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**IEEE P802.11**  
**Wireless LANs**

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**Tentative Minutes for the 54<sup>th</sup> Meeting of the IEEE P802.11****Full Working Group**  
**IEEE 802.11 Interim Meeting**  
**Grosvenor Resort, Lake Buena Vista, Florida****11 to 15 January, 1999****Monday, 11 January 8:30 to 10:30 Opening Plenary IEEE 802.11**

- 1 Opening Meeting called to order by:** Vic Hayes at 8:30 opened the meeting with the agenda of 54<sup>th</sup> session of 802.11 is in doc.:IEEE P802.11-99/1. George Fishel, Secretary is present and ready to take the notes.
- 2 Objectives for this meeting:**
  - 2.1 **Comment resolution and resubmit for LB of the drafts of TGa and TGb**
  - 2.2 **Comment resolution of WPAN PAR + 5Criteria and submission to ExCom**
  - 2.3 **Joint meetings with ETSI BRAN on OFDM and spectrum issues**
  - 2.4 **Teleconference with the FCC plus resulting actions**
- 3 Roll Call:** People in the room were invited to introduce themselves by name and company. There were 72 people in the room.
- 4 Voting rights:**
  - 4.1 Participation in debates, moving and seconding, is only permitted by voting members, in all 802.11 meetings (at all levels). The subgroup chairs may permit observers to participate in debates.
  - 4.2 Voting at the working group level is by voting members only. Chair may permit observers to participate in debate.
    - 4.2.1 To become a voting member:
      - 4.2.1.1 Participate in at least 2 out of 4 consecutive plenary meetings. Voting rights start at third meeting.
      - 4.2.1.2 Participation in at least 75% in meetings, in the room
        - One interim may be exchanged for a plenary
        - Voting members will get a token to be used at votes
      - 4.2.1.3 All members have voting rights at task group meetings
    - 4.2.2 Voting rights can be maintained:
      - 4.2.2.1 By participation in 2 plenary meetings within 4 consecutive plenary meetings
      - 4.2.2.2 One interim may be substituted for a plenary
    - 4.2.3 Voting rights may be lost:
      - 4.2.3.1 After failing to pay the conference fee
      - 4.2.3.2 After missing two out of three consecutive letter ballots
  - 4.3 Current state of member status:
    - 4.3.1 Voting members (86) at the beginning of this meeting
    - 4.3.2 Aspiring voting members (22)

- 4.3.3 Nearly voting members (59)
- 4.4 Attendance List, Registration
- 4.4.1 Administration: The attendance list was circulated, Richard Pain supervising - 75% attendance according to the attendance list is required to qualify for participating in the meeting as a whole, so make sure to sign the book. Copies of the attendance list are handed out before the end of each meeting.
- 4.4.1.1 Important for administration of voting rights that the attendance book is used properly.
- 4.4.1.2 Sign per meeting (morning, afternoon, evening). Do not sign ahead.
- 4.4.1.3 Place initials. Do not cross or underline. You must attend the session after signing.
- 4.4.1.4 Circle the letter corresponding to the meeting you attend when signing (F=full 802.11, P=PHY, M=MAC group).
- 5 Registration:** The shared meeting fee to attend this meeting is \$135 US. This fee will be added by the hotel bill, if you are staying in this hotel, to cover the cost of coffee breaks, equipment and meeting rooms for the week.. If you are not staying at this hotel please pay the fee at the front desk. You must pay the fee even if you only attend 1/2 hour of any meeting. Failure to pay will cause your name to be added to the deadbeat list. You will lose your voting rights until the fee is paid.
- 6 Check E-mail addresses in the book:**
- 6.1 Some addresses have been struck, or have a \$-sign added to the right - those received complaints from the reflector
- 6.2 Please strike your e-mail address if you do not use it. Mark bulk e-mail with YES if your email server allows long email files and you want to receive meeting documentation in this manner.
- 7 Logistics:** Electronic distribution is the method of making documents available four paper copies will be made available for those without computers.
- 7.1 Rudolf will manage Copying and collection of files. Karen Halfords assists in arranging documents. Rudolf has files on Flash PCMCIA card. Before a submission is presented, a document number must be assigned by Harry and a file copy on diskette in Office 95(Word 6.0, Power Point 4.0 or Excel 95) submitted using the 802.11 templates for record and distribution.
- 7.2 Document distribution: The primary dissemination of documentation is via electronic file distribution. However three (3) mediums will be used. They are: a) 802.11 network b) flash, memory card, c) paper copy
- 7.3 All files must use the IEEE802.11 templates for word documents and PowerPoint. Vic Hayes updated the template for PowerPoint files.
- 7.4 Coffee breaks at 10 AM and 3 PM. Noon to 1:00 PM lunch, printing is available in the hotel 802.11 office.
- 8 IEEE Patent Policy** Vic Hayes, 802.11 chair explained the IEEE Patent Policy as per Clause 5 of the IEEE Standards Bylaws and per Clause 6.3 of the IEEE Standards Operations Manual. He specifically asked for notification from members of patents applicable to the Published standards or draft standard and patent holders submit the requested statement.
- 9 Individual Representation:** All attendees are representing themselves as individuals and not companies and/or any special organization.
- 10 Anti-Trust Laws** Discussion of price is disallowed in 802.11 sessions due to the threat of price fixing. Price fixing discussions are governed by Anti-Trust Laws and are illegal.
- 11 Other announcements**
- 11.1 Volunteers needed for the preparation of the mailing on Thursday evening. Several people volunteered. Cherry Tom and Steven Anudren.

11.2 Sponsor ballot for 802.11 a and b invitation to ballot for those that are interested. You must be a member of IEEE or the Computer Society to participate in this ballot.

**12 Recognition:** No input at this time

**13 Approval of the minutes of previous meetings:**

13.1 Minutes of the Albuquerque meeting will be carried until Wednesday. Minutes available on the flash card, and the server.

13.2 Point of order raised from the floor to determine if a quorum is present.

**MOTION #99/54 P01 : To rescind the ruling of the 802.11 chair that "the extension to the high rate HR/DSS/FH PHY is not a second PHY and the session was not out of order" at the November 1998 meeting. Motion made by: Bob O'Hara Seconded by: Annil Sanwalka.**

**Motion #99/54 P02: To ammend motion by adding the following line to the end: "and therefor opens the subject for further study" Motion made by: John Fakatis Seconded by: Tom Siep**

**No discussion on the motion.  
Motion on the floor to vote.  
Motion P02 is carried 47-0-0.**

**MOTION #99/54 P03 : To rescind the ruling of the 802.11 chair that "the extension to the high rate HR/DSS/FH PHY is not a second PHY and the session was not out of order" at the November 1998 meeting and therefor opens the subject for further study. Motion made by: Bob O'Hara. Motion seconded by: Annil Sanwalka.**

**Discussion on the ammended motion followed.  
Motion 3# on the floor to vote.  
Motion P03 passes 41-7-0**

13.3 **Report on sponsor ballot by Vic Hayse**

13.4 **Report on letter ballot 16 (2)**

- Draft 802.11a approved by 54/19/5 or 73 %
- Draft 802.11b recirc. approved by 58/17/3 or 77 %
  - needs to be reviewed with original vote
- WPAN PAR and 5 C approved by 60/14/4 or 81 %
- Comment files are respectively 99/16, 17 and 18

13.5 **Report of the Thursday ExCom meeting Vic Hayse**

13.6 Financial report of the Waltham meeting not available.

13.7 Report of the RFID meetings in the CEPT

13.7.1 In the CEPT area, Spread Spectrum devices are limited to 100 mW EIRP

13.7.2 Primary users are Electronic News Gathering (ENG) and Fixed Services

13.7.3 ENG is an analogue system

13.7.4 both have awfully low receiver levels

13.7.5 100 mW as already a burden

13.8 Report of the RFID meetings in the CEPT (2)

13.8.1 RFID devices have a request for being permitted 500 mW EIRP using Spread Spectrum

13.8.2 Increases about 3 dB per meeting

13.8.3 Latest report showed 5 W (10 W) EIRP

- 13.8.4 Need it for power transfer to battery-less tags
- 13.8.5 Will cause interference to our devices
- 13.9 3.5 Report of the RFID meetings in the CEPT (3)
  - 13.9.1 Lucent Technologies and Telxon are defending our case.
  - 13.9.2 Agreement reached about interference model
  - 13.9.3 120 dB pathloss over 60 meter was original proposal
  - 13.9.4 Primary users might be our rescue
  - 13.9.5 Still looking for more supporters
- 13.10 **Review of document list**
- 13.11 **Adoption of agenda**

**Motion #99/54 P04 To adopt the agenda as presented Motion made made by Tom Siep Seconded by: Stan Reible**

**Discussion on motion**

**Motion #99/54 P04 to Floor For vote**

**Agenda approved 47-0-0**

**13.12 Unfinished business**

13.12.1

**Motion #99/54 P05: that an ad hoc working group be established during this interim meeting. This group shall consist of interested volunteers. It shall:**

- 1. Review the proposed limit on in-band emissions for RF lighting devices operating in the 2.45 GHz ISM band. It will either recommend that IEEE 802.11 support this limit, or it shall propose an alternative.**
- 2. It shall draft a letter to the Secretary of the FCC reiterating our position in this letter (see doc. IEEE 802.11 - 98/390r2)**
- 3. It shall identify delegates by name (preferably at least two) who are willing to meet with the FCC to discuss this matter and who are authorised to negotiate a limit on in-band emissions on behalf of IEEE 802.11**
- 4. The ad hoc group shall report findings and recommendations at the next plenary session (Thursday?).**

**Made by Don Johnson Seconded by: Harry Worstel**

**Discussion on motion**

**Motion to floor for vote**

**Motion #99/54 P05 approved 45-0-1**

**The group will be Al Petrick, George Fishel and others.**

**4 Adjourned at 10:30 until Wednesday meeting.**

**Wednesday, 13 January 13:30 to 15:30 Plenary IEEE 802.11**

**5 Vic Hayes opened the meeting at 13:35 with an introduction of members present. A total of 53 persons present.**

**6 Review of documents list and assignment of numbers.**

7 Agenda Update

7.1 Old Business

7.1.1 Study Group WPAN

7.1.2 TGa

7.1.3 TGb

7.1.4 Microwave lighting

7.2 New Business

**Motion #99/54 P06 to approve the agenda as modified. Proposed by: Al Petric and seconded by: Harry Worstell**

**Motion to floor for vote**

**Motion#99/54 P06 carries 41-0-2**

**8 Report from MMAC-PC on the planed activities for the Japan meeting**

8.1 An exhibition of wireless devices will be a part of the Japan show.

8.2 Anyone wishing to participate is invited to do so.

8.3 The press will be invited to document the Japan meeting

**9 Printer connected to server please do not disconnect.**

**10 Harris will sponsor a social tonight from 7:00 to 10:00 with a cash bar.**

**11 Old business**

11.1 WPAN Report by Bob Heile

11.1.1 Summary of report

11.1.2 Summary of comment review

11.1.3 Next steps

11.1.3.1 Motion in SG: Submit the document for re-circulation to letter ballot (WG) to submit the document UMENTS -98/16r5 and 98/162r8 to ExCom. Result in the WG: approved by Unanimous consent.

11.1.4 The question was posed as to how many of the people the voted on the WG letter ballot would change their votes from No the Yes and 1 person raised his hand. This person must send a letter of retraction to Vic.

**Motion # 99/54 P07 Motion in SG: Submit the document for re-circulation to letter ballot to WG to submit the document UMENTS -98/16r4 and 98/162r7 to ExCom. Motion made by: Bob Heile and seconded by:Ian Gifford**

**Motion to the floor for vote**

**Motion #99/54 P07 is approved 28-0-4**

11.2 Report by Naftali Chayat on TGa working group activity.

**Motion #99/54 P08 To approve the motion that 802.11 a/ BRAN PHY's are based on 52 sub-carriers and 4 will be dedicated pilot sub-carriers. Motion made by: Naftali Chayat and seconded by Steve Gray.**

**Discussion on motion followed**

**Motion to the floor for vote**

**Motion #99/54 P08 passes: 39-1-4.**

11.3 Report by John Fakatselis on TGB working group activity

**Motion #99/54 P09 The IEEE 802.11 support a limit on the RF Lighting Emissions in the 2.4 GHZ ISM band of 20mV/meter peak envelope field strength at 3 meters. Motion made by: Jim Zyren and seconded by: Harry Worstell**

**Discussion on the motion**

**Motion to the floor for vote**

**Motion #99/54 P09 passes with 45-0-1**

**Motion #99/54 P10 that the 802.11 appoint delegates to meet with the FCC and authorize them to negotiate this limit. Motion made by: Jim Zyren and seconded by: Al Petrick**

**Dicussion on motion**

**Motion to the floor for vote**

**Motion #99/54 P10 passes 49-0-1**

**Motion #99/54 P11: to send a letter (document 99/027 ) be sent to the secretary of the FCC Motion made by: Jim Zyren and seconded by: Michael Fischer**

**Dicussion on motion**

**Motion to the floor for vote**

**Motion #99/54 P11 passes 46-0-1**

**12 New Business**

12.1 Presentation by Michael Fisher Document number 99/029 Mechanism to Allow Correct Calculation of Frame Durations.

**Motion #99/54 P12: To adopt document number 99/029 into TGa, TGB draft standards and into current 802.11 standard, Motion by Michael Fischer**

**Discussion of motion**

**Motion #12 to floor for vote:**

**Motion Carries 35-0-2**

13 Meeting adjourned for the day at 15:30 until Friday Closing Plenary.

### **Friday, 13 January 13:30 to 15:30 Closing Plenary IEEE 802.11**

13 Vic Hayes opened the meeting at 13:45.

14 Report on meeting arrangements at the Mukuhara Hotel for the Japan meeting of 802.11 approximately 29 persons indicated they would attend the meeting.

15 At the last three meetings paper copies of documents were offered and not taken. It was determined that paper copies were not needed and will not be available in the future meetings.

16 At the next meeting Office97 will be the standard for all documents.

17 Agenda

**Motion #99/54P13 Motion to approve amended agenda Motion by: Stuart Kerry Seconded by: Allen Heberling.**

Motion #99/54P13 carries 33-0-0

18 TGb report by John Fakatselis

19 Motion #99/54P14: Move to issue the document 802.11b/D2.last to be created by the editor from the material supplied by the comment resolutions approved by TGb to WG re-circulation ballot. Motion by John Fakatselis and seconded by Dean Kawaguchi

Motion #99/54P14 carries 37-0-1

20 WPAN Report by Tom Siep

20.1 Had a PAR that was approved and by ExCom had a letter to be presented to ExCom

Motion #99/54P15: Motion that the working group forward a suggestion letter on changes to the PAR to ExCom Motion by: Tom Siep Seconded by Allen Heberling

Discussion followed.

Motion: Call the question on Motion #99/54P15. Motion by: JohnFakatselis Seconded by: Michael Fischer

Question Called 21-5-4

Motion #99/54P15 to floor for vote

Motion #99/54P15 passes 14-9-7

21 Recap of Output Documents by Vic

21.1 Output documents

21.1.1 WPAN PAR-r8 + 5 Criteria-r5

21.1.2 WPAN PAR-r7 + 5 Criteria-r4

21.1.3 WPAN Ballot resolutions

21.1.4 SG Recommendation

21.1.5 Draft letter for FCC

21.2 Output documents 2

21.2.1 TGa draft/D2.last plus /D3.0

21.2.2 TGa Ballot Resolutions

21.2.3 TGb draft/D2.last plus /D3.0

21.2.4 TGb Ballot Resolutions

21.2.5 20 day WG letter ballot for TGa, TGb, WPAN

22 Report from TGa by Naftali Chayat

Motion # 99/54P16 to forward the 802.11a draft 2.1, after incorporation of the text changes arising from the comments resolution process and decisions taken during January 99 meeting, to a 25 day WG Re-circulation Ballot. Motion by Naftali Chayat: Seconded by: John Fakatselis

Motion#99/54P16 Passes 28-0-0

Motion # 99/54P17: to issue liaison letter to MMAC-PC Wless Ethernet group appreciating their willingness to align their standard with 802.11a and ask to align their draft standard with the draft 2.1 version of the .11a standard Naftali Chayat/Ohsawa

Motion # 99/54P17 passes 26-0-1

Motion #99/54P18: to issue a liaison letter to BRAN appreciating the cooperation during the meeting and asking then to consider 802.11a preamble structure as one of the candidates for a BRAN H/2 preamble Naftali Tak

Motion #99/54P18 Passes 26-0-0

Motion #99/54P19: That 802.11 joins the submission of a joint statement with ETSI/BRAN and MMAC-PC to the ITU-R (doc. 99/042), supporting lowering restrictions to RLANs in the 5.15-5.25 GHz band, and to

**empower the 802.11 chair to revise the final version of this joint submission. Motion made by: Masahiro and Seconded by: Takanashi**

**Motion #99/54P19 Passes 26-0-0**

**Motion #99/54P20: That 802.11 issue a support letter to the CEPT committee, supporting the BRAN document as shown in 99/40, while stressing the importance of the increased frequency allocations and lowered restrictions to the 802.11a WLANs. Motion made by: Naftali Chayat and Seconded by: Dean Kawaguchi.**

**Motion #99/54P20 Passes 24-0-0**

**24 Next meeting objectives**

**25 New Business**

**25.1 Sign the book for AI**

**25.2 Return all NIC cards to owners.**

**26 Next Meeting**

**26.1 Objectives for next 802.11 meeting**

26.1.1 To resolve comments on ballots of draft 802.11a and draft 802.11b

26.1.2 To submit the drafts to Sponsor Ballot

26.1.3 To submit WPAN's PAR and 5 Criteria to ExCom for submission to NesCom

26.1.4 ?

**26.2 Future meeting locations**

26.2.1 March 8-12 - Hyatt Regency, Town Lake, Austin, TX, Plenary

26.2.2 May 10-14 - Shinagawa? Prince Hotel, Tokyo, Japan, Interim (NTT, Clarion, NEC)

**Meeting adjourned at 15:30**

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## 1 Future Meeting Schedule

- **1999**
- *March 8-12 - Hyatt Regency, Town Lake, Austin, TX, Plenary*
- *May 3-7 - Makuhari Prince Hotel, Tokyo, Japan, Interim (NTT, Clarion, NEC)*
- *July 5-9 - Queen Elizabeth, Montreal, PQ*
- *Sept 13-17 - Hilton, Santa Rosa, CA, Interim (Alantro)*
- *November 8-12 - Hyatt Regency, Kauai, Koloa, HI, Plenary*
- **2000**
- *January TBD - Israel?, Interim (Breezecom)*
- *March 6-10 - Hyatt Regency, Albuquerque, NM, Plenary*
- *July 10-14 - Hyatt Regency La Jolla, San Diego, CA, Plenary*
- *November 6-10 - Hyatt Regency, Tampa, FL*
- **2001**

*Attendance list for* Lake Buena Vista

| <i>Full name</i>         | <i>status</i> | <i>att. %</i> | <i>phone</i>       | <i>company</i>  | <i>e_mail</i>                    |
|--------------------------|---------------|---------------|--------------------|---|----------------------------------|
| Mr. Jeff Abramowitz      | voter         | 80            | +1 408 326 5974    | 3Com Corporation                                      | jeff_abramowitz@3com.com         |
| Dr. Reza Ahy             | voter         | 75            | +1 650 961 9900    | BNA   | rahy@earthlink.net               |
| Mr. Geoffrey T. Anderson | nonvoter      | 20            | +1 201 930 6261    | Sony Electronics Inc.                                 | geoffrey_anderson@mail.sony.com  |
| Mr. Carl F. Andren       | voter         | 100           | +1 407 724 7535    | HARRIS Corporation                                    | candren@harris.com               |
| Mr. James R. Baker       | voter         | 100           | +1 925 737 1646    | Nortel Networks Inc.                                  | jbaker@nortelnetworks.com        |
| Mr. Kevin M. Barry       | voter         | 100           | +1 516 244 4345    | SITA  | kbarry@sitaaps.org               |
| Mr. Phil Belanger        | voter         | 99            | +1 330 664 7953    | Aironet Wireless Communications Inc.                  | pbela@aironet.com                |
| Mr. Simon Black          | voter         | 100           | +44 1223 847400    | Intalk Ltd.   | simonblack@intalk.com            |
| Mr. Timothy J. Blaney    | voter         | 40            | +1 530 273 3482    | Commcepts   | tim@wireless-network.com         |
| Mr. Jan Boer             | voter         | 100           | +31 30 609 7483    | Lucent Technologies Nederland                         | janboer@lucent.com               |
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| Mr. Ronald Brockmann     | voter         | 75            | +31 30 228 1245    | No Wires Needed B.V.                                  | ronald.brockmann@nwn.nl          |
| Mr. Chris Brown          | nonvoter      | 15            |                    | TRW Wireless Products                                 |                                  |
| Mr. Naftali Chayat       | voter         | 100           | +972 3 645 6262    | BreezeCom   | naftalic@breezecom.co.il         |
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| Mr. Peter Ecclesine      | voter         | 99            | +1 408 527 0815    | Cisco Systems Inc.                                    | petere@aimnet.com                |
| Mr. Richard Eckard       | voter         | 100           | +1 781 466 2780    | GTE Laboratories Inc.                                 | reckard@gte.com                  |
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| Dr. Steven D. Gray       | voter         | 100           | +1 972 894 4422    | Nokia Research Center                                 | steven.gray@research.nokia.com   |
| Mr. David Halasz         | nonvoter      | 40            | +1 330 664 7389    | Aironet Wireless Communications Inc.                  | dhala@aironet.com                |
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| Mr. Juha Heiskala        | voter         | 100           | +358 9 4376 6812   | Nokia Research Center                                 | juha.heiskala@research.nokia.com |
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| Mr. Donald C. Johnson    | voter         | 100           | +1 937 434 8389    | WLAN Consulting Inc.                                  | johnsdb@aol.com                  |
| Mr. Tal Kaitz            | voter         | 100           | +972 3 6456273/262 | BreezeCom   | talk@breezecom.co.il             |
| Mr. Kevin Karcz          | aspirant      | 99            | +1 603 862 1008    | University of New Hampshire                           | kjk@unh.edu                      |

| <i>Full name</i>             | <i>status</i> | <i>att. %</i> | <i>phone</i>         | <i>company</i>                         | <i>e_mail</i>                      |
|------------------------------|---------------|---------------|----------------------|--|------------------------------------|
| Mr. Dean M. Kawaguchi        | voter         | 100           | +1 408 369 2629      | Symbol Technologies Inc.               | deank@psd.symbol.com               |
| Mr. Stuart J. Kerry          | voter         | 100           | +1 408 267 4680      | OK-Brit                                | stuart@ok-brit.com                 |
| Dipl. Ing. Jamshid Khun-Jush | aspirant      | 30            | +49 911 5217 260     | Ericsson Eurolab Deutschland GmbH      | jamshid.khun-jush@eedn.ericsson.se |
| Mr. Duhyun Kim               | nonvoter      | 40            | +1 404 870 6958      | Lucent Technologies                    | dkim1@lucent.com                   |
| Mr. Patrick Kinney           | voter         | 60            | +1 319 369 3593      | Intermec Technologies Corp. (Norand)   | kinneypw@norand.com                |
| Dr. Steven Knudsen           | voter         | 90            | +1 403 207 6321      | WiLAN                                  | stevenk@wi-lan.com                 |
| Mr. Tom Kolze                | nonvoter      | 60            | +1 602 460 2894      | ComSTAR Communications                 | tkolze@getnet.com                  |
| Mr. Bruce P. Kraemer         | voter         | 40            | +1 407 729 5683      | HARRIS Corporation                     | bkraemer@harris.com                |
| Mr. Vinod Kumar              | nonvoter      | 15            |                      | Alcatel                                |                                    |
| Mr. David S. Landeta         | aspirant      | 80            | +1 407 729 5540      | HARRIS Corporation                     | dlandeta@harris.com                |
| Dr. John B. Langley          | nonvoter      | 30            | +1 408 616 6329      | RadioLAN                               | jlangley@radiolan.com              |
| Mr. Stanley Ling             | voter         | 100           | +1 707 521 3071      | Alantro Communications                 | sling@alantro.com                  |
| Dr. Scott Marin              | nonvoter      | 55            | +1 972 852 7109      | Bosch Telecom Inc.                     | smarin@boschtelecominc.com         |
| Mr. Brian Markwalter         | aspirant      | 35            | +1 352 237 7416      | Intellon Corporation                   | brian.markwalter@intellon.com      |
| Mr. Brian D. Mathews         | nonvoter      | 20            | +1 407 724 3477      | HARRIS Corporation                     | bmathews@harris.com                |
| Mr. Mark S. Mathews          | nonvoter      | 15            | +1 407 644 8582      | AbsoluteValue Software                 | mark@absoval.com                   |
| Mr. Michael D. McInnis       | voter         | 80            | +1 425 865 2840      | The Boeing Company                     | michael.d.mcinnis@boeing.com       |
| Dr. Maasaki Mitani           | nonvoter      | 30            | +81 3 5280 3338      | Tokyo Denki University                 | mitani@c.dendai.ac.jp              |
| Dr. Masahiro Morikura        | voter         | 100           | +81 468 59 3132      | NTT Wireless Systems Labs.             | morikura@mhosun.wslab.ntt.co.jp    |
| Mr. Peter Murray             | nonvoter      | 60            | +1 908 232 9054      | No Wires Needed                        | pmurray@pipeline.com               |
| Mr. William Myers            | nonvoter      | 15            |                      | Bosch Telecom Inc                      |                                    |
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| Mr. Yuji Nakayama            | nonvoter      | 30            | +81 3 55 11 2109     | NTT Mobile Communications Network Inc. | yuji@linkdv.nttdocomo.co.jp        |
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| Dr. Richard van Nee          | voter         | 100           | +31 30 609 7412      | Lucent Technologies Nederland          | vannee@lucent.com                  |
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| Mr. Richard H. Paine         | voter         | 100           | +1 425 865 4921      | The Boeing Company                     | richard.h.paine@boeing.com         |
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| Dr. Stanley A. Reible        | voter         | 100           | +1 781 246 0103 X105 | Micrilor Inc.                          | reible@compuserve.com              |
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| Mr. Anil K. Sanwalka         | voter         | 100           | +1 416 754 8007      | Neesus Datacom Consultants             | anil@neesus.com                    |
| Dr.-Ing. Peter Schramm       | nonvoter      | 20            | +49 911 5217 360     | Ericsson Eurolab Deutschland GmbH      | Peter.Schramm@eedn.ericsson.se     |

| <i>Full name</i>           | <i>status</i> | <i>att. %</i> | <i>phone</i>            | <i>company</i>                       | <i>e_mail</i>                |
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| Mr. Thomas Siep            | voter         | 100           | +1 972 480 6786         | Texas Instruments                    | siep@ti.com                  |
| Mr. Donald I. Sloan        | voter         | 75            | +1 330 664 7917         | Aironet Wireless Communications Inc. | dons@aironet.com             |
| Mr. Hitoshi Takanashi      | voter         | 100           | +81 468 59 3471         | NTT Wireless Systems Labs.           | takanasi@pcs.wslab.ntt.co.jp |
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| Mr. Jim Zyren              | voter         | 76            | +1 407 729 4177         | HARRIS Corporation                   | jzyren@harris.com            |