding changes to the frame formats. The editor*

6.3.1.4. *Move – to postpone the vote on this motion until Thursday.*

6.3.1.4.1. *Moved Peter E*

6.3.1.4.2. *Seconded John K*

6.3.1.4.3. *Discussion*

6.3.1.4.3.1. *In favor of postponing because of reservations about meta-language.*

6.3.1.4.3.2. *Against postponing, since this is not unique or unusual. There is plenty of precedent. This*

particular text and instructions are very clear and straightforward.

6.3.1.4.3.3. In favor of postponing. It would allow actual text to be generated by tomorrow. The issues could be cleared up.

6.3.1.4.3.4. Call the Question

6.3.1.4.3.4.1. Raju

6.3.1.4.3.4.2. Called without objection

6.3.1.4.4. *Vote on motion to postpone: fails 23:39*

6.3.1.5. *Protest about the motion, being a compound motion, from Ken Clements.*

6.3.1.6. *The chair rules this motion in order.*

6.3.1.7. *Motion to appeal the chairs ruling*

6.3.1.7.1. *Duncan Kitchin takes over as Chair*

6.3.1.7.2. *Moved Ken Clements*

6.3.1.7.3. *Seconded Raju Gubbi*

6.3.1.7.4. *Discussion on the appeal*

6.3.1.7.4.1. Wants to see everything together at one time. Supports the appeal

6.3.1.7.4.2. Call for Orders of the day

6.3.1.7.4.3. The session time is expired.

6.4. Recess

7. TGe QoS Session, Thursday AM, March 15, 2001

7.1. Opening

7.1.1. Called to Order by Duncan Kitchin

7.2. Continuation of New Business

7.2.1.1. *Motion to appeal the chairs ruling*

7.2.1.1.1. *Discussion on the appeal*

7.2.1.1.1.1. John Fakatselis speaks against his decision as chair. As a matter of progress, lets move forward. The intent of the motion is to give adequate opportunity to contribute to the process. Suggests accepting Ken's appeal. There is now a comprehensive document that contains the actual text. Calls the question.

7.2.1.1.2. *Any objection to calling the question.*

7.2.1.1.2.1. The question is called with no objection.

7.2.1.2. *Vote on the appeal to the ruling on the motion being out of order: Appeal passes 41:4:19*

7.2.1.3. *The motion is ruled out of order.*

7.2.2. The Chair passes to John Fakatselis**7.2.3. Comments on status from the chair**

7.2.3.1. *We need to make decisions on the EDCF, HCF, and FEC proposals. We need 75% approvals to get to a letter ballot. A letter ballot is the first step to closure. After ballot, it is harder to introduce new aspects, however.*

7.2.3.2. *Review of Letter ballot process to approval.*

7.2.3.2.1. *To make the group aware of the risks involved with sending a draft to letter ballot or sponsor ballot.*

7.2.3.2.2. *It is OK to let a draft go out with placeholders. It is still OK to make submissions, and then make a comment to adopt a particular submission to solve the comment issue.*

7.2.3.3. *Discussion*

7.2.3.3.1. *What is the distinction between technical or editorial changes in comments.*

7.2.3.3.2. *The criterion was "if the proposed change results in a interoperability difference" it is a technical change.*

7.2.3.3.3. *The resolution process involves the full working group. We have to address all comments before the next draft can go out.*

7.2.3.3.4. *The 802.11 operating rules say that a draft must be complete (document 00/331r1). We will abide by the operating rules, but the group can make the ultimate decision by voting.*

7.2.3.4. *We have a 4 hours requirement for inclusion of text, which is strictly applied. This should be kept in mind before making motions. We have the option to make motions in full TGe session this afternoon.*

7.2.3.5. *Straw Poll – how many people have motions ? we have 4 motions.*

7.2.3.5.1. *Matt Sherman can be this session*

7.2.3.5.2. *Greg can be at 1:00*

7.2.3.5.3. *John's can be now*

7.2.3.5.4. *Michael has one for now, and one for 1:00*

7.2.3.6. *Straw Poll: How many people feel that there has been adequate time to review document 110r1, clause 9 only?*

7.2.4. Motion - Motion to adopt the text in 01/130r2 into the TGe draft.

7.2.4.1. *Moved Matthew Sherman*

7.2.4.2. *Second Harry Worstell*

7.2.4.3. *No discussion*

7.2.4.4. *Motion passes 28:7:23*

7.2.5. Motion to adopt document 120r3 as the draft text for clause 7.5.

7.2.5.1. *Moved John Kowalski*

7.2.5.2. *Second Sri*

7.2.5.3. Discussion

- 7.2.5.3.1. *In support of the motion. There has been broad support on working on this. It enables the AV market and position 802.11 well against competing standards.*
- 7.2.5.3.2. *Speaks in favor of the motion. It allows reducing bit error rates to a needed level.*
- 7.2.5.3.3. *In favor of this, it is optional.*
- 7.2.5.3.4. *Call the question*

7.2.5.3.4.1. Harry

7.2.5.3.4.2. Michael

7.2.5.3.5. Question called without objection

7.2.5.4. Vote on the motion: passes 63:3:6

7.2.6. Motion to adopt the text in document number 802.11-01/196 as part of the 802.11e-QOS draft.

- 7.2.6.1. *Moved Chris Hansen*
- 7.2.6.2. *Second Raju Gubbi*
- 7.2.6.3. *Discussion*

- 7.2.6.3.1. *This is draft text for the interleaver for FEC coding. This says that if FEC is employed, this interleaver must be employed.*
- 7.2.6.3.2. *Speaks against the motion – Document 140 discussed the effects of an interleaver. There are many reasons why it is a bad idea. Many times it makes things worse.*
- 7.2.6.3.3. *If the interleaver could be controlled by negotiation it would be preferable, but as mandatory it can't be supported.*
- 7.2.6.3.4. *Concerned about the MAC header issue and the ability to reject a frame. The header is not interleaved.*
- 7.2.6.3.5. *Call the question*

7.2.6.3.5.1. Maarten

7.2.6.3.5.2. Steven

7.2.6.3.5.3. Any Objection to call the question – yes;

7.2.6.3.5.4. Vote on call the question: The question is called: 39:17:14.

7.2.6.4. Vote on the motion: Motion fails 5:50:15

7.2.7. Motion to adopt the HCF proposal by adopting the text changes from submission 01/110r0

- 7.2.7.1. *Moved Michael Fischer*
- 7.2.7.2. *Seconded Sri*
- 7.2.7.3. *Discussion*

- 7.2.7.3.1. *This does not contain clause 9. Document r1 contains clause 9, and was available last night. This covers everything except clause 9, and has been available since Tuesday.*

7.2.7.3.2. *Does the HCF proposal remove the EPCF mechanism? Does the HCF correctly replace the EPCF? No functionality has been removed.*

7.2.7.3.3. *Is it the intention to make a similar motion in TGe adding clause 9? Yes, there is no ambiguity in the document under clause 9.*

7.2.7.3.4. *Can't support this motion without Clause 9.*

7.2.7.3.5. *There are issues in the r0 presentation that are not resolved: Some could be taken care of in letter ballot. But unlimited TXOP are hard to deal with in letter ballot. Speaks against the proposal until these things have been resolved. These issues are resolved in r1.*

7.2.7.3.6. *In favor of moving HCF forward. It appears that if we accept this, it provides a stronger basis to accept r1 this afternoon. The preceding issues can be dealt with in letter ballot. It is most important to move forward. Calls the Question.*

7.2.7.3.6.1. Greg

7.2.7.3.6.2. John

7.2.7.3.6.3. Any Objection to call the question? Yes

7.2.7.3.6.4. Vote on calling the question: passes 52:15:5

7.2.7.4. *Vote on the motion: 49:8:17*

7.2.8. Move to establish an ad-hoc group within 802.11 Task Group E to evaluate the TGe draft for suitability for AV transmission.

7.2.8.1. *Moved John Kowalski*

7.2.8.2. *Second Michael Fischer*

7.2.8.3. *No Discussion*

7.2.8.4. *Vote on the motion: passes 50:1:14*

7.2.8.5. *Motion is void because this is the QoS subgroup*

7.2.9. Move to adjourn

7.2.9.1. *Objection to adjournment*

7.2.9.2. *Vote to adjourn (requires 2/3) : fails 20:33:6*

7.2.10. Move to establish an ad-hoc group within 802.11 Task Group E QoS sub group to evaluate the TGe draft for suitability for AV transmission.

7.2.10.1. *Moved John Kowalski*

7.2.10.2. *Second Michael Fischer*

7.2.10.3. *Discussion*

7.2.10.3.1. *What is the output? Just recommendations of how to use the standard for AV*

7.2.10.3.2. *Call the question*

7.2.10.3.2.1. Greg Parks, Michael Fischer

7.2.10.3.2.2. Any objection to call? none

7.2.10.4. *Vote on the motion: Passes 56:1:8*

7.3. Adjourn**8. Full TGe Session – Thursday Afternoon, March 15, 2001****8.1. Opening****8.1.1. Called to order at 1:00PM****8.1.2. Chair's status update**

8.1.2.1. *Completed presentation of papers*

8.1.3. Agenda Review

8.1.3.1. *Old Business*

8.1.3.2. *New Business*

8.1.3.2.1. *Reports from Subgroups*

8.1.3.2.1.1. *Security Report*

8.1.3.2.1.2. *QoS Report*

8.1.3.2.2. *Editors Report*

8.1.3.2.3. *Motions for 802.11 Plenary*

8.1.3.3. *Next Meeting Objectives*

8.1.4. Agenda Discussion

8.1.4.1. *Are there any additions for old business or new business?*

8.1.4.2. *Request to add editors report*

8.1.4.3. *Add reports from subgroups, Security, then QoS*

8.1.4.4. *Agenda approved without objections*

8.2. Old Business**8.2.1. Approval of January minutes for TGe**

8.2.1.1. *Approved without objections*

8.3. New Business**8.3.1. Security subgroup report**

8.3.1.1. *Dave Halasz*

8.3.1.1.1. *Baseline document 00/419*

8.3.1.1.2. *draft 01/018*

8.3.1.1.3. *Work on splitting the PAR*

8.3.1.1.4. *Discussion of 01/018r3, producing 01/018r4*

8.3.1.1.5. *Four motions to bring forward*

8.3.1.1.6.

8.3.1.2. *TGe Security sub group formally requests that the TGe PAR be separated into Security and the remainder of TGe.*

8.3.1.2.1. *Moved Dave Halasz*

8.3.1.2.2. *Unanimous in the Security Subgroup 10:0:0*

8.3.1.2.3. *Discussion*

- 8.3.1.2.3.1. What is the advantage of doing that at this point in time since we are close? Because of the paper on UC Berkeley on the weaknesses of WEP has become public. The split doesn't happen right now. This will enable the split later, if needed.
- 8.3.1.2.3.2. Concern – the objective is to decouple the rate of progress if appropriate. We run the risk of getting no-votes in sponsor ballot if one is ahead of the other, or if there are interactions. There is no way for cross-participation currently. Actually the split might help.
- 8.3.1.2.3.3. Could we make a motion for cross-pollination?
- 8.3.1.2.3.4. The concern is valid, considering these two subgroups are in lock step. By splitting the PAR, there are still scheduling problems that prevent cross-involvement between the subgroups. However, the letter ballot does force participation from all members.
- 8.3.1.2.3.5. Then we may need QoS / Security joint sessions.
- 8.3.1.2.3.6. Noted that if this interaction doesn't happen there could be delays at sponsor ballot.
- 8.3.1.2.3.7. Does this require approval at ExCom? Yes, the next motion forwards two PARs and a cover letter to ExCom for approval.
- 8.3.1.2.3.8. We are asking to approve a draft under what group? Currently this is under TGe.
- 8.3.1.2.3.9. What is the result of the letter ballot forwarding motion? Once TGe approves the draft, the next motion is to send it to sponsor ballot. The sponsor ballot action would be to approve TGe, making the QoS section moot. At the 802.11 level, we can wait for the resolution of the splitting of the PAR, and submit the draft on behalf of TGi
- 8.3.1.2.3.10. Is this not a WG letter ballot? It is an 802.11 WG Letter Ballot. We have to demonstrate consensus in 802.11 before forwarding to Sponsor ballot.
- 8.3.1.2.3.11. The process would likely take more time than the approval of the PAR. We were advised 4 months is needed for PAR approval.
- 8.3.1.2.3.12. Until this is 802.11i, it can't be sent to Sponsor Ballot.
- 8.3.1.2.3.13. The concerns are with the Sponsor Ballot in motion 4. We can't approve something with an unresolved technical "no" vote.
- 8.3.1.2.3.14. The viewpoint is that 802.11e goes forward, and the Security group becomes 802.11i
- 8.3.1.2.3.15. Call the question

8.3.1.2.3.15.1. Duncan / Michael
 8.3.1.2.3.15.2. Called without objection

8.3.1.2.4. *Vote on the motion: Passes 68:1:8*

8.3.1.3. *Move to forward documents 01/166, 01/167, and 168 to Standards Board for approval.*

8.3.1.3.1. *Moved Dave Halasz*
 8.3.1.3.2. *(forwarded from Security Subgroup)*
 8.3.1.3.3. *Call the question*

8.3.1.3.3.1. John / Michael
 8.3.1.3.3.2. No Objection

8.3.1.3.4. *Vote on the motion: Passes 67:1:4*

8.3.1.4. *Move that document 01/018r4 be adopted as the TGe Security draft text. (technical)*

8.3.1.4.1. *Moved Dave Halasz*
 8.3.1.4.2. *(forwarded from Security Subgroup)*
 8.3.1.4.3. *No Discussion*
 8.3.1.4.4. *Vote on the motion: Passes 65:0:8*

8.3.1.5. *Move to conduct a WG letter ballot to forward document 01/018r4 to Sponsor Ballot.*

8.3.1.5.1. *Moved Dave Halasz*
 8.3.1.5.2. *Discussion*
 8.3.1.5.3. *Move to amend motion to:*
 8.3.1.5.4. *Move to conduct a WG letter ballot to forward document 01/018r4 to Sponsor Ballot under the new PAR in document 01/166, subject to its approval.*

8.3.1.5.4.1. *Moved Michael Fischer*
 8.3.1.5.4.2. *Second Duncan*
 8.3.1.5.4.3. *Discussion*

8.3.1.5.4.3.1. *If the PAR split fails, the letter ballot work would be lost.*
 8.3.1.5.4.3.2. *If NESCOM does not approve the PAR, as TGe, we have to re-combine the letter ballots back into one before Sponsor Ballot*
 8.3.1.5.4.3.3. *Move to suspend the rules to complete the business of debating this motion: Bob / Michael. No Objection.*
 8.3.1.5.4.3.4. *Call the question on the amendment.*
 8.3.1.5.4.3.5. *Duncan / John K*
 8.3.1.5.4.3.6. *No Objection*

8.3.1.5.4.4. *Vote on the amendment: passes 38:9:19*

8.3.1.5.5. *The main motion is:*

8.3.1.6. *Move to conduct a WG letter ballot to forward document 01/018r4 to Sponsor Ballot under the new PAR in document 01/166, subject to its approval.*

8.3.1.6.1. *Call the question*

8.3.1.6.1.1. Michael / John
 8.3.1.6.1.2. Objection to calling the question.
 8.3.1.6.1.3. Vote on calling the question: passes 68:10:2

8.3.1.6.2. *Vote on the main motion: Passes 71:0:11*

8.3.2. Motions on behalf of TGe QoS

8.3.2.1. *Motion to adopt the HCF proposal by adopting the text changes from submission 01/110r0*

8.3.2.1.1. *Michael Fischer*
 8.3.2.1.2. *on behalf of QoS subgroup*
 8.3.2.1.3. *Discussion*

8.3.2.1.3.1. Motion to amend.
 8.3.2.1.3.2. Ruled out of order due to text for the proposed amended motion not being available 4 hours in advance
 8.3.2.1.3.3. Appeal to the ruling

8.3.2.1.4. *Chair passes to Duncan Kitchin*
 8.3.2.1.5. *Discussion on ruling*

8.3.2.1.5.1. This motion , once amended, must have the text to implement it available in advance. If the motion to amend passes, the main motion becomes out of order. Suggest that the chair be support in ruling out of order.
 8.3.2.1.5.2. Call the question
 8.3.2.1.5.3. John F / Michael
 8.3.2.1.5.4. Vote on calling the question: 62:5:4

8.3.2.1.6. *Vote on the appeal to the ruling: fails 6:52:9*

8.3.2.1.7. *Chair returns to John Fakatselis*

8.3.2.1.8. *Call the question*

8.3.2.1.8.1. Sri / Michael
 8.3.2.1.8.2. No objections

8.3.2.1.9. *Vote on the main motion: Passes 52:5:8*

8.3.2.2. *Motion to adopt document 120r3 as the draft text for clause 7.5.*

8.3.2.2.1. *Moved John Kowalski*
 8.3.2.2.2. *on behalf of QoS subgroup*
 8.3.2.2.3. *Discussion*

8.3.2.2.3.1. FEC does not belong in the MAC. Doesn't believe this is effective.
 8.3.2.2.3.2. In favor

- | | |
|--------------|-------------------|
| 8.3.2.2.3.3. | In favor |
| 8.3.2.2.3.4. | Call the question |

- | | |
|----------------|--|
| 8.3.2.2.3.4.1. | Amar / Michael |
| 8.3.2.2.3.4.2. | Objection? Yes |
| 8.3.2.2.3.4.3. | Vote on calling the question: Passes
49:6:5 |

8.3.2.2.4.	Vote on the motion: Passes 52:10:8
------------	------------------------------------

8.3.2.3.	Motion to adopt the text in 01/130r2 into the TGe draft.
----------	--

- | | |
|------------|------------------|
| 8.3.2.3.1. | Matthew Sherman |
| 8.3.2.3.2. | on behalf of TGe |
| 8.3.2.3.3. | Discussion |

8.3.2.3.3.1.	Point of Information what is 130r2? what is it? Enhancement of RTS/CTS mechanism.
--------------	---

8.3.2.3.4.	Vote on the motion : Fails 42:19:12
------------	-------------------------------------

8.3.3. Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1

- 8.3.3.1. Moved Greg Chesson
- 8.3.3.2. Point of Information – has it been on the server for 4 hours? Yes. Has 131r1 been presented? Not the r1 version.
- 8.3.3.3. Second Wim Diepstraten
- 8.3.3.4. Discussion
- 8.3.3.4.1. The proposal has been demonstrated by two independent teams. Provides excellent properties and provable preference over Legacy DCF. I does not make guarantees. It ready to enter the letter ballot process.
- 8.3.3.4.2. Against this motion, because the text states that it has state machines that are not normative. Parliamentary Enquiry - how can this motion be amended?
- 8.3.3.4.2.1. This is not a problem. Adoption of this motion does not relate to the annexes where the normative state machines exist.
- 8.3.3.4.2.2. As parliamentarian, there is no way to create normative text without meeting the 4 hours rule.
- 8.3.3.4.3. Motion to amend the motion to : “Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1 and make the state machines specified therein normative.”
- 8.3.3.4.3.1. Ken
- 8.3.3.4.3.2. Second Greg
- 8.3.3.4.3.3. Parliamentary Enquiry – the state machines in this document are not SDL. Changing an informative annex into normative text requires a change to the text and may not be in order.

- 8.3.3.4.3.4. Bob – The proposed amendment is not as expect. This is a text change. This amendment would be out of order.
- 8.3.3.4.3.5. Point of information – could we have a straw poll?
- 8.3.3.4.3.6. Chair rules this motion to amend is out of order.
- 8.3.3.4.4. *Motion to amend to: “Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1 with the understanding that state machines shall be normative.”*
- 8.3.3.4.4.1. Moved Ken Clements
- 8.3.3.4.4.2. Seconded John Kowalski
- 8.3.3.4.4.3. Motion to amend the amendment to: “Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1 with the understanding that state machines included thereby shall be normative.”
- 8.3.3.4.4.3.1. Moved Jin Meng
- 8.3.3.4.4.3.2. Second Sid
- 8.3.3.4.4.3.3. Point of Order – calls the amendment of the amendment out of order.
- 8.3.3.4.4.3.4. The chair rules this amendment out of order
- 8.3.3.4.5. *Move to amend to: “Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1 with the understanding that state machines shall be normative.”*
- 8.3.3.4.5.1. Discussion
- 8.3.3.4.5.1.1. This is a change to the understanding of the text, not the text itself.
- 8.3.3.4.5.1.2. Against this amendment as unnecessary at this time. Calls the Question
- 8.3.3.4.5.1.3. Michael / John
- 8.3.3.4.5.1.4. Vote on call the question. Question called – 48:8:8
- 8.3.3.4.5.2. Vote on amendment: Fails 9:44:11
- 8.3.3.5. *Move to adopt the EDCF proposal by incorporating normative text from document 01/131r1 into the 802.11e-QOS draft D0.1.*
- 8.3.3.5.1. *Point of Order – asking for ruling on this text due to lack of normative state machines*
- 8.3.3.5.2. *Chair asks for Discussion*
- 8.3.3.5.2.1. This document is not perfect the first round. This is an editorial issue, and will be fixed before sponsor ballot
- 8.3.3.5.2.2. Question Called
- 8.3.3.5.2.2.1. Matthew / Michael
- 8.3.3.5.2.3. Point of order – calling the question is not in order unless any opposing party has spoken.

8.3.3.5.2.4. Vote on calling the question: passes 47:5:4

8.3.3.5.3. *Call for orders of the day – time is up.*

8.3.4. Adjourn

**IEEE P802.11
Wireless LANs**

802.11 Task Group E Security Subgroup Minutes

Date: March 2001
Author: Jesse Walker
Intel Corporation
Phone: 503-712-1849
Fax: 503-264-4843
e-Mail: jesse.walker@intel.com

**Minutes of the IEEE P802.11 Task Group E
Security Subgroup**

March 12-15, 2001

Marriott, Hilton Head, SC

1 Monday PM

Minutes taken by Dave H., 03/12/2001, 6:30

1.1 Agenda approved

- Discussion of splitting the PAR
- Pros
- - Timeline
- Cons
- - QoS not enforced to oversee

1.2 Motion Moved by Bob Beach

- TGe security subgroup formally request that the TGe PAR be separated into security and the remainder of TGe.
- Second by Albert Yong

1.2.1 Discussion

- - Jon
- - - Timing is important. If fails then will be more difficult later.
- - Carlos
- - - Time to ask is when we are ready
- - Garry
- - - Splitting will allow meetings to be held at different times.
- - Bob
- - - Evidence of schedules will be seen with approval of text
- - - As soon as task is split the work can be done parallel
- - - As soon as work is split, the joint TGe meeting will be more productive
- - Dave
- - - Current text is at a state that could be taken to letter ballot

- - - Splitting the group will make for more efficient planning
- Merwin
- - - Q: Is motion independent of “Are we ready with text?” A: Yes
- Vote on motion 10 – 0 – 0, motion passes
- Motion by Dave H.
- - Recess until tomorrow at 10:30 AM.
- - Seconded by Bob Beach
- - Vote 10 – 0 – 0

2 Tuesday AM

New PAR 166, 167, 168 in Monday directory

2.1 Review of new PAR

The intent is to split the existing TGe PAR. These are just red-lines of existing PAR. There are three documents instead of two, as one represents a cover letter.

2.2 Papers

2.2.1 Carlos Rios – Optional MAX Level Security for Home WLANs, 01/165

- Summary: good solution for enterprise, but not very good for home, because have to manually generate and distribute WEP keys.
- Proposal: keep everything at MAC layer in the home, to provide mutual authentication, session key, support for WEP2, add on top of existing WEP.
- Based on 00/200 “Plug and Play security”. use as a new authentication scheme
- Details: Stations have factory assigned public/private key pairs, stations learn each other’s MAC address and public key. This is used to authenticate the Diffie-Hellman exchange.
- Not proposed as an alternative for enterprise, but only for the home.

Question about rekey: what to do if key is compromised? A: change keys using Diffie-Hellman.

Q: Use EAP? Answer: No don’t need additional server. Q: But EAP doesn’t assume an additional server. And it can be used for multiple authentication.

Q: How does equipment “learn”; How does it know it is talking to the “right” peer? A: Not addressing this. There is an external registration event. A: There has to be a way to deregister a device, too.

Q: Are the Diffie-Hellmans signed? A: Unknown. It seems to be subject to man-in-the-middle attack.

Comment: Desire to re-cast this in the existing terminology.

Comment: Seems this has some strengths and some known weaknesses. The weaknesses become discovered and the press gives us a bad name.

Comment: Want a secure mechanism for using a public key. The basic idea is good, but need the implementation needs some work.

Comment: This is only for device authentication, not user authentication. The idea is user invisibility; anyone can use the device.

Comment: Guard against pointless security.

2.2.2 Bob Beach – TGe Security @home

Not a proposal, rather an investigation of how to apply baseline to small environments

- Show how a product would use TGe baseline in the home or SOHO; requires no new protocols (except on exception)
- Environment: 1-2 APs, 1-4 STAs, little or no expertise, some STAs taken into enterprise, no dedicated service; other systems may be in range.
- Problems to Solve: ESS definition, discovery, KDC location, KDC configuration, KDC discovery, username/password defs, multiple APs
- ESS definition: by default AP use MAC address as ESS, send beacons with ESN bit set by default, channel selected at random
- ESS discovery: collect ESS by listening to beacons, save in stable storage, may collect many ESSes which aren’t used
- KDC location: each AP has a mini-KDC as well as IAKerb; 32-64K enough, a few KD for tickets, a few K for username password storage.

- KDC configuration: realm = ESS = MAC address by default; contains one pre-defined user by default, password unique for each access point with stick on label
- KDC discovery: use TGe defined means of probes/responses
- User/password definition: need another new protocol. Basic approach is to use the 1st session key of new user for future access; NIC comes with an app to collect list of local ESS's; prompts for user name and AP unique string; application associates ESS and uses the password to get the right ESS. Assumption: typical user knows how to get onto Internet, so can define username password. If rejected by AP, mark its ESS as uninteresting. If rejected by all APs then complain to user. Otherwise accepted by some AP and are in; save initial session key as a password. This can be repeated with other ESSs
- Multiple APs: Assume all APs controlled by same user, on same subnet, etc. Options: let each AP be a separate realm. Inconvenient, and requires STA to roam between ESSes. The other is make one AP the KDC and the others use it; require a new AP-AP protocol. User selects one AP as the master, and its string gets used as the registration string. One AP informs the other it is the KDC; other APs use MAC level packets to authenticate users.

Comment: unless more UI, can't join network later that becomes interesting. Response: You can always keep trying.

Question: Where does mini-KDC code come from? A: Wrote his own, using MIT code as a model.

Question: There is a vulnerability with the use of the string.

Question: Can you configure 2nd to use 1st to register users, so user doesn't have to register twice. A: yes. A: Can you transfer KDC databases between APs? A: Yes.

Comment: String used to identify KDC and confidentiality. This is an abuse of the same string. Second, needs to be some way to introduce state into process, so registration is a separate thing from subsequent log-in.

Recess for Lunch

3 Tuesday Afternoon

3.1 Startup

Dave explains the process for the next two days:

- Need comments by today, so jesse can get them folded into 01/018-r4 and this document onto the server by noon on Wednesday.
- Need motions prepared for tomorrow: splitting PAR, bringing doc 01/018-r4 to letter ballot

3.2 Papers (Continued)

3.2.1 Status of TGe Security Enhancements Document

- Question about race condition. A: We do not specify the filtering of unencrypted packets, so this needs to be done.
- Q: Any replay protection in WEP2? A: Currently, no. A proposal is welcome. We are addressing the small IV space, it would be good to address replay protection also.
- Q: How can we make plans to address this? A: Make a proposal.
- -- Bob
- Question about race condition. A: The race condition is AP allows traffic, but key is not delivered yet. Also, it needs to be defined better how filtering gets done. Also, it should be specified that 802.1x runs in the clear.
- Comment .1x has a mechanism to deliver a key, once one key is established. This can be described for 8.1.3.2
- Comment: Comments about setkey may be sufficient

3.3 Discussion of 01/018-r3

8.2.3.3.2: 1¹²⁷0, not 10¹²⁷ Also clear up "On each use of OCB mode" to indicate a new IV is chosen for each frame. Insert "to A" in front of "...the bit 1" in the last sentence of this clause.

8.2.3.3.3: 1st sentence below the figure "..., then encrypting..." should be "..., then decrypting...". Also later, "...un-pre-whitening the encrypted..." should say "decrypted"

8.2.3.5.2: People don't want to store a per-association IV. Either provide a different algorithm or give implementations more latitude to choose IV.

Default Modes: don't have to include ENS elements. This creates interoperability problem. Doesn't understand how punting this to ULA this helps. Also seems to be duplicating functions already in MAC. Not clear there was consensus for this change.

- Need this type of functionality if you are not using Kerberos. Otherwise, the fields have to be NULL. There is always the case where the AP cannot tell the STA what to do, because it won't know; only the authentication server will.
- We've gone to the trouble of defining a way to negotiate authenticate, and now we are not using it. Want model to know which to use when it approaches a client. Even the response for explicit information is the AP doesn't have to tell anything.

Long discussion about how 802.1X works.

Straw Poll: How many people are happy with R3 language? Happy: 10 Unhappy: 2? Abstain: 3.

7.3.2.20: The wording is funny. The messages are fodder consumed by key derivation.

Making the information elements one opaque block? Wasn't this discussed in Seattle?

Generalize the Realm and Principal name elements? A: I thought I did. Please help with substitute text. Comment: None of the non-Kerberos schemes require these elements. "It maps to specific names in other authentication mechanisms..."

List of authentication suite selectors: Can you use Kerberos with option 3? Answer: yes. Clean this up.

7.3.2.18: No Unicast cipher suite if no ESN asserted.

Same Clause: no way for Upper Layer Authentication to negotiate cipher (a la TSL/IKE/SSL/etc). Answer: Right.

Let's save this for balloting process; differs too much from adopted baseline. It's a good idea. Editor supports it.

Don't do it now; we have to add new service primitives in Clause 10.

8.2.2.1: Don't talk about WEP2's data integrity problems. Just say that it is not recommended. Comment: NO consensus to make this change. Editor to prepare better wording. "Rudimentary" "basic"

Delete sentence "...Basic WEP promises but does not provide."

8.1.3.2 (a) change "must" to "shall". Change this section to talk about a conformance statement. Objection to "must be as fast as possible" Run wording past John. "Must support fast roaming". Comment: Why should all algorithms have to support fast roaming? Response: Fair, but it is difficult to see how you can get any security without (a) and (b). Will reword this section to say conformant authentication algorithms have to implement (a) and (b), but (c) is desirable.

3.4 Paper by Ron Brockmann – IV Selection & Replay Attacks in WEP2

Problem: active attacks against WEP2. Easy to change specific bits in replayed packet.

Can detect this only if IVs get recycled.

Sequence: IV is an initial value + sequence number. Peer selects the initial value number. Then increment sequence number.

Question: How to prevent initial value from being recycled? A: Peer selects it.

Only makes the attacker's life a bit harder; doesn't offer total protection.

Concern: This requires the implementation saves state. This might be difficult to support in existing hardware.

Need a way for the peer to specify the IV.

Ron will submit proposal for text changes when they are available.

3.5 Other discussion

Call for Straw Poll: Does the MAX level security scheme Carlos fall within spirit of Baseline 00/419?

Discussion on straw poll:

- Not enough detail to know if it does
- If it is done in the ULAP it falls within 419; if it is a MAC level authentication scheme, then it doesn't
- Motion (clause 8 from Monterey minutes) says we can't consider MAC level authentication as part of baseline; this must wait for ballot. This motion passed 3-1-3.

No straw poll.

3.6 Todo

Need Jesse to rev doc.

Recess until 10:30 Wednesday

4 Wednesday AM

4.1 Meeting called to order

4.2 Review of schedule

Dave Halasz reviewed the plan of record:

- We voted to split the PAR in doc 01/166-168
- We will review 01/18-r4
- We will need a motion to take 01/18-r4 to letter ballot
- We will need a motion to progress docs 01/166-168

Discussion: we have to take motions up in TGe; can't go directly to WG.

Interaction of QoS and Security. We've done our best to address this in Security and need to make QoS aware of this.

Have discussion with Michael Fisher on how to take Security to letter ballot prior to QoS

4.3 Review of 01/18-r4

4.4 Discussion of Motions

Chair suggests a recess until 10:30 to consider motions to forward 01/18-r4 as draft 0 for letter ballot

Suggestion to make a motion to accept this motion, and then move to postpone the vote until tomorrow. This allows TGe S to be able to show progress during the TGe plenary

4.5 Recess until 4 today

5 Wednesday PM

5.1 Call to order

5.2 Review of work

- Approve draft text for letter ballot
- Approve PAR documents

5.3 Motion: Move to forward document 01/18-r4 to letter ballot

Moved: Bob Beach

Second: Tim Moore

Discussion:

- Point of order: Move to TGe or to letter ballot
- Answer: leave it vague

Vote: 6-0-0, Motion passes

5.4 Motion: Move document 166, 167, 168 to Standards Board for approval

Moved: Don Berry

Second: Kevin Barry

Discussion:

- Does PAR cover topic of crypto regulatory?
- Answer: No. Question need to modify the PAR. It would be easier to neither expand or contract the PAR.
- If we put this in a PAR, opening up a can of worms; it is a bit parochial as well, because this is really about discussions with the U.S. Government.
- We should have a best effort attempt to address this even if we don't address the PAR.

Vote: 5-0-0, motion passes

5.5 Motion: Move to request Subgroup to request the U.S. Department Bureau of Export Administration to Review the Security Draft 01/18-r4

Moved: Jesse Walker
 Second: Kevin Barry
 Discussion:
 Vote: 5-0-1 motion passes

5.6 Other Discussion

Alan Chickinsky is writing a paper on attacks “Security Degrees” (no document number yet). He requested reviewers.

Do we need an ad hoc to discuss open issues?

5.7 Recess until 10:30 Thursday

6 Thursday AM

6.1 Call to order

6.2 Review of Status

Bringing four motions to TGe at 1 PM:

1. TGe Security subgroup formally requests that the TGe PAR be separated into security and the remainder of TGe (procedural)
2. Move document 01/166, 01/167, 01/168 to Standards Board for approval (procedural)
3. Move to adopt document 01/018r4 as the TGe Security draft (technical)
4. Move to conduct a WG letter ballot to forward document 01/018r4 to Sponsor Ballot (Procedural)

Discussion: We have not adopted 01/018r4 as the draft of the TGe Security Subgroup, so need to do this.

6.3 Motion: Move that document 01/018r4 be adopted as the TGe Security draft

Moved: Bob O’Hara
 Second: Don Berry
 Discussion: None
 Vote: 7-0-0, motion passes

6.4 Assigning Responsibility for Getting U.S. Export Regulatory Review of the Security Draft

Call for volunteers. Jesse Walker and Dave Halasz volunteer. At next meeting will give a report on the status.

6.5 Other new business

Question: Has there been any contact with WECA about the draft and WEP2?

Answer: No.

Tim Moore and Albert Yong volunteer to discuss this with WECA.

Question: Need for an interim meeting?

Answer: Letter ballot will require 30 days, and there will be only about two weeks remaining prior to the Orlando meeting.

It would make sense to begin comment resolution if we go to letter ballot, otherwise a conference call would be sufficient. The purpose of the conference call would be to discuss how to get the document to letter ballot if we do not get it to letter ballot.

Dave to announce there will be a conference call if we don’t get to letter ballot, and an ad hoc meeting if we do.

Offers to host ad hoc meeting in Akron, Washington, D.C., Chicago, and Toronto.

Concern of some people who can’t justify travel to ad hoc meeting.

We could make it an interim meeting.

IF we have an interim meeting, group agrees to have it in Chicago. Probably the week of April 30, perhaps April 30.
When is the next WG meeting? May 14.

6.6 Motion to adjourn

Vote 7-0-0

**IEEE P802.11
Wireless LANs**

802.11 Task Group f Minutes

Date: March 2001

Author: Jesse Walker
Intel Corporation
Phone: 503-712-1849
Fax: 503-264-4843
e-Mail: jesse.walker@intel.com

**Minutes of the IEEE P802.11 Task Group F
March 12-15, 2001**

Marriott, Hilton Head, SC

1 Tuesday AM

1.1 Appointment of Secretary

Jesse Walker volunteers to take minutes.

1.2 Motion to accept minutes from January

Moved: Butch Anton, Seconded: Bob O'Hara. No discussion. Minutes approved without objection.

1.3 Goals:

Review comments from 2001-102
Consider submission to fill holes
Adopt resulting merged text as official 1st draft recommended practice

1.4 Schedule Review

1st internal .11 ballot in March
Schedule fork issue – May 2001: hold for .11e or start external ballot?

1.5 Agenda

Status
Old Business – review existing work
New Business – merge text into the document
Draft for letter ballot has to be done at end of session on Wednesday by 10.
Motion to Adopt agenda: Jon Roshdahl, Second: Gary Spiess. No discussion. Motion adopted: 7-0-0.

1.6 Call for 11f Papers

doc: IEEE 802.11/01-102-r1
No other papers submitted

1.7 Discussion of 01-102-r1

Bob O'Hara led a discussion of the paper. Revision of the document produced at the January meeting. Cover just the changes:

1. Runs over UDP, not directly over IP.
2. Alternative Figure 1. This differs slightly from prior diagram. Current document still has both. Discussion
 - a. ESS Manager is not part of document
 - b. Bridging not necessarily used. Original document included 802.2. Need to relabel block as "internal 802 routing". We don't have to specify this routing function.
 - c. Diagram is half stack diagram and half block diagram, not one or the other.
 - d. How many IP addresses are there? If one, there is one stack; if two, at least two stacks.
 - e. General rule of thumb: 1 IP address per box.
 - f. Something has to decide which medium to put a packet on.
 - g. IP keeps track of its interfaces, and can output packet on correct interface.
 - h. Changed "802.1" to "DS Services".
 - i. The APME/SME box needs to be beside DSM as well as 802.11 box. Suppose you change "802.11" to "Wireless Medium". Does this save ourselves trouble later?
 - j. This picture is trying to shoe-horn integration service into this diagram. This is a mixture of concerns. The diagram should concern itself only with the IAPP functions.
 - k. Not comfortable with the diagram.
 - l. DMS is not correct, either. The DSM is really the interconnect lines between the ESS Manager and the AP. "DSM" changed to "DSM interface".
 - m. Still need to clean up ESS manager to become registration service. It may not even belong in this diagram. Split it into two figures.
3. New references to Service Location Protocol. This is now specified as the means for finding Registration service.
4. List of abbreviations that need to be filled out.
5. Definition of IAPP-INITIATE.request added. Provides a mapping of registration service's MAC address (BSSID), the ESS (SSID) the AP is registering with, and its DSM IP address.
 - a. Q: How does an AP select among more than one Registration protocol, if there is more than one?
A: We will discuss that later.
 - b. This primitive is inside an AP.
 - c. Jesse volunteers to do a security analysis of protocol, so we can decide if and how it may be secured. Jesse does not believe IPsec is an appropriate medium to secure this, as IPsec presupposes a large amount of configured policy, and the IAPP exists to bootstrap policy. He believes this primitive should support an optional authorization token that can be used to show that the registration is authorized.
 - d. The IAPP needs to be media independent (this is why UDP/IP is the transport). Being media aware causes problems.
 - e. Q: Provision for proprietary parameters in this request? A: No. Vendors can create their own interfaces for that function.
 - f. Q: Is URL flexible enough to specify the protocol? User name/password? Etc? A: Want to limit flexibility to service:service-name. Use DNS to resolve service name.
6. Definition of IAPP-INITIATE.confirm added. Indicates the status of the request.
 - a. Q: How does first AP join ESS? A: The registration service has to be deployed first. It is the first ESS element.
7. Definition of IAPP-INITIATE.indication added. Don't know how it gets used. Leaning toward eliminating this.
 - a. Talked about IAPP maintaining its registration status with registration service. If some "heartbeat" did not arrive, an AP would be taken out of the ESS.
 - b. Note we have a question about this, defer decision
8. Definition of IAPP-TERMINATE.request added, to deregister.
9. Definition of IAPP-TERMINATE.confirm added, to confirm deregistration
10. Definition of IAPP-ADD.request added. Used by an AP to announce that it has associated with a STA. This updates the bridging in the network. Parameters include STA's MAC address and sequence number.
 - a. More than one AP may think it is associated with a STA, since the Associate Response from one may get lost, and the STA may associate with another AP.
 - b. Relying on sequence number will get tricky.
 - c. MLME provide a "path identifier"
11. IAPP-ADD.confirm added. An automatic response to a confirm. There is no handshake, so it always succeeds.
12. IAPP-ADD.indication added, to tell other APs that another AP has associated with the STA.

- a. It may be needed for the algorithm to operate correctly.
 - 13. IASP-REMOVE.request, to report a Disassociate from a STA.
 - 14. IAPP-REMOVE.confirm added.
 - 15. IAPP-REMOVE.indication NOT added, so other APs can learn that a STA has disassociated.
 - a. It might be needed for the algorithm to operate efficiently
 - 16. IAPP-MOVE.request, to report a STA has reassociated. Reports MAC, address, Sequence Number, old AP MAC (i.e., its BSSID).
 - 17. IAPP-MOVE.confirm, to tell when the MOVE request completes.
- Recess until 3:30; meet in Ball Room C.

2 Afternoon session

(Minutes recorded by Jon Rosdahl in Jesse Walker's absence at TGe S)

2.1 Call to order

3:30pm Called to order:

2.2 Discussion of 01-102-r1(continued from AM session)

1. 4.13.2 Need to determine the format of the Context_Blob
2. 4.13.3 Mr. Spiess' Comment needs to be considered, and we need to determine what is really needed there.
 - a. Do we need to fully describe the context Blob?
 - b. Does the Blob need to be Phy specific or MAC version specific?
 - c. Concern over having to be overly specific, and make this field become tied to a specific "n-Squared Lock Step problem."
 - d. His comment was removed from the normative text, but the issue is open to letter ballot resolution.
3. 4.13.4 There may or may not be a context_blob from the old AP
4. 4.14 Move.Indication
5. 4.15 Move.response. Identified Flow of information for both functions.
6. 4.16 IAPP-Config-READ.request
 - a. Need to identify the semantics still. It may be that this is a hang over and needs to be removed. No comments were made pro or con.
7. 4.18 IAPP-INQUIRY.request
 - a. This may also be a hang-over. We need to determine what the real need of this is.
 - b. No comment pro or con was made.
 - c. Discussion of the fact that we have no official DRAFT text. DOC is 102r1 is the current submission that we are discussing. We can remove the items that were deemed unnecessary as a simple means of creating a rev 2 for submitting to the working group .
 - d. Jon asked that IAPP Config-READ and IAPP-INQUIRY and associated indication, confirm, and request may be removed until their need is identified.
 - e. Discussion of why it was there, and it was stated that they were added by someone, and that the person that added it may not be here to defend their inclusion.
 - f. A restatement of the motion had no comment,
 - g. A discussion of how to remove the text followed.
 - h. Only the IAPP-INQUIRY was removed, and the IAPP-Config-READ were left in.
8. Section 5:
 - a. Discussion of how section 5 intro came to be, and the ideas of the use of SLP and the registration service.
 - b. Discussion of some sections that may cause more questions than answers.
 - c. The Deletion of all the paragraphs was deemed not necessary, but rather that the information in these paragraphs may need to be re-worded to discribe how the ESS is put together. (NAT rfc 1631)
 - d. Re-order the paragraphs to align with the flow of ideas.
 - e. Removed the redundant line items, and some comments they are listed below to ensure we allow further comment if needed:

“

When an AP initially comes up, it makes a request for the “IAPP Service”.

Then the AP uses the "IAPP Service" to register with the ESS

The AP registers with the ESS the specified configuration parameters.

If the AP fails to locate the "IAPP Service", then the AP

(Possible Comment/Change To Locate the Registration Service, Check into using CORBA. (Jens-Peter, NEC))

ESS vs. DNS domain boundaries: the ESS domain must be a subset of a DNS domain.
(Check to see if we care).

.....

- f. Discussion of whether the ESS vs DNS boundaries can place a restriction of the other.
 - g. Can a service cover a number of DNS domain boundaries? The discussion was that some said that it can, but others disagreed.
 - h. A Letter ballot commenter request was added to the text to answer the last question indicated in the deleted text above:
 - i. Letter Ballot commenters are requested to comment on the interaction between the ESS and DNS Boundaries. I.e. does an ESS have to be completely contained inside a single DNS boundary?
9. 5.1.1
- a. Changes to the original text included proper editing for word usage to imply a recommend practice rather than a good reading paragraph.
 - b. A discussion for what the correct name may be was suggested as service:ess-registrar.1.0.en:register:
 - c. explanation of how the SLP and the registration URL may be used was given.
 - d. Details of the actual usage was omitted on purpose, but the text that is there is sufficient for a starting point.
 - e. Concern for a group that may not wish to have the AP start the registration if there is not an infrastructure in place or if registration is not there and we are requiring to have the AP register the Service.
 - f. IN the simple case, a set of APs that cannot reach a DNS service will not be able to provide IAPP service of move, but would be able to provide the IAPP add service, and this would cause the broadcast packet to be sent to update any bridge or router in the system.
 - g. AS the STA moves from AP to AP, the broadcast packets on the LAN will indicate where the STA is to keep the routing of data for the STA to the correct location
 - h. The Protocol is not pro-active to look more than once for the registration service. An external entity may wish to fix this up by restarting the IAPP, but the Protocol is not necessarily the place to be.
 - i. Products may be able to correct the problem, but for now, the Protocol will not be.
 - j. Question of how much is really required to add this functionality: A: we don't want to tackle that specific issue on the fly, but during Letter ballot the specifics will assuredly come out.
 - k. What is the difference between an ESS and Subnet in the Ethernet? The ESS is much less rigidly defined, but a Subnet lives off one port of a switch.
 - l. Explanation of why the Registration service info was moved to 5.1.3, and updated.
 - m. Changing information in the AP may cause problems in the WLAN due to the dis-associate commands that would have to be generated as the paragraph is written.
 - n. The discussion lead to suggest that there should be a different way to facilitate the change of information in the AP that is being told to the ESS. It was decided to leave as a minimalistic and allow letter ballot comments to expand.
 - o. A section of how to Deregister from the Registration Service was added. 5.1.3
10. The Change info section includes the URL for the change, and more text will need to be added to this section is the future.
11. 4.4.4 was expanded to be consistent with the other primitives. And mirrors the Initiate.
12. 5.1.4 Registration Service
- a. This section is currently vague and doesn't say what Registration Service to use.
 - b. Concern that even though it is similar to what the 802.11 said about the DS we could
 - c. Find ourselves coming back to revisit this in the future.
 - d. We may get some comments, but this is probably a good place to start with text.
 - e. Discussion of how the Registration Service is used and how long it keeps entries.

2.3 Recess and will start at 5.2 Authentication when we re-adjourn.

3 Evening session

3.1 Discussion of 01-102-r1(continued from AM session)

Bob O'Hara continued to lead the discussion of the document

1. Support of 802.11 authentication and pre-authentication was blank in Monterey. The new text says that if something is transported, it may be transported in the Context Blob. Not evident this is useful, unless enhanced security implements an authentication algorithm that does not provide the client with an authorization token.
 - a. No one seems to have implemented pre-authentication today.
 - b. And the .11 authentication messages disappear, so why do anything?
 - c. Dave would like to state we will not do anything for this because 802.11 security is removing the use of the 802.11 authentication and pre-authentication.
 - d. Text amended to "There are not requirements from the existing authentication mechanisms of IEEE 802.11-1999 or from the work of 802.11 Task Group e Security Subgroup that require the communication of authentication information between Aps. Thus, the IAPP makes no provision to carry such authentication information."
2. No changes to "5.3 Secure IAPP". IAPP protection needs to be no stronger with the router message protection.
 - a. Authentication needed for registration service. Can we use 802.1X to authenticate the device to the network at attachment time?
 - b. Clean up terminology to refer to 802.11 Task Group e, since that is what it is called in Clause 5.2.
3. 5.4. AP Specific MIB: Text says to delete this.
 - a. Preference to use same language as in other sections: if letter ballot comment can provide suitable MIB definitions for this section, then MIB attributes may be added
4. "5.5 Single Station Association". Considerable text added, to add text describing how the IPAA helps enforce a single association by a STA.
 - a. Stations are tied 1-1 with MAC addresses. So a single device can have multiple stations.
 - b. Discussion of last paragraph, to explain what it is trying to specify. It says what to say at layer 2 but not 3. Needs to say subnet broadcast.
 - c. Needs some work, since source and dest address can't be same.
 - d. Needs text for when the lookup on the first registration fails.
5. Clause 6 is packet formats
6. Changed names of packet types to correspond more closely with the primitives. Can delete packet types that don't correspond to primitives. Remove INQUIRY-request and INQUIRY-response from Table 1.
7. "6.2. ADD-notify" packet
 - a. The station may need to send this message, because the AP won't know the IP address of the STA.
 - b. Have the STA send an XID frame? Text updated to specify this.
 - c. Figure 2 is updated to show an XID frame.
 - d. And we don't need an ADD-notify packet type any longer, because 802.2 now provides this function.
 - e. This is used for loopback. Not clear it is a good idea. Resolution will be deferred.
 - f. New hack: use subnet broadcast from address 0.0.0.0, which is legal?
8. MOVE-notify and MOVE-response: directed communication between entities known to be on the network.
 - a. Packet consists of address length, pad, MAC address, sequence number from the (Re)associate request
 - b. MOVE-notify from new AP to old AP
 - c. MOVE-response goes in other direction

3.2 Recess until Wednesday AM

(Minutes recorded by Jon Rosdahl in Jesse Walker's absence at the TGg vote)

3.3 Called to order

3.4 Review agenda

Plan to finish this morning, and submit Thursday

3.5 Discussion of document 01-102-r1 (continued from Tuesday)

1. Clause 6.3 Move-notify Discussion
 - a. Question: why call it Move-notify instead of Move-Request?
 - b. Answer: We had chosen notify because the "request" was used for the primitive, and the notify was used for the packet to help prevent an ambiguity.
 - c. Resolution: leave it till letter ballot if it should change.
2. Clause 6.4 Move- response
 - a. This is the response to Move-notify packet
 - b. The old AP does not care if it receives or not for the most part. It will continue as it should whether it gets the ack or not. The main point of this packet is to carry the context Blob.

3.6 Motion: Moved to adopt document 2001/102r2 as the initial draft of 802.11f

Moved: Jesse Walker

Second: Jon Rosdahl

Discussion: Postpone vote since the revised document has not been on the server for 4 meeting hours. We want the vote to stand so we can report progress at the WG Plenary.

3.7 Motion: Moved to postpone to Thursday at 8:00 AM

Moved: Bob O'Hara

Second: Jesse Walker

8-0-1

4 Thursday

4.1 Call to Order

4.2 Vote on motion deferred from Wednesday

Vote: 9-0-2, motion passes.

4.3 Motion: to conduct a working group letter ballot to forward the 802.11f draft to sponsor ballot

Moved: Bob O'Hara

Second: Gary Spiess

No discussion

Vote: 12-0-1, motion passes

Remark: be prepared to work, because there could be two letter ballots

4.4 Call for new business

No new business

4.5 Move to Adjourn

Moved: Gary Spies

Second: Sri Kandala

No Discussion

Vote: 8-0-0, Motion passes

4.6 Adjourn

IEEE P802.11
Wireless LANs

TGg Minutes for March 2001 Session Hilton Head, SC

Date: March 30, 2001

Author: Matthew B. Shoemake
IEEE 802.11 Task Group G Chairperson
shoemake@ti.com

Rob Roy
Secretary for Session

TGg Minutes 03/12/01 Hilton Head 6:30 pm

1. Chair (MS) opened the session.
2. Rob Roy was selected as secretary for the session to take all minutes.
3. Recap of morning ad-hoc session (Vlad's document 01/152, Mark Webster's document 01/153)
4. Brief overview of the sessions to come during the next three days.
5. Chair's update and announcements (doc no. XXX)
 - a. HR study group formed in March 2000
 - b. In July 2000, 802.11 TGg was formed
 - c. From Sep. 2000 till now, meeting as 802.11g WG
 - i. Adopted official selection procedure 00/209r3
 1. 20 step procedure
 - ii. Adopted official functional req 00/210
 - iii. Adopted official comparison criterion 00/211
 - d. Nov 2000, one proposal was down-selected
 - e. 3 remaining proposals
 - f. Stuart Kerry indicated that he received IP statement from Supergold
 - g. Jan 2001 mtg, FCC communications are contained in 3 documents
 - h. Info about FCC Tutorial on Tue night
 - i. Info about WLAN network
6. Minutes of Monterey meeting (Doc. 108r1) Motion: Anuj Batra, Second: Al Petrick. Minutes approved by unanimous consent.
7. Tentative agenda presented
 - a. Motion to adopt the agenda: Proposed: Chris Heegard, Second: Stuart Kerry
 - b. Jan Boer: Motion to amend the agenda: Modify the agenda by moving all votes under Selection Procedure Step 19 until after the FCC Tutorial on Tuesday evening. Second: Carl Andren
 - i. POI: Heegard: Isn't there a schedule that we must follow?
 - ii. Al Petrick: Yes, there is a schedule
 - iii. Heegard: Speak against the motion, there is much work to do
 - iv. Zyren: Speak in favor of motion, several discussions with FCC, Julius Knapp indicated that they will decide a course of action. An article in EE Times indicates that FCC is considering rule change. Hence down-selection without Knapp's presentation is unwise and probably against PAR.
 - v. Chair's clarification: Not following FCC rule change will not violate PAR.
 - vi. Pratik Mehta: Is it possible to get Knapp to this group earlier for Q&A?
 - vii. Vic Hayes: No, Knapp arrives around noon on Tuesday.
 - viii. Al Petrick: Speak against, timeline is important. Last mtg conf. Call with FCC – minutes indicate no particular reason to delay.
 - ix. Carl Andren: several innuendos indicate that FCC may be changing its position, delaying will clarify it.
 - x. Tim Wakely: Against. FCC is trying to streamline the rules. They want us to choose the technology without any consideration for rules.

- xi. Frank H.: For, last conf call wasn't attended by all members of TGg. With Knapp being present, better clarification can be obtained.
 - xii. Heegard: Against, Knapp indicated that FCC wanted IEEE to choose the best coding technique, no reason to delay
 - xiii. Boer: For, the delay is insignificant, better results can be achieved with this delay.
 - xiv. Kowalski: Against, many votes are pending in several other groups, we need to move forward without delay.
 - xv. Zyren: For, Knapp may be sharing more details, which could help making better decision
 - xvi. Heegard: Against, FCC doesn't want us to wait, so we should move forward
 - xvii. Webster: For, new info came from the last phone call from FCC. Concern that FCC may come with some constraints for us, so it's better to know so that we can put better standards in place.
 - xviii. Ken: Against, it's been clear that visit of commissioner is to see what we are doing. If FCC had a presentation to give us as how the spectrum will be allocated, then it would make sense.
 - xix. POI Zyren: Knapp is not a commissioner; he is Chief of Policy Maker (?)
- c. Move to vote: delay the Sel. Proc. #19 vote after FCC presentation, motion passes 32/25/4
8. Heegard: Motion to schedule all 3 votes under Sel. Proc. #19 on Wednesday, Second: Batra
- a. POI, Kowalski: Overlap with 802.11e on Wed 3:30. Is there enough time to do this?
 - b. Chair: No, there is not enough time.
 - c. POI, Boer: what time were the TGg votes originally scheduled?
 - d. Chair: at 9:30a Tu, 2:30p Tu, 10:30a We
 - e. POI, Andren: If this motion passes, are we constrained to have all 3 votes on Wed?
 - f. Chair: yes
 - g. Tim W: POI: will there be enough time to have the first vote after FCC presentation.
 - h. Chair: yes, we can go up to 11 pm (from 8 pm)
 - i. Tim W, POI: If we approve this agenda, will any further changes require 2/3 majority?
 - j. Chair: Yes
 - k. Straw Poll: Move to have first vote on Tue and the remaining two on Wed 24-24
 - l. Motion: Move to schedule first vote under Sel Proc 19 for Tue night after the FCC Tutorial and schedule the remaining two on Wed. by: Caldwell/Heegard
 - i. Heegard: for
 - ii. Zyren: against
 - iii. Chris: for
 - iv. Vote: Motion fails 26/28/3
 - m. Now motion is back to Step 8
 - n. Zyren: Against, scheduling all three on the same day will not allow enough time in between the votes
 - o. Chair: The original intent of the schedule was to spread out with sufficient time in between votes
 - p. Heegard, POI: If the votes are taken in the beginning, middle, and end of given sessions on Wed, how much time do we have between votes?
 - q. Kerry: 802.11 allows 30 min. slack in calculations
 - r. Chair: 3.5 hours between 1 & 2. 4 hours between 2 & 3
 - s. Anuj: For
 - t. POI, Weishi Feng: How robust are the proposals against interference?
 - u. Chair: We have coexistence as a criterion in selection procedure. We are currently debating the motion related to when the TG will vote.
 - v. S Halford: Against, not enough time to consider changes if all the 3 votes are scheduled on Wed.
 - w. Kowalski: For, how much debate do we need? Let's get it over with.
 - x. Call a Question, Heegard: no objection.
 - y. Vote on Motion at Step 8: Motion passes 32/25/2
9. POI Heegard: Kowalski noted that there will be some voting in TGg, so we shouldn't have any conflicts in timing.
10. Chair: Will talk to Fakatselis to ensure it.
11. Meeting recess for 10 min.
12. Chair presented a strawman for modified agenda
13. New speakers requested the following time slots for their presentation: Chris Hansen (20 min.), Zehavi (35 min.), Coffey (15 min.)

14. Chair asks scheduled speakers to indicated how much presentation time they require – Heegard: 30 minutes, O’Farrell: 45 min, Webster: 60 min.
15. Chair proposed having new presentations Mon. night.
16. Zyren: Propose to bring Julius Knapp to TGg for a face to face discussion
17. Chair proposed meeting Knapp after his Tutorial. Vic Hayes to request Knapp on TGg’s behalf.
18. Zyren: Old business, regulatory procedure
19. Zyren, Motion: Schedule time on Tue eve after FCC Tutorial for Knapp to visit TGg to discuss regulatory issues pertaining to our efforts. Immediately following discussion with Knapp, TGg to hold a discussion on regulatory issues related to adoption of high rate systems in 2.4 GHz. Second: Boer
 - a. POI, Heegard: How long will this discussion go on?
 - b. Chair: We are open to go till 11 pm.
 - c. Ecclesine: Against, discussion should be limited to technical issues only, no regulatory part.
 - d. Zyren, POI: clarification
 - e. Ecclesine: 99.231, Gaussian jammer vs. other kinds of jammers. Focus on technical, not regulatory
 - f. Zyren: proposed amendment
 - g. Al Petrick: Against, probably same info will be repeated.
 - h. Dennis: For
 - i. Heegard: Against, we shouldn’t have too much dissidence and differences in IEEE and expose it to external bodies e.g. FCC.
 - j. Zyren: For, FCC is part of Gov’t., and are used to getting many different points of view. Open floor is a great idea and hear Knapp’s opinion.
 - k. Ivan: PO Order: Against, 802 has always put a unified front to FCC. Is this meeting with FCC in order?
 - l. Chair asked opinion of 802 VP, Paul Nikolich
 - m. Paul, VP of 802: We must go through SEC to take official FCC position.
 - n. Chair: If we don’t take any official position, informal discussion is ok.
 - o. Steve POI: What makes it an official position?
 - p. Paul: official position is communicated thru a formal letter, which goes thru a formal approval process
 - q. Ivan: Since these meetings are public, records are public, how can we ensure that misinformation and misrepresentation of IEEE is not taking place.
 - r. Vic: Minutes of the Julius Knapp meeting will not include who said what and when.
 - s. Chair: There is difference between discussion and official position of IEEE, just having something on record does not mean that it’s IEEE’s official position
 - t. Heegard: during last mtg, we discussed a mechanism for discussion with FCC, why are we not following it exactly?
 - u. Vic: After some consultation between Kerry, Nikolich and Hayes, conclusion is that at that time, some questions were asked in Monterey. At that time it felt that it would be better to be moderated. Now feel comfortable in having a face-to-face mtg. Members are not supposed to make statements, but ask questions.
 - v. Heegard: Against, We all have access to FCC. Why should we treat this special, especially in an IEEE forum?
 - w. Dennis: For, forum is an opportunity to get better understanding of FCC’s position.
 - x. Zyren: There is some legitimate concern that there could be some misrepresentation of IEEE, but clarity of information is of significant importance.
 - y. POI, John Terry: Will the FCC session be moderated?
 - z. Chair: I will definitely moderate the session.
 - aa. Amendment: Discussion shall be restricted to questions only from 802.11 attendees and shall be moderated by TGg chair.
 - bb. Ivan: can Chair ask questions?
 - cc. Chair: No
 - dd. POI, Al: Time line?
 - ee. Chair: Start at 8:30, end no later than 11 pm
 - ff. Lansford: In favor of motion, there has been a lot of information floating, NPRM has a lot to do with the final fate of outcome.
 - gg. Heegard: for, FCC wants to get info from us to make the rules.
 - hh. Ivan: .15 and .16 should be informed about this session

- ii. Kevin Smart: previously, we agreed that all regulatory issues are to be addressed by Chair of Regulatory, Vic Hayes
 - jj. Chair: Vic Hayes will be present
 - kk. Vote: Motion passes 42/0/4
20. New agenda proposed by Chair
- a. POI, S Halford: it does limit the time of discussion.
 - b. Chair: .11 Chair has suggested this format
 - c. S Halford POC: If debate or discussion continues after a presentation, then a motion has to be made and 2/3 vote needed to change the agenda.
 - d. Chair: Ruling: if there is any unfinished business, it will go to the section "Unfinished business" on Thu
 - e. Ecclesine, POI: TGh: when are they meeting Knapp?
 - f. Vic: Possibly Tue eve
 - g. Vote on motion to approve agenda: pass 44/0/2
21. Chris Hansen (01/162) presentation on requesting further PBCC-22 justification
22. Jim Lansford and Ephie Zehavi presented on interference (01/061)
- a. Question from Steven Gray
 - i. If you have a jammer, that comes into a band, you'll see a degradation
 - ii. EZ: If you are using 12 carriers, it's feasible to get minimize degradation.
23. Anuj Batra presented (01/142)
24. Recessed for night at 11:00pm

03/13/01 morning

- 1. Chair opened session
- 2. Zyren Question: Make sure that all the presentations are on server before the presentation.
- 3. Tim O'Farrell of Supergold made first presentation. (presentation on server doc # 01/143)
 - a. Related documents 336r48G and 01/017r28G
 - b. Enrique continued the second part of the presentation
 - c. Tim finally concluded the presentation
 - d. Zehavi Question: following mtg in Monterey, did you evaluate the proposal for BT interference?
 - e. A: No, but we would be keen to do that. We'll look at narrowband jammers. We'll look at 10^{-8} level of interference.
 - f. Zehavi Q: Looking at this proposal, what changes need to be done in current .11B design to achieve this?
 - g. A: The radio will remain unchanged. The change will go to Baseband with additional 40K gates.
 - h. Webster Q: How many feedforward taps do you recommend? (Ref. Pg 37)
 - i. A: It implies unlimited feedforward taps. For 250 ns, you are looking at a 50 to 70 taps.
- 4. Halford made the next presentation (OFDM as a HR extension to the CCK-based .11B std)
 - a. Current .11B RF gives adequate performance up to 36 Mbps. OFDM preserves current channelization
 - b. Tim W. Q: How many Kgate does one require for OFDM receiver?
 - c. Zyren A: gate complexity compared to CCK is about 1.6. Gives you both CCK and OFDM. Front end is the same, only the baseband changes.
 - d. Tim W Q: In the comparison matrix, how did it compared to MBCK proposal?
 - e. A: O'Farrell about 10K gates
 - f. Heegard Q: Did you try reduced state sequence?
 - g. A: Looked at a number of reduced state sequence. Would rather not discuss it.
 - h. Heegard Q: will they be better for BT interference?
 - i. A: Not sure that one can detect BT with natural channelization.
 - j. Heegard Q: I believe that interferer was present at the time of preamble in Zehavi's talk
 - k. Zehavi: Yes, interferer can be present anytime.
 - l. Ken Clements Q: Your proposal makes the packets look like .11B packets, right?
 - m. Halford: Yes
 - n. Webster: We looked at it as a combined signal, both legacy and proposed.
 - o. Heegard Q: a no. of companies developing .11a products. What addition/change they have to make to run as .11g based on OFDM proposal?
 - p. A: .11g has to maintain backwards compatibility, so one has to be able to handle CCK and Barker.

- q. Heegard Q: You have multiple generations of CCK RXs, with increased performance in each generation. Which one is used for comparison to 1.6 complexity
 - r. Zyren A: Intersil has multiple generations RX. 3861B was used as benchmark for comparison with OFDM. 3863 has higher gate count, hence 3861 comparison actually shows a higher overhead.
5. Session recessed till the afternoon session

03/13/01 Afternoon Session (1 pm)

1. Chair opened the session
2. Chris Heegard made his presentation on PBCC-22 (1:06pm – 1:34 pm)
3. Chair proposed one representative for each of the proposals to come up to the front for a 60 min. Q&A session.
 - a. Sean Coffey for PBCC, Steve Halford for OFDM, (Edit: O' Farrell came late)
 - b. Zehavi Q: what are the performances of the proposals in the presence of BT jammer, when the power of interferer is comparable or higher than signal?
 - i. Heegard A: The comparison criteria have been set. The problems being brought up is new and needs more work.
 - ii. Halford A: These are important points, we are not far enough that this can't be addressed.
 - c. Tim Q: What are the time to market dates for the proposals
 - i. Zyren: FCC is looking at rulemaking proceedings. It is important to have FCC's input in hand before TTM can be established.
 - d. Anuj Q: In this body, we are standardizing the TX, not the RX?
 - i. Chair: yes, that's correct
 - e. Carl: IP segment statement – what does the reciprocal basis imply?
 - i. Coffey A: Licenses are royalty free for those who won't be asking royalty from us in this space
 - f. Zyren: When do you come to market and how about FCC compliance?
 - i. Heegard: We have a prototype which has been validated - it will be in market this summer.
 - g. Steven Gray: What would happen if a 10 dB interferer comes into the picture – to your ADC, LNA?
 - i. Webster: We could back off signals form ADC. We haven't done a detailed analysis as Ephie has done in his study.
 - ii. Coffey: Our results are just the same as 802.11b, without change.
 - h. Richard: Question on BT interference – if it appears in the middle of the packet, OFDM can deal with it by erasures. Is there any similar approach in PBCC?
 - i. Coffey: There are different things you can do when the BT is coming in at a very high or very low level. If it comes at a very high level, the only thing you can do is use the power of 64-bit code. We haven't examined the details of this issue.
 - i. Zehavi: Coding scheme used by PBCC – QPSK is a well-known code. Did you do any study comparing this code with a pragmatic code with interleaving under multipath?
 - i. Coffey: the question would have been interesting 2 years back when PBCC-11 was being considered.
 - j. Zehavi: Several papers were written based this topic in recent years. Did you perform any study to compare PBCC with other coding schemes, which are still 8PSK?
 - i. Coffey: personally no.
 - k. Hansen: Do you have any data/experiment to support the 0.5 dB gain through cover code?
 - i. Coffey: Cover code related issues are good question to answer, but not a good question to answer first, before deciding between PBCC and alternative proposals. Total difference between PBCC and alternative proposals is documented by simulation data; we do not know how much of this difference is due to cover code.
 - l. Tim: MBCK
 - m. V K Jones: OFDM has been mentioned as a worse interferer to BT. Under strong multipath channel, won't PBCC have similar behavior?
 - i. Heegard: yes, you are right. After multipath, PBCC will look Gaussian, but OFDM coming out of TX looks Gaussian.
 - n. Webster: Sean, your block diagram has sequence detector. Question on equalizer stage - MBCK team needed 10 taps to meet the performance requirements. How complex is your design?

- i. Heegard: You don't need have 10 taps. Assumption that more taps is always better is not true. How you compute taps depends on many things. In our chip baseband requires 250K gates, slightly more half of that is seq detector, around 130K gates. General structure of the equalizer is fairly simple.
 - ii. Coffey: multipath curves we show indicate implementation loss. We didn't drive any of our results from bounds, they are based on simulation. It's 64-bit M-algorithm decoder, very reasonable complexity.
 - o. Webster: I've read PBCC FAQ, there were no details on the equalizer? Hence the question on complexity
 - i. Coffey: There are 2 things – performance and complexity. We worked out the performance curves first. Since there are no questions on performance, I guess you are happy with it. Our curves show implementation loss.
 - ii. Heegard: 2 things – some people look at adaptive filtering, they assume that longer is always better. That's not always the case. Our design doesn't have the biggest block as the equalizer. Our biggest block is sequence estimator. Equalizer with the adaptive parts is smaller than the estimator.
 - p. Dirk: in OFDM soln, you need any further filtering, what's the backoff? Approximately how many gates you need to implement?
 - i. Zyren: Compared to an existing baseband, we have a 60% increase in the gate count
 - ii. John (Intersil): Gate counts are counted differently. If you do them in a certain way, you get drastically different answers. Hence rather than give an absolute number, it's easier to give a comparative figure. We are not trying to be elusive.
 - q. Geert: Sean, could you elaborate how different the costs are for cover code?
 - i. Coffey: PBCC w/cover code and wo/CC are the same, not different.
 - r. Halford: When you simulated OFDM, did you try any of the simplest interference suppression techniques?
 - i. Coffey: no
 - s. Webster: Do you have any comments based on FCC's input in Monterey?
 - i. Coffey: no
 - t. Steven Gray: You are doing some sort of BT suppression, right?
 - u. Halford: Yes, we are using a number of different techniques for BT
 - v. Zyren: Q for Anuj, OFDM on BT, you get a lot of spikes, there is an IF filter in BT, shouldn't it suppress most of those spikes?
 - i. Batra: We used a 1 MHz IF filter in BT receiver to suppress spikes.
 - w. Tim W : What's the IP statement for MBCK proposal?
 - i. Colum Caldwell: Reasonable royalty, following IEEE guidelines.
- 4. Chair requested a 10 min. closing statement.
- 5. Heegard presented the PBCC closing
 - a. FCC: told us that they want IEEE to make the decision. We shouldn't try to do anything different from what FCC told us.
 - b. IP: TI has offered a royalty free licensing
 - c. Alantro/TI are technology companies. Purely based on technology, PBCC is the best. OFDM has its limitations.
 - d. Marketing: Easy to make. Backwards compatible. Easy migration path.
 - e. No overhead of preamble postamble needed.
 - f. No 60% overhead needed
 - g. Developing a chip takes a long time. Previously decisions have been made because example chips were done and demonstrated.
 - h. We are least controversial from regulatory perspective, signal being put is similar to what's already there
 - i. IEEE 802.11 has gone a long way, we are here to support the progress, not slow it down.
 - j. This solution is the best, and stalling tactics shouldn't be used.
- 6. Zyren's closing
 - a. There has been never been a single PBCC radio in the market, which implies that CCK is a robust solution.
 - b. Proponents of PBCC imply they have FCC compliance, in reality it doesn't.
 - c. CCK/OFDM is fully backward compatible. OFDM is going to be in 2.4 GHz band, no matter what. We can converge on a single technology, which is OFDM

1. A: we have not heard anything yet, that's why we do this FCC fourms
13. Lansford: days, weeks, months - what's the timeframe for the NPRM (Notice of Proposed Rule Making) to come out?
 1. A: can't do better than months. Commissioners receive it and decide how it goes from there
14. Tim W: what's the status of RF lighting issue
 1. A: Issue is it's on my desk as we speak. Fusion lighting is developing RF lighting products. There were objections. Focus has turned from that band to DARS (?) band. They have said that it should be below 23 GHz. It's been around for sometime, don't know how it's going to shape up
15. Fakatselis: do you have any formal program in place to work together (like ETSI)?
 1. A: depends on how you define formal. We work together with regulatory bodies. There is a lot of dialogue with regulatory authorities.
16. Carl: given explosive growth of WLAN industry, is there any hope of opening more in unlicensed bands?
 1. A: Commission is very happy about what's going on. There are some open spectrum, 19, 59-64 (mm wave band). However, in general, the spectrum is very crowded. Difficulty is finding a band that is going to work
17. Lansford: does this mean that UTAM is going away?
 1. A: no, absolutely not. Utam in the band (19.10 – 19.20 band) is not being used high enough. Ultrastarcomm (?) has come and said if they can do something. So it continues to remain unlicensed
18. Ecclesine: 58-59 GHz has been allocated for Intelligent Transportation Services (ITS) use, is here any possibility of opening to ISM band some classes that UNII has?
 1. A: its been a while since I've looked at it. Intelligent Transportation System has been a high priority. We already have some overlap with ITS spectrum in 5G. We have to look at it.
19. Matthew: NAFTA, how is passing of it effected FCC?
 1. A: I won't point to market changes. We had good working relations together in standardizing equipments and harmonizing our process. This activity came out of NAFTA

Vote of thanks to Julie. Discussion session began.

1. Chair reminded the attendees about discussion on regulatory issues, we have time till 11 or recess for the night.
2. Zyren: this was very beneficial. First opportunity to ask some direct questions. We are almost about to get a rule change in a few months. We understand that 6 months is very short time FCC terms. Drafting a notice takes a long time to send it out. Recapping Q&A, I would like to ask the group - are we going to promise something that we can't deliver due to FCC ruling?
3. Chair opened floor for discussion
4. Pratik: The evening was quite informative and useful. I felt like what Julie was saying that the NPRM will be initiated in 2 months or so. Earlier we thought that this may not even start for 6 months or so. Whereas 6 months is when they can expect a resolution
5. Ecclesine: we have a sponsor ballot ahead of us, which may take about a year or so. So we should proceed with our own decision
6. Barry: Is this a good time to discuss other topics, e.g. interference?
7. Chair: that would be out of order
8. Matt: if it takes a year to figure out FCC rulemaking changes, should we stop the process, tabling the action of .11g, is there an option?
9. Chair: all kinds of things we can do.
10. Dirk: FCC impediments that can happen to this group, how soon can this group move to get this schedule done
11. Chair: Al has the schedule and Stuart gave the answer:
 - a. Ballot 3/01, sponsor letter ballot 07/01, comment resolution 9/01, submit to revcom 11/01, - (next revcom is march 2002)
12. Fakatselis: Based on discussion and comments today, its unusual for a .11 group to speculate what FCC will do, I have a parliamentary enquiry regarding the speculative process. Is there somebody in exec comm. who can affect the schedule

13. Chair: can happen in ExComm or WG
14. Barry: What can WG do?
15. Chair: WG can do many things; it's difficult for me to speculate what the procedure could do.
16. Zyren: apart from procedural issues, there were many issues on BT interference issues, ask the group about how they feel about this issue? Do we need to drive the process immediately
17. Anuj POI: Topic in agenda?
18. Chair: Topic in agenda is FCC
19. Zyren: FCC-related broad issue all-encompassing issue
20. Stuart: observation is: do not stop the process, FCC is looking for a group to decide to help him. If we don't do anything for 6 months, group will get a bad name for itself
21. Ecclesine: IEEE is making std for the whole world, not just us. He was referring to interference. We shouldn't build a system that is "talk only".
22. Zyren: What Julie said is not to stop the process, it's our decision. We can promise to the market and may not be able deliver - are vendors going to ask 22 Mbps or 54 Mbps? There will be so much confusion. Risk in continuing without taking rule change in process is very high.
23. Barry: Peter brought some issues. BT interference – are we going to do anything about it?
24. Chair: Can't answer this question
25. Dick: How long ago was .11a issued?
26. Stuart: July 99. Final approval in Sep. 99.
27. Pratik: Peter's point is interference issue, we should be talking about this issue in detail. We need to study this in detail.
28. Anuj: POI; Doesn't IEEE 802.15.2 have a PAR to work on coexistence of 802.15.1 an 802.11?
29. Chair: yes they do
30. Peter: amateur radio and other are interfering. We should be able to coexist with other things not only SSB. Amateur TV? If you listen and recognize, you can fix it, otherwise not. We must recognize that fact.
31. Tim W: FCC works during this year, .11g will work during this year. it'll be best for us to not to delay the process
32. Heegard: it won't hurt the market
33. Barry: if we come out with a product that doesn't coexist with BT, we'll get black eye.
34. Zyren: confidence that industry has on IEEE will be shattered if we standardize something that we can't deliver due to FCC rules.
35. Fakatselis: If we move full speed ahead and we have a standard, and then we need to withdraw because it's not FCC compatible, it'll look bad on IEEE. Is there anything in between so that we continue the process but don't put IEEE's name at jeopardy? Is there anything we can do which will not put IEEE in a position so that it has to revoke a standard?
36. Chair: It's unlikely that IEEE would revoke the standard because it does not apply to one jurisdiction, e.g. the FCC's. Solutions would be okay in other parts of the world, so would be no need for revocation.
37. Heegard: we have done a thorough process in 802.11g, argue for delay that FCC is going to rule is not a wise one.
38. Pratik: new information on coexistence issues, we should look at that very deeply.
39. Lansford: In coexistence group 802.15.2, to depoliticize the process, we came up with standard set of tests. Consensus derived models could be used in this body as well.
40. Anuj: keep the focus in this group, not diversify
41. Stuart: we are having dialogue with FCC. We should look at the option of both proposals being standardized.
42. Barry: is there a process to compare both the methods and compare through standard models?
43. Zyren: Stuart's comments have merits. It may be wise to keep both the options on the table
44. Stuart: Idea of 2 technologies together.
45. Chair: Mergers are encouraged.
46. POI, Barry: when can the merger of proposals happen?
47. Chair: Wed morning
48. Halford: is there a process to evaluate BT interference? Group saying so many objections, rushing in to make a decision without all the facts on the table will be mistake.
49. Heegard: Process is in place, we have vote tomorrow, it's too late now
50. Ken: what's going on here is that we can't sit and wait? If we blindly go ahead without keeping interference in view, then we are making a mistake. We should continue further evaluation
51. Matt: Regardless of what fcc rules, .11b already exists, hence we shouldn't stop the process in the group
52. Coffey: it's sign of health of the group that many different ideas coming into the picture, let's push it on.

53. fakatselis: we need to make progress, but understand the .11 process, once we go full speed ahead, it's difficult to go back. We are speculating on the FCC outcome.
54. Ecclesine: Julie will go to other industry bodies, and tell them that best technical solution should come out.
55. Pratik: .11b products came out long time ago, BT wasn't around at that time. Since we know it now, we must take that into consideration. PC OEMs are very concerned about it.
56. Chair: There is a lot of coexistence work going on in various places: 802.15.2., 802.11h, BT Sig – FYI.
57. Dave: BT will come out in 100 M units, we'll be the bad guys if we interfere with BT.
58. Chris: One thing I've avoided is predicting FCC ruling in this case. PBCC does not add a new type of interference to the band.
59. Dave: I've heard that some proposals will do worse to BT than other.
60. Zyren: it's two sides of the same coin. Mutual interference is to be taken into consideration. We need to get the best solution out. WiLAN took their solution to FCC and were denied. FCC said that there will be a rulemaking, hence we must take the time to select. The process can take a year or more, do we have to move forward immediately, given that the group is facing technical issues?
61. Peter: It'll not be BT 1.0b which will ship in 100 M, there will be other versions of BT, we must take than into consideration
62. Chair: Speaking queue is empty
63. Dick: Moved for adjournment
64. Chair: Any objection to recessing for the night. Hearing no objections, we stand recessed.

03/14/01 morning Indigo Room (morning session)

1. Chair opened the session
2. Ieee 802.11g ballot was presented (Step 19)
3. Stuart showed the list of voting members
4. The process was explained by Chair
 - a. Each voting member should come up and pick up the ballot from Stuart
 - b. Door will be closed and nobody will be allowed to go in or out during the voting procedure. Vic Hayes will be at the door
 - c. At the end of the voting, We'll recess, and reconvene at 10:30 am with the results posted.
5. Ken Clements: Need for affiliation? If you make you mandatory, maybe someone can challenge the legal validity of the vote.
 1. Chair: Ruling of Chair is that it's non-mandatory field, one needs to put something, for example a dash (-), but do not leave it blank.
6. Zyren: this is not a closed ballot, so the voter can be informed before invalidating his/her vote
 1. Chair: the field is non-mandatory and ballots will not be deemed spoiled based on the affiliation field.
7. Mike Paljug: why is there "none of the above", which used to be in the ballot in the past?
 1. Chair: Has never been on 802.11g ballot. IEEE 802.11b put this on the ballot in 1998, but otherwise, this is not the norm. Group had not put it on, so ballot represents the default including the abstain option.
8. Numbers were written on each ballot.
9. Ballots were handed out to each voting member.
10. Members deposited their filled in ballots to the Chair.
11. Members were instructed not to leave the room until all votes are counted. Handed out 102 ballots and confirmed receipt of 102 ballots.
12. All ballots were counted and meeting recessed at 8:50 am. Will reconvene at 10:30 am

TG Part II 03/14/01 morning part II

1. Chair opened session at 10:30 am
2. Voting results are on server, doc # 01/180r0
3. Chair reporting no irregularities, no spoil ballots. There were 102 ballots. OFDM received 48 (49%), PBCC 43 (44%), MBCK 6 (6%), Abstain 5, Spoiled 0.
4. Results of IEEE 802.11g Ballot Technical Selection Procedure – Step 19 – Round 1 eliminates the MBCK proposal.
5. Barry: given the close vote, there is no way we'll get 75%. Motion: to adjourn for the session.
6. Chair: Clarify that motion is to end the session, not to end the meeting, and this motion will end 802.11g session for the week.

7. Barry: Confirms that the motion is to adjourn for the session, i.e. the week.
8. Second: Frank Howley
9. Stuart: Procedurally, if you adjourn, Matthew will have to remain to inform the ExCom.
10. Chair: I will remain to present report(s) to WG.
11. Stuart: Is this a procedural motion.
12. Chair: Motion is procedural and only requires >50% to pass.
13. Pratik: Goals of ad hoc?
14. Chair: No debates in motion to adjourn.
15. Mike Paljuk, POI: Please show the remaining agenda.
16. Chair: Agenda for week is shown.
17. Motion to adjourn session passes 47/15/6.

**IEEE P802.11
Wireless LANs**

Minutes of Joint 5GHz Globalisation Study Group (5GSG) Meetings

Date: March 13-15, 2001

Author: Garth Hillman
Advanced Micro Devices
5204 East Ben White Blvd, Austin, TX 78741
Phone: (512) 602-7869
Fax: (512) 602-2700
e-Mail: garth.hillman@amd.com

Abstract

Minutes of the 5GHz Globalisation Study Group meetings held during the IEEE 802.11/15 Plenary meetings in Hilton Head from March 12 through 15, 2001.

Executive Summary

1. The motion to extend the lifetime of the 5GSG until the July Plenary passed.
2. The decision was taken to introduce an intermediate step on the path towards a global WLAN standard at 5GHz. The intermediate step is to develop an inter-working mechanism. The rationale for taking this action was:
 - a. Much of the standards development required to create an inter-working mechanism will be reused in the global standard
 - b. The horizon for developing the inter-working mechanism will be short enough to garner committed participation
3. PAR and 5 Criteria documents required to promote the 5GSG to a Task Group were generated and submitted to the 802.11 executive committee for decision.
4. Two inter-working proposals were presented.

Tuesday 1-13-01, 10:30-12 noon

Officers Present – Bruce Kraemer, Vice Chairman; Garth Hillman, Secretary

Attendance – 50
Roll was called.

Name	Affiliation	Email Address
Masa Akahane	Sony	akahane@wcs.sony.co.jp
Takashi Aramaki	Matsushita Communications	Takashi.aramaki@vvp.mci.mei.co.jp
Larry Arnett	Mitsubishi	larnett@ieee.org
Gil Bar-noy	HLAN	glib@hlan.com
Joe Battelle	Net Schools	joeb@netschools.net
Alistair Buttar	Motorola	Alistair.buttar@motorola.com
Pat Carson	TDK	pcarson@tdktca.com
Joan Ceuterick	National Semiconductor	Joan.ceuterick@nsc.com
James Chen	Atheros	jamesc@atheros.com
Todor Cooklev	Aware	tcooklev@aware.com
Dick Eckard	Verizon Labs	Dick.eckard@verizon.com
Javier Espinoza	TDK	hespinoza@tdktca.com
Marcus Gahler	NextComm	mgahler@nextcomminc.com
Pierre Gandolfo	Cisco Systems	pgandolf@cisco.com
Rik Graulus	Resonext	Rik.graulus@resonext.com
Evan Green	Intel	Evan.r.green@intel.com
Gary Green	Cypress Semiconductor	gwg@cypress.com
Kerry L Greer	ShyCross	greerk@skycross.com
Amer Hassan	Microsoft	amerh@microsoft.com
Steven Hall	SiliconWave	shall@siliconwave.com
Garth Hillman	AMD	Garth.Hillman@amd.com
Frank Howley	Atheros	fhowley@atheros.com
David Hytha	SiliconWave	dhytha@siliconwave.com
Jamshid Khun-Jush	Ericsson	Jamshid.khun-jush@eed.ericsson.se
Bruce Kraemer	Intersil	bkraemer@intersil.com
Thomas Kuehnel	NEC USA	kuehnel@crl.nj.nec.com
Yunxin Li	Motorola	A12082@email.mot.com
Titus Lo	NextComm	Titus.lo@ieee.org
Leslie A Martin	Rockwell Collins	lamartin@collins.rockwell.com
Bill McFarland	Atheros	billm@atheros.com
Stefan Mangold	ComNets Aachen University	Stefan.mangold@comnets.ruth-aachen.de
Pratik Mehta	Dell	Pratik_mehta@dell.com
Reiner Mim	Proxim	rmim@proxim.com
Paul Moose	Advanced Broadband Communication	paulm@advbroadband.com
Marashino Morikura	NTT	morikura@ansl.nec.co.jp
Peter Murray	Intersil	pmurray@pipeline.com
Chiu Ngo	Philips	Chiu.ngo@philips.com
Gunnar Nitsche	Systemonic	Gunnar.nitsche@systemonic.de

Erwin Noble	Philips Components	Erwin.noble@philips.com
Dirk Ostermiller	Micro Linear	dirko@xmission.com
Cedric Paillard	Icefyre Semiconductor	cpaillard@icefyre.com
Doug Prendergast	Mitsubishi	dprender@pcicanada.com
Max Riegel	Siemens	Maximilian.riegel@icn.siemens.de
Adam Ruef	MobileStar Network	aruef@mobilestar.com
Henry Saam	Magis	hsaam@magisnetworks.com
Takuma Tanimoto	Hitachi	takuma.tanimoto@hitachi.com
Jerry Thrasher	Lexmark	thrasher@lexmark.com
Madan Venugopal	Comsilica	madan@comsilica.com
William Watte	M-TEC Wireless	William.watte@mtecgrouop.com
Mike Wilhoyte	TI	wilhoyte@ti.com

Roberts Rules of Order apply.

Voting Status – since this is a study group and not a task group anyone present can vote. However in plenary sessions only voting members can vote.

Interim Vice-Chair - Jamshid Khun-Jush (Ericsson) in attendance.

Agenda for the remainder of the week was proposed:

1. Approve minutes of the last meeting
2. Review progress made since ETSI-BRAN#22 and Monterey and IAG meeting in Stockholm meeting
3. PAR and 5 Criteria documents must be completed and presented to the 802.11 Plenary on Wednesday PM.
4. Extend life of 5GSG
5. 5GHzPP
6. MOA for Jim Carlow
7. Prepare for Julius Knapp-FCC
8. Inter-working Proposals

Agenda was approved.

Membership of attendees – MMAC – 1; ETSI-BRAN – 13; IEEE – 26

Takashi volunteered to update 5GSG via email on MMAC meeting schedules and standards progress.

Schedule Changes:

BRAN#25 moved from Sophia Antipolis to Seattle
H2GF move from May 15,16 to May 9, 10 in Princeton
H2GF tentatively moved from Sept. 15,16 to Sept. 7,8

Note: 5GS = converged standard resulting from 5GHz PP *for editorial purposes only.*

Bruce Kraemer (doc 11-01-161r0):

1. Minutes of the last meeting were approved.
2. Reviewed convergence steps to get to a single global standard. This information has been available on the web site for two months now.
3. Regulatory convergence steps were briefly reviewed in view of the fact that Julius Knapp from the FCC will attend the 1:00 PM meeting today.
4. Convergence progression using a protocol stack analogy was reviewed.
5. Q (HP) – will 5GS (converged standard resulting from 5GHzPP) be simply union of H2 and .11a or would it be a new enhanced functionality standard.
 - a. A – TBD and included in PAR
6. Scenarios reviewed – 5 slides presented from Monterey, SA (Sophia Antipolis) and IAG (Stockholm) meetings. These scenarios were representative and did not represent a complete set..
7. **Action:** Request for additional scenarios for home, public and corporate spaces.
8. 5GHz Roadmap reviewed. History of how Joint SG was born; path through Inter-Working standards revision step to 5GHzPP which would be empowered to write the 5GS.
9. Q – will 5GS be a new standard that may not include backward compatibility?
 - a. A – TBD
10. 3GPP has not been a complete success and a project model and should not be blindly emulated
11. Q – should we call partnership project 5GPP?
 - a. A – no, G will cause confusion since it implies reference to a 5th generation cellular standard; 5GHzPP was chosen as an interim name.
12. Reviewed Organizational structures of IEEE, ETSI, ARIB (Japan) and noted which levels within each standards body may need to be involved in the approvals process.
13. Preparation for Julius Knapp visit at 1:00 PM meeting. In particular Bruce prepared a strawman proposal of 5 questions for Julius. Ask Julius his view on future interferers in the 5GHz band?
14. PAR and 5Criteria docs. on IEEE web site are incorrect and this will be rectified over lunch.

- 15. 5 Motions needed to be raised during this Plenary were reviewed.
- 16. SGs are only authorized from one plenary to the next. Therefore:
- 17. **Motion** by Bruce Kraemer was made to extend the life of the 5GSG until the next plenary in July 2001.
 - a. Motion was seconded by Garth Hillman.
 - b. Discussion – Q – what is time line for 5GSG and how does it relate to formation of 5GHzPP. A – Bruce suggested a possible time line and showed it is conceivable that SG promotion to TG would occur almost simultaneously with formation of 5GHzPP but that is OK.
 - c. Vote – was unanimous (41 for, 0 against, 0 abstentions)
- 18. **Action** - 5GSG web page needs to be created. Any volunteers to generate a strawman 5GSG web page this week for review? N Stefan Mangold Un. Of Aachen came forward.

Tuesday 3-13-01 1PM – 3 PM

Officers Present – Bruce Kraemer, Vice Chairman; Garth Hillman, Secretary

Attendance – 34

- 1. Julius Knapp from the FCC Office of Engineering and Technology (OET) fielded questions from the audience. The FCC has jurisdiction for private use. [The NTIAA (Bill Hatch manager) has jurisdiction for federal allocations.] In general the process to be followed for any requested changes would start with OET. The goal of the FCC is to remain objective. The questions represent the views of the individuals and not their companies.
 - a. Prepared questions:
 - i. #1 Europe spectrum includes 5.47-5.725; does the FCC forecast allocating this band in the US? A – no current consideration for relocation of this band. All petitions are source agnostic therefore the International community will not have special influence; requests will be based on their merit.
 - ii. #2 Europe requires DFS and TPC; will the US? A – no.
 - iii. #3 Would there possibly be an increase in allowed transmit power if DFS and TPC were implemented? A – advised not to reopen the question of increasing power since the satellite community will push back hard and you may end up losing ground.
 - iv. #4 Any action pending re: modifying the rules for use of U-NII bands? A – no, the rules are not that old.
 - v. #5 What does the FCC propose as the best path to achieving spectrum usage rule changes? A – do our homework and then start with OET informally. If there is not a unified position in industry the process is more difficult and could take from 1 to 2 years. The goal is less than one year. For example comment period alone lasts 75 days. The fastest is about 6 months.

- vi. #6 5.725-5.825 is doubly defined by U-NII and 15.247 ISM regulations. Which set of rules should be used? A – use one set of rules or the other not a combination of both! Dual rule products are not explicitly prohibited.
- b. Extemporaneous Comments/Questions:
 - i. Comment - FCC lab is in Columbia Maryland; [contact - jdichoso@fcc.gov]. The role of Julius' department is to filter/prepare submissions for consideration by the commissioners.
Commission has been happy with what has been happening in unlicensed bands therefore continued support is likely; revenue/auctions is not a high priority for agency.
 - ii. Q – is more spectrum likely; A – more likely than not. Cost compensation for incumbents must be dealt with however.
 - iii. Q – is experimental license on federal gov. spectrum possible? A – it depends.
 - iv. Q – indoor/outdoor distinction? A – indoor to appease satellite community
 - v. Q – roadside band (Oct. 1999)? A - digital short range communications band is in progress, e.g., electronic toll booths.
 - vi. Q – could WLAN be used in this band or does the dept. of transportation now have jurisdiction? A – no, FCC still retains jurisdiction.
 - vii. Q – ultra wideband radios? A – proposals made, test data in, will be put out for public comment, outlook is optimistic.
- 2. Edited 5GSG PAR
 - a. Straw poll taken regarding EXPLICITLY referencing Inter-working in PAR
 - b. Results (23 for, 1 against, 5 abstain)

Tuesday 3-13-01; 8PM – 11 PM

Officers Present – Bruce Kraemer, Vice Chairman; Garth Hillman, Secretary

Attendance – 26

- 1. Edited PAR
- 2. Edited 5 Criteria
- 3. Meeting adjourned

Wednesday 3-14-01; 10:30PM – 12 noon

Officers Present – Bruce Kraemer, Vice Chairman; Garth Hillman, Secretary

Attendance – 38 initially

1. Motion by Bruce Kraemer for authorization to request the 802.11 WG to extend the lifetime of the 5GSG through the next Plenary in July 2001. Seconded by Garth Hillman.
 - a. Results – (38 for,0 against,0 abstain)
2. Made final edits to 5 Criteria document.
3. Motion by Bruce Kraemer to accept doc. 11-01-173r0, – 5 Criteria – and present the document for approval at the 802.11 plenary. Seconded by Tudor Cooklev.
 - a. Results – (28,0,7)
4. Made final edits to PAR document; there remained two highlighted areas requiring go/no go input from 802.11 chair:
 - a. Reference to global standard as subsequent step.
 - b. Time line
5. Motion by Bruce Kraemer to accept doc. 11-01-172r0 – PAR – with pending changes to highlighted sections to be resolved by Stuart Kerry and present the document for approval at the 802.11 plenary. Seconded by Gary Green.
 - a. Results – (14,1,7)
 - b. The one ‘no’ vote was changed to a ‘yes’ after the two highlighted areas were resolved by Stuart Kerry.
6. Meeting was adjourned.

Wednesday 3-14-01; 3:30 – 4:15PM

1. Motion in the 802.11 Plenary to extend the life of 5GSG passed (78,7,5).

Thursday 3-15-01; 1:00 – 3:00PM

1. Final preparation for Plenary; the consensus opinion was to proceed with request to the SEC for extending the life of the 5GSG and presenting the PAR and 5 Criteria to the SEC.
2. Review meeting plans – next candidates BRAN23 in Sophia (4/3-6) and IEEE in Orlando(5/12-16); decision TBD and depends on opportunity for progress toward establishing 5GHzPP.
3. Presentation (doc. 11-01-xxx) by Stefan Mangold (University of Aachen) on Inter-working Mechanisms
4. Presentation (doc. 11-01-170) by Jamshid Khun-Jush (Ericsson) on Inter-working Mechanisms

Thursday 3-15-01; Closing Plenary (doc. 11-01-204) 3:30 – 7:00PM)

1. Scope of Proposed Project:

Establish coexistence and inter-working among the 802.11a, ETSI HiperLAN/2, MMAC CSMA and HiSWANa standards. Extension of each of the MAC and PHY layers of these standards will be defined collaboratively to achieve coexistence and inter-

Purpose of Proposed Project:

To establish coexistence and inter-working among the 802.11a, ETSI HiperLAN/2, MMAC CSMA and HiSWANa standards. A subsequent project under a separate PAR is to create a single converged standard in the 5GHz band. **Thursday 3-15-01; 802 SEC (7:00 – 11:00PM)**