Tentative Minutes

IEEE P802.11 Joint MAC/PHY Working Group

Interim meeting
Dayton, Ohio
September 14 - 17, 1992

Monday, AM

Back from Break 10:45 am. Vic chairs joint MAC, PHY working group and proposes process by which papers are presented. Each contributor should introduce his/her paper and state which issues (referring to Issues List) they are addressing, and how much time they want for presentation. We will budget time after the introductions.

Larry van der Jagt introduces **Bob Crowder's paper 92/100 on architecture**. This first was presented on the 802 reflector.

Jim (Schuessler, NSC)- Makes proposal that reflector traffic be published as a contribution/submission for each meeting.

General agreement, but need person to take responsibility to do this.

Comments on incomplete connections on reflector were addressed by Dave Bagby (keeper of reflector alias base). Dave will try to address this for future meetings.

Conclusion reached to dissolve the ARCH reflector and conduct further transactions over the GENERAL reflector. Many people were interested in the discussion being conducted.

Orrest Storoshchuk - **doc. 92/101, by Bob Crowder on Quality of Service for Time Bounded data types**. Paper divides Time-bounded requirements into voice, video, Industrial Automation and Multi-Media.

Michael Rothenburg, John McKown, Motorola make comments on accuracy of Bob's paper, question assumptions, etc.

Dave Bagby - Tries to focus on issues. Thinks this is input to issue 15.1 This is just an introduction, not full discussion. Too bad Bob is not here to explain paper.

Michael comments on multi-media, video over LANs. There is strong standardization effort on compressed video. It is quite possible to transmit full motion video from 1.2 to 2.0 Mbit/s. We need to accommodate this, otherwise, we will not be able to address this progress.

Vic: Further discussion on paper should be done in a small group later in the week.

Tim Kwok, Apple introduces his papers 92/109 and 110. Paper 109 is a revised version of his paper done for this group last year. He gives some BW requirements at the end. Paper 110 goes into the network services needed for these requirements. three classes: Best effort (contention), reservation based (real time, time based and real time, non-time based) Can class information content based on delivery desired. His paper divides services into these categories.

Ryan Tze introduces **paper 92/98, Wireless LAN Station Management Issues, by Steve Chen**. Addresses issues 12.1, 13.2, 13.4, 13.5, and others. Steve defines a station management

model and proposes an object oriented management information base (MIB) be developed. Station management is divided into four functions: Frame Management, Access Management, Physical Connection Management and Co-ordination Management. The later (CM) has the single point of access to external management agents. Main point is that station management should be a separate entity - as the current model shows. Ryan does not request more time.

John - Does this mean that any object that is controllable (e.g. antenna selection), does that mean it is automatically available to an application?

Ryan - refers him to Steve.

Paper will be discussed further in MAC group.

François thinks this model already exists, but not in this level of detail.

Larry - Goal is to pass OSI standard, so of course we will have OSI managed objects.

Michael - 802.3 has model that is well understood. The problem is to make a MIB. We need a very well defined MAC and PHY before this is possible - so this may be premature. Also takes issue with goal of getting through ISO - real issue is to get industry following, which means following SNMP.

Simon Black - We can follow OSI principles, but there may be object unique to wireless that are appropriate for a lower layer management entity. These may not have peer to peer associations for instance.

Vic proposes to discuss 109 and 110 tomorrow morning. Please read papers and think about how we can answer specific issues with these papers.

Larry introduces **Tim Phinney's paper taken from IEC/ISA FieldBus standard**. Tom proposes that the MAC/PHY interface be used to direct work within 802.11. A nice thing about this interface is "Start of Activity" signal from MAC, as well as "End of Activity" indication. This helps in Preamble generation and error recovery. Tom also goes into detail about what we should use for an FCS (Frame Check Sequence). Overall this model is "state of the art" and worth our consideration. After reading, we should have perhaps a 20 minute discussion.

Wim's paper 106 will be distributed tomorrow morning. Vic assigns 20 minutes to discussion.

We need 2.5 hours tomorrow in total to complete this work.

Rich - Mentions **JEM meeting**. Vic introduces. 802.11 position requested to Joint Experts Group. Groups include T1, TIA, CCIR. Vic asked Rich, Spectrics, to present our position to this meeting. Standards groups requested to address Common Air Interface (CAI). there are six to eight groups including European. Are there any volunteers to help with a 20 minute presentation? Wants to present arch. and discussion of shared or integrated position on use of new 1910-1930 spectrum. (i.e. split spectrum into voice and LBT or combine and share it)

Dave - Who is this group made up of?

Rich - This is a PCS group. Vic was called by a co-chair from AT&T.

Dave - Senses some PCS politics here...

Vic. - Advised by NCR to attend a "Telocator" group. Started as a business group (cartel?) interested in paging. Proposed CAI for non-packetized data. However, there is a group doing mobile data, in which Vic was asked to be involved with. He had personal and professional problems in being there, since it seems like group intends to dictate requirements to our group. Vic decided not to go.

Chan: - Group has pager spectrum they have not used. They are looking for expanding the services for data. Must have a service provider, and want a computer industry representation on committee. Chan thinks we should have an observing member of no political significance - he volunteers. This is a very delicate situation. They have no interest in doing WLAN his way or any other way.

Chuck - Who are member companies of Telocator? They are a private membership?

Chan: - Primarily radio common carriers. Evolved into paging companies. Generally have licenses to operate pagers within cities.

Rich - Telocator is only one body doing common carrier paging. There is also activity from other standards groups, i.e. CTIA. He thinks it will not be dominated by Telocator.

François: Does this group have power to generate standards.?

Rich: No, only develop consensus on CAI.

Chan: CTIA is Cellular Carriers, T1P1 is active, working for exchange carriers. Exchange body could be EIA or ANSI. T1P1 is from ANSI, same as FDDI.

Vic: EIA renamed itself TIA/CTIA?

Chan: EIA/TIA has been around for a long time. Cellular standard uses IS prefix rather than older TR. If cellular needs a new standard, EIA would supervise. If new entrepreneurs want a new standard, such as PCS, it is not clear who would manage.

Dave: Leery of participating in JEM. Tends to be political. Made bid to be own WINForum - which said "no thank you". Thinks we may be manoeuvred into being controlled by this group. Think carefully.

Chan: Hate to see 802.11 as a sponsoring organization!

Chuck: Believes FCC will be there, listening to comments. Thinks we need to go prepared to debate as well as present.

Dave: Next meeting is the same time as our next one. Vic will find out. Meeting in Washington DC.

Rich: Agrees with Dave's sceptical view. If we don't participate we loose, as well as if we DO participate. We need to be an active voice. There are two opinions by data users in this group: segmented verses open. We need to express both, but need to assert strongly on requirements for access and interference. This needs to be done quickly. Vic asks if Rich can prepare paper. Solicits input from members to develop this paper. Target tomorrow morning.

Simon: Interested in exact groups represented.

Vic **adjourns at 12:10 pm until 8:30 am tomorrow morning**. After lunch, MAC and PHY groups will have separate meetings.

Tuesday, AM, Joint MAC/PHY Working Group

François Simon has requested some time to present an outline of a draft standard later in meeting.

Tim Kwok , Apple, combined presentation on **doc. 92/109 and 110**. Wants to provide a framework within which to design a **multi-media** MAC protocol. Breaks Information into Time and Non-Time based and Delivery requirement into Real Time and Non-Real Time.

APPLICATION CLASSIFICATION

Information Type / Delivery Requirements	Time Based	Non-Time Based
Real Time	Video Conferencing Video on demand	Image Browsing Interactive Computing
Non-real Time	Video Mail	Email File Transfer (background tasks, no user interface)

Tim makes several motions related to the issues document.

Chan: Other ways to look at this. Possible to guarantee delivery, variance is amount of delay incurred. Could classify the amount of delay tolerable.

Don: In case of non-time based information. should do it as quickly as possible.

Tim: Yes, for non-time based information. Not enough for video. Sure, try to optimize delivery time.

Chuck: Agrees with Chan.

Dale Gulick: If delay too much, some data is now not valuable to deliver at all.

Dave: Puzzled by reservation service 2: video. Assumes class 2 will come at expense of class 1 (asynchronous - no reservation) Sees fuzzy boundary between two

Tim: Class 2 is definitely a separate service class. Video is not possible at all with best effort delivery.

Chan: Come back to Don's comment. Work as fast as possible. May not be desirable. Assumption of under loaded system is not correct.

Michael: Refers to first motion to rename terms. Asynchronous Service to Best Effort. Mixes time with error. Asynchronous is a time term. Best effort includes error characteristics. Maybe a time bounded best effort system may do fine, since dropping an image is not big deal once in a while. Thinks names should be rethought.

Tim: Yes, understand. There is a loss requirement for both services - including time based.

Jim: Get back to Dave's comment. He sees fuzzy line between 1 and 2. I see fuzzy line between 2 and 3. Same knobs twiddling in both, but just different values.

Tim:

Larry: Distinction between things we have to buy new equipment for verses acceptable performance. today. ATM relies on the mega-bandwidth of the link and uses some overhead to reserve and prioritize data values. BW is limited, some things are going to have to get shed. Are we going to get acceptable performance. from best effort is Dave's question? Reservation would be there to insure class of time bounded services get delivered.

Simon: Gets back to line between 1 and 3. Don't see need to distinguish. Only the data type differs. If I call up a large file - I want just as quick service as if I called up a video image. There is no difference.

Paul: Distinction between 2 and 3 is delay and bandwidth are different. In 3 the variance is less of a constraint

Don: Concerning 1 and 3: Always have BW limits. Choose to use class 1 only, as BW decreases, delay increases. As you use class 2 more and more, you get blocking (denial of service).

Vic: Stop conversation due to time limit. Issue 15.9 will be worked on in the small group on Time bounded as well as motion (withdrawn) to change terms.

Next is document **92/96: Tom Phinney paper on Fieldbus MAC/PHY interface** presented by Larry. Paper states set of service primitives between PHY and MAC or more formally, the Data Link Layer. It includes several classes of PHY characteristics - interlocking primitives. These are:

- PHY_Data_Req (Class Data)
- PHY_Data_Ind (Class Data)
- PHY_Confirm (Class status)
- Start of activity
- Data
- End of Data
- End of Activity
- End of Data and Activity

There is some question as to whether we should maintain two SAPs in this interface. There is a synchronization issue with two - we much insure this. Perhaps we should have one SAP that conveys the Parameter Control Vector (PCV) and data.

François: How handle FCS error?

Larry: pass it up to MAC is one alternative

Paul Congdon: Likes primitives. How do monitor function like LBT?

Larry: Through the PCV. This will have the receive power level.

Dave: Is there an assumption of amount of time between Cmf on Start of Act. and Data?

Larry: These primitives are assumed to be continuous. When they are not, errors occur.

PHY Group intends to follow this model and work on definition of primitives. This afternoon, we will work on NPRM comments.

Rich Lee: Straw poll to group. Is it the right direction for group to follow this document as a model? 16 for, 0 oppose, 5 abstain. (There are about 30 people in room..)

Lunch Break: 12:15 pm, reconvene at 1:50 pm

Start with presentation of Wim's document **92/106**. Discusses several **aspects of the etiquette being developed by WINTech within WINForum**. Introduces WINForum. See presentation foils. FCC has made two proposals within NPRM and asked for modifications from industry.

Dave: Makes point that we should NOT comment on this presentation or what WINForum is doing to the FCC. We should comment to the FCC based on our own thoughts. Uncomfortable about seeing this in 802.11.

General: Comments that interpret this presentation as "rules" are incorrect. Both the FCC NPRM and current WINTech document are only proposals (Straw men) subject to change and most certainly will be changed in more than one aspect before approved.

Wim's analysis of the WINTech proposal show a DLBT (Dynamic Listen Before Talk) "defer" threshold margin of 24 dB. (Makes listed assumptions) Defer thresholds range from 80 dBm to 100 dBm for 100 kbit/s to 10 Mbit/s systems

Larry: This is great, BUT.... You haven't shown any sigma information around your curves which show us the penalty we are paying for working with averages. Worried that what is shown will give much lower rule for Mbit/s/hectare than we could really do. Absolutely convinced that if you use LBT in any way, you will waste good opportunities to talk and thus waste bandwidth.

Chuck: We're in a fading environment.

Larry: The fallacy is that we are in a fading environment since over such a short distance the environment can totally change. You don't find out as much as you might think by listening at any one location. There will be a capture effect in many cases which will improve the situation. A slotted-Aloha scheme may be the most efficient scheme. To suggest LBT to the FCC is not correct.

John: Assume you are correct. You should orient this input to the FCC, not Wim. Wim is predisposed toward the suggestions already made by the FCC since they will more likely accept this.

Chan: Agree, more is to be lost by LBT, than is to be gained, however my method of reaching this conclusion is different. Experience from cellular is that new sites are located between the old, without ref. to the theory .. and they work. Should you accept the loss from accidentally stepping on another, or to accept the loss from not communicating when you could have. Believe the loss from deferment exceed the losses from interference.

Wim: Yes, if you have a recovery mechanism from errors.

Michael: Agrees partially with Larry. However, Thinks LBT is good. The problem is to make a more "intelligent" squelch. What would FCC like to see?

Wim: Rules should be simple. Efficiency is important as measured by Mbit/s/hectare/Hz(/watt)

Don: Appears that if you use DLBT, there is an effect on the coverage range. Don't want a 100 kHz. system jamming a 10Mb/s system.

Larry: 10 Mbit/s guy shouldn't see the 100 kbit/s guy at all - especially with capture effect.

Wim: Does not agree.

Chuck: Glad someone took time to do this, since created good discussion. This is the kind of stuff the IEEE needs to put into its comments to the FCC.

---Back to the presentation.

Coexistence of 1 Mbit/s and 10 Mbit/s systems pose interesting problems and effects. LBT time is a 10:1 ratio different. Systems become somewhat unpredictable. 1 Mbit/s will operate for a while and 10 Mbit/s will operate for a while - due to collisions.

Don: Contends that a 20 dB difference between 100 kbit/s and 10 Mbit/s will interfere and the 10 Mbit/s system will not be successful as Larry believes.

Larry: Disagrees... Assuming some 18 dB margin for successful communication. This is overly restrictive.

Stopped for Break: 3:30 pm -- 3:50 pm

Wim finishes his presentation. See foils for conclusions.

Chan: Under high load in channelized system, the total throughput will decrease as compared to a wide band system.

Wim: Agrees, the spectral density will decrease....

Richard: Without channelization, can't use LBT - agree. But you draw conclusion that you must use LBT with channelization. It not possible that some other protocol would serve the needs of the FCC?

Wim: We are not defining a protocol, rather an etiquette. Foils will be added to doc. 106 as an annex.

John: How do you avoid the criticism that you are "too polite" in not transmitting.

Wim: This is a trade-off needing more study. However I would refer you to my last contribution on dynamic power control.

Paul: We seem to be saying go ahead...Do you want 802.11 to back WINForum's position, or are we going to draft our own comments.

Dave: Dangerous to ask FCC to enforce a protocol as a law. Different than their nature. It also provides bad conformance problem to them. There is zero probability that between now and the end of year (that is the time all this may be finished) that we can draft a protocol acceptable to more than three of you!

Larry: FCC giving us 10 MHz. is not much.

Jim: Don't want to rubber stamp WINForum position as put forth by Wim. Worried that LBT will preclude time bounded services. What is process for drafting the 802.11 comments.

Dave: There are other things we can comment on to FCC. We need to focus on those things we can agree on. Let's not lose opportunity to submit comments.

Jim: Agrees completely

François Simon, IBM: Presents **THE Draft Standard**. With the help of others, he has put together a skeleton draft document. It is based on 802 document rules and includes very little. Has a draft table of contents proposed by Larry. The model is in as well as the definitions. An appendix is a copy of the Functional Requirements. I don't think this is controversial since this is all stuff we have agreed with previously. This is the place that resolved issues go. As issues are closed, the relevant text is transferred from the Issues Document to the Draft Standard. Asking for your approval.

Dave: This is a great thing. Missing this for a while. Gives us a place to record our thought process. This the container to put our conclusions into.

Chan: Agrees with Dave.

No objections! Document will be copied for all after a number is assigned.

Break into MAC and PHY Working Groups. 4:30 pm