Issue Identification: 4.5 (Topic: Network Types).

Can a station be a member of an ad-hoc and non-ad-hoc network at the same time?

Alternatives:

1) - Yes
2) - No
3) - May be

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol

2) - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

Arguments:

General:

1.0) - To be true it must be a single channel.
2.0) - It could always be implemented using Sleep function.
3.0) - Wired networks do not allow this (but wireless networks could).

Pro:

1.1) - There is a need for the standard to support this alternative.

1.2) - Yes. Station A can be registered with a controller/AP, and associated with that AP - a member of an infrastructure network. Station B may be registered with that controller/AP, but not associated with the AP, it is registered only for the purpose of conversing with other wireless stations - it is not a member of the infrastructure network. These two stations can converse without station A having to disassociate from the AP, so it retains its membership in the infrastructure network while forming an ad-hoc network with station B.

2.1) - Multiple association has security impacts.

2.2) - At any point in time a STA is a member of one, and only one, BSS. A STA may be within range of both types of networks, but will participate in one or the other.

3.1) - A strong market requirement as not been defined, and this requirement should not be a primary factor on the MAC protocol selection, neither should it delay the standardization process.

Con:

Related Issue Identification:

1) - 4.1 (Network Types)
2) - 4.3 (Network Types)

Issue Originator: Dave Bagby

Issue History:

January 1993: Date first opened.
March 1993: Alternatives #1 and 2 - Reference #1 - Argument_pro # 1.1, 2.1 and 2.2 - Attempt to close the Issue; failed in MAC group; result: yes-9, no-8, abstain-0.
May 1993: Reference #1 - Argument_pro #1.2
July 1993: Alternative #3, Argument-general #1.0 to #3.0 and Argument-pro #3.1

Issue Status: Open

Issue Identification: 6.10 (Topic: Security).

Shall the minimal Security algorithms set be expended to include a Privacy equivalent to wired LANs?

Alternatives:
1) - Yes

References:

Arguments:

General:

1.0) - Most users will require a level of security for their wireless LANs that they perceive to be equivalent to the physical security of their wired LANs. We must provide this at the MAC layer as customers cannot be required to retrofit existing LANs.

2.0) - The desired properties of a candidate encryption algorithm include but are not limited to:
a) - Strong (see General #1.0 above; is this a function of key size?)
b) - Self-synchronizing (loss of packets must not require re-synchronization).
c) - Efficient (must not significantly add to processing overhead)
d) - Exportable/ImportableLicensable according to IEEE guidelines.

Pro:

1.1) - Authentication is of little value without an integrity or confidentiality service. Confidentiality is often easier to implement.

1.2) - A common encryption algorithm is necessary for interoperability.

1.3) - Encryption, when done properly, can provide the services of confidentiality, integrity, and Authentication. Thus, return on investment is high.

Con:

1.1) - Known strong encryption algorithms:
a) - may need to be licensed;
b) - may be computationally complex; or
c) - may add excessive packet overhead.

1.2) - At this time, the privacy equivalent of wired LAN has not been quantified (e.g.; 20 bit, 40 bit key, etc).

1.3) - Known strong algorithms have problem with Export/Import restrictions.

Related Issue Identification:
1) - 6.4 (Security)
2) - 6.6 (Security)
3) - 6.9 (Security)

Issue Originator: D. Bagby

Issue History:
May 1993: Date first opened.
July 1993: Alternative #1. Argument-general #1.0 and #2.0, Argument-pro #1.1 to #1.3 and Argument-con #1.1 to #1.3.

Issue Status: Open

Issue Identification: 10.1 (Topic: Coordination).

~~What is a Coordination Function (CF) ?~~
What Coordination Function (CF) will be specified in the standard?

Alternatives:

1) - A Distributed Coordination Function (DCF).
2) - Point Coordination Function (PCF)
3) - Both, DCF and PCF (same alternatives as specified in Issue 10.2B).

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time Bounded MAC Protocol.

2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

3) - P802.11-93/10a1 - Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications (Draft)

4) - P802.11-93/3 - What are Adhoc Wireless LANs? - A Viewpoint.

5) - P802.11-93/70 - A distributed Access Protocol Proposal Supporting Time-bounded Services.

6) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

General:

1.0) - Selection is dependent on the selected MAC protocol or the protocol selection is dependent on the coordination alternative selected.

2.0) - Proposed to change the CF definition (see Reference #3). CF should include protocol flow control of all contention resolutions (Slotted aloha / CSMA) and also data packet delivery for local network management and interface to the access point.

3.0) - The current definition of CF should be retained (see Reference #3).

Pro:

1.1) - A DCF should be specified as the default mode of operation. A DCF is simple to implement, sufficient for asynchronous service, and well suited to ad-hoc networks. A PCF should be added as an optional extension when Time-bounded service is required. The WHAT protocol (Reference #1) is an example of this approach.

1.2) - A DCF should be specified as the primary mode of operation. A DCF based on CSMA/CA + Ack as proposed in this document (Reference #2) has good medium sharing characteristics without added control overhead. The throughput efficiency is high and stable for high loads. It is well suited for Ad-Hoc operation, and allows overlap of infrastructure and Ad-Hoc, even on the same channel. It does fully support single channel PHY's.

1.3) - DCF facilitates ad-hoc networks better because it does not require a controller (From Alternative 2b of Issue 10.3 (Reference #2)).

1.4) - DCF is lower overhead and possibly lower access delay (in small population BSAs) (From Alternative 2e of Issue 10.3 (Reference #2)).

2.1) - A PCF can be built on top of the proposed CSMA/CA access method (Reference #2), allowing full coexistence and efficient sharing between Asynchronous and Time Bounded Services. Reserved but unused Isochronous bandwidth is fully available for the Asynchronous service, without any control overhead. The proposed Time Bounded Service (Reference #2) implementation using the CSMA/CA access method with priority does not burden the implementation of an Asynchronous Service only MAC.

2.2) - It is easy to manage the assignment of PCF in ad-hoc networks (see Reference #4).

2.3) - PCF lends itself to network planning topology.

2.4) - Having PCF access to the media can be tailored to the traffic nature of channel utilization optimization.

2.5) - PCF lends itself to power management.

2.6) - The quality of Time-bounded service is higher with PCF than the one provided by DCF.

2.7) - PCF is required for Time-bounded services (TBS) support (From Alternative 2a of Issue 10.3 (Reference #2)).

2.8) - PCF is better for high population networks, deterministic media access to avoid collisions (From Alternative 2d of Issue 10.3 (Reference #2)).

3.1) - By using DCF as the basic CF, with a PCF on top of it for Time Bounded service, there is no issue related to overlap of Ad-Hoc and infrastructure networks. For the same reason there is no issue for the MAC to operate on a single channel PHY, because of the medium sharing characteristics of the DCF (From Argument-pro 1.1 of Issue 10.3 (Reference #2)).

Con:

2.1) - There are difficulty to manage the assignment of PCF in ad-hoc network

2.2) - It is very difficult to manage assignment of PCF in a mobile station in a high mobility situation.

2.3) - Ad-hoc network require special function to become the PCF, opposed to the DCF which does not require any special function.

Related Issue Identification:

1) - 10.2B (Coordination)
2) - 10.3 (Coordination)

Issue Originator: Larry Van Der Jagt

Issue History:

May 1992: First opened
July 1992: Rephrase the Issue
March 1993: Alternative #1 - Reference #1 - Argument_pro # 1.1
May 1993: Alternative #2 - Reference #2 - Argument_pro #1.2 and #2.1
July 1993: Alternative #3, Argument-general #1.0 to #3.0, Argument-pro #2.2 to #2.8 and #3.1, Argument-con #2.1 to #2.3 and References #3 to #6.

Issue Status: Open

Issue Identification: 10.2 (Topic: Coordination).

What are the event that causes switching between multiple Coordination Functions (CF) ?

Does multiple Coordination Functions (CF) need to be specify ?

Alternatives:

References:

Arguments:

General:

1.0) - Splitting of the Issue into 2 related issues:

10.2A - What are the event that causes switching between multiple Coordination Functions (CF) ?

10.2B - Does multiple Coordination Functions (CF) need to be specify ?

Pro:

Con:

Related Issue Identification:

1) - 10.1A - (Coordination)
2) - 10.1B - (Coordination)

Issue Originator: Larry Van Der Jagt

Issue History:

May 1992: First opened

Issue Status: Open

Issue Identification: 10.2A (Topic: Coordination).

What are the event that causes switching between multiple Coordination Functions (CF)?

Alternatives:

1) The following functions causes switching between multiple CFs:

- Hand-off: The process of passing control of the Mobile Station's activities from one Coordination Function to another, whether or not the Coordination Functions are members of the same Administrative Domain or not.

- Ranging: The act of a Mobile Station which is transiting from one Service Area to another while Signed-on and in session.

- Roaming: A form of Registration used for Mobile Stations which will use a network on a temporary basis.

2) - There are no multiple CF's needed as basic access method.

3) - Switching from Distributed Coordination Function (DCF) to Point Coordination Function (PCF).

References:

1) - P802.11-92/126 - The Use of Terms for Expressing the Concepts of "Roaming", "Hand-off", "Registration" and "Identification" in WLAN Systems.

2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

Arguments:

General:

1.0) - If the coordination function Alternative selected in Issues 10.1 and/or 10.2B (Related Issues #2 and #3) is 'both' PCF and DCF, than the text of this Issue should changed to 'What event causes a Basic Service Set (BSS) to switch between PCF and DCF?'

2.0) - A new Issue should be open (Related Issue #4) which states 'What are the events that causes a station to switch BSS within an ESS?'.

Pro:

2.1) - A Point Coordination Function (PCF) can be used as described for the Time Bounded Service (Reference #2), but it is built on top of the DCF. So the DCF is the basic CF. Therefore Switching is not applicable.

3.1) - Request for Time-bounded service from a station to a controller which supports Time-bounded services.

3.2) - Detection of high traffic causing high rate of collisions.

Con:

Related Issue Identification:

1) - 10.2B (Coordination)

2) - 10.1 (Coordination)

3) - 10.2B (Coordination)
4) - 10.5 (Coordination

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Alternative #1 and Reference #1.
May 1993: Alternatives #2 and #3 - References # 2 and #3 - Argument_pro #2.1, #3.1 and #3.2.
July 1993: Argument-general #1.0 and #2.0 (decision to open a new Issue 10.5)

Issue Status: Open

Issue Identification: 10.2B (Topic: Coordination).

Do multiple Coordination Functions (CF) need to be specified?

Alternatives:

1) - Yes

2) - See Alternative #2 of Issue 10.2A

3) - Both Distributed Coordination Function DCF) and Point Coordination Function (PCF)

References:

1) - P802.11-92/126 - The Use of Terms for Expressing the Concepts of "Roaming", "Hand-off", "Registration" and "Identification" in WLAN Systems.

2) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

Arguments:

General:

1.0) - It is proposed to close this Issue because the Issue is addressed as an Alternative of Issue 10.1 (Both PCF and DCF should be specified in the standard) (see Related Issue #2).

Pro:

2.1) - See Alternative_pro #2 of Issue 10.2A

3.1) - Both Distributed Coordination Function (DCF) and Point Coordination Function (PCF) are required to support efficient operation with network size independence for asynchronous service. PCF is required for TBS, but this should not be forced on small population and ad-hoc networks.

Con:

Related Issue Identification:

1) - 10.2A (Coordination)

2) - 10.1 (Coordination)

Issue Originator:

Issue History:

May 1992: First opened

November 1992: Alternative #1 and Reference #1

May 1993: Alternatives #2 and #3 - Reference #2 and #3 - Argument_pro #2.1 and #3.1

July 1993: Argument_general #1.0 proposing to close the Issue at the September 1993 meeting.

Issue Status: Open

Issue Identification: 10.3 (Topic: Coordination).

What are the issues surrounding the Point Coordination Function (PCF) and Distributed Coordination Function (DCF) arguments ?

Alternatives::

1) - No issue related to overlapped ad-hoc and infrastructure network.

2) - The following is a list of issue addressing the overlapped of ad-hoc and infrastructure network:
a) - PCF is required for Time-bounded services (TBS) support.
b) - DCF facilitates ad-hoc networks better because it does not require a controller.
c) - PCF is better than DCF for minimizing power consumption of portable stations.
d) - PCF is better for high population networks, deterministic media access to avoid collisions.
e) - DCF is lower overhead and possibly lower access delay (in small population BSAs).

References:

1) - P802.11-93/70 - A Distributed Access Protocol Proposal Supporting Time Bounded Services.

2) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol

Arguments:

General:

1.0) - The alternatives and arguments of this are directly related to Issue 10.1. Therefore, the Alternatives and Arguments of this Issue are transferred to Issue 10.1 and closure of this Issue is recommended.

Pro:

1.1) - By using DCF as the basic CF, with a PCF on top of it for Time Bounded service, there is no issue related to overlap of Ad-Hoc and infrastructure networks. For the same reason there is no issue for the MAC to operate on a single channel PHY, because of the medium sharing characteristics of the DCF.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 and #2 - References #1 and #2 - Argument_pro #1.1.
July 1993: Argument_general #1.0 proposing to close this Issue at the September 1993 meeting.

Issue Status: Open

Issue Identification: 10.4 (Topic: Coordination).

- What are the requirements concerning service area ?

Alternatives:

Arguments:

General:

1.0) - As no special requirement for service area, which are not already specified for Basic Service Set (BSS), can be identified, closure of this Issue is recommended.

Pro:

Con:

Related Issue Identification:

1) - 10.2A (Coordination)

Issue Originator:

Issue History:

May 1992: Date first opened

July 1993: Argument_general #1.0 proposing to close the Issue at the September 1993 meeting.

Issue Status: Open

Issue Identification: 10.5 (Topic: Coordination).

- What are the events that causes a station to switch Basic Service Set (BSS) within an Extended Service Set (ESS)?

Alternatives:

1) - The following functions causes switching between multiple BSSs:
   a) - Change in quality of service (QOS):
      i) - Hand-off
      ii) - Ranging
      iii) Roaming
   b) Explicit station configuration changes:
      i) - User initiated request
      ii) BSS Management
   c) - Both, changes in QOS and station configuration changes

Arguments:

General:

Pro:

Con:

Related Issue Identification:

Issue Originator: Alex Belfer

Issue History:

July 1992: Date first opened and Alternative #1

Issue Status: Open

Issue Identification: 12.1 (Topic: Interfaces).

What is the MAC/PHY interface ?

Alternatives:

1) - A Parametric MAC-PHY Interface Model (Document P802.11-92/99). The paper defines a first cut of defining 'a universal MAC structure, or "load-able" state machine topology. The initial means to conceptualize this MAC structure is by defining a set of PHY independent primitives at the MAC-PHY interface'.

2) Document P802.11-92/100 - Proposed WLAN Architecture.
The paper addresses the following interfaces and Service Access Points (SAPs):
- MAC/PHY logical interface with a MAC-PHY / Medium Independent PHY Layer SAP boundary and a Local Management (PHY specific) / Medium Independent PHY Layer SAP boundary..
- DTE/DCE Interface optional exposed at the Medium Independent PHY Layer / PHY boundary

3) Document P802.11-92/125 - MAC/PHY Interface Specifics in Support of the Use of a Parameter Service Access Point Approach to PHY Independence.
This paper proposes "two Service Access Points between the MAC and PHY":
- The Data Service Access Point (DSAP). It "supports the transmission of normal data packets called MAC Protocol Data Units (MPDU)".
- The Parameter Service Access Point (PSAP). It "supports interactions between the MAC and PHY that can happen on a frame by frame basis in order to improve the ability of stations to access the medium.

4) - Separate data a..l Management paths support the Data Service Access Point (DSAP and the parameter Service Access Point (PSAP).

References:

1) P802.11-92/99 - A parametric MAC-PHY Interface Model
2) P802.11-92/100 - Proposed WLAN Architecture
3) P802.11-92/125 - MAC/PHY Interface Specifics in Support of the Use of a Parameter Service Access Point Approach to PHY Independence.

Arguments:

Pro: -

1.1) - The solution proposed (P802.11-92/99) 'is put forward to overcome the dependency of MAC in PHY implementation techniques. In this way, the idea of a universal MAC can accomplished. The solution also frees the constraints placed on the system implementors to adopt a particular FY (?) structure so as to utilize the common MAC hardware. Thus, diverse PHY media such as IR, Sonics and Radio can benefit from the scale economy in the MAC hardware production.

2.1) - This paper (P802.11-92/100) captures the sense of the July [1992] discussion.

3.1) - The solution proposed (P802.11-92/125) that with 'this simple method a significant amount of flexibility is introduced into the MAC/PHY interface and into the MAC's ability to successfully achieve media access':
- Low cost in terms of MAC complexity
- Flexibility to take advantage of emerging technologies
- Critical to achieving the operation of multiple PHYs using a single MAC.

4.1) - It is agree with support of the parametric MAC-PHY interface model in concept if not in detail. A similar model of this type of interface is the PCMCIA Socket Services.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
November 1992: Alternatives #1, 2 and 3, Argument-pro #1, 2 and 3 and References 1 to 3.
July 1993: Alternative #4 and Argument_pro #4.1.

Issue Status: Open

Issue Identification: 12.9 (Topic: Interfaces).

Should data and control information be passed simultaneously across the MAC / PHY logical interface ?

Alternatives:

1) - Yes
2) - No

Arguments:

Pro:

1.1) - It was decided that there should be two separate, independent, bidirectional information paths between the MAC and PHY, one for data and one for management/control. This implies that data and control information can be passed simultaneously.

Con:

Related Issue Identification:

Issue Originator: Dave Bagby

Issue History:

May 1992: Date first opened
July 1993: Alternative #1 and #2 and Argument_pro #1.1.

Issue Status: Open

Issue Identification: 13.3A (Topic: Management).

What support will the standard provide for DC power management?

Alternatives:

1) - Implementation dependent
2) - The MAC should provide specific Power Management Functionality such as:
   a) - Temporary buffering functions
   b) - Transmitter and receiver synchronization

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

2) - P802.11-93/94 - The Importance of Power Management Provisions in the MAC.

Arguments:

Pro:

1.1) - Some implementations are more concerned with power consumption than others. The CODIAC protocol (Reference #1) allows implementations to trade off power consumption requirements with overhead and access delay. These features are described in the main text of this document.

2.1) - The MAC should provide specific Power Management functionality like temporary buffering and transmitter and receiver synchronization, to allow stations to go into sleep without loss of service.

Con:

1.1) - See Argument-pro #2.1

Related Issue Identification:

1) - 13.3 (Management)
2) - 13.6 (Management)

Issue Originator: C. Heide

Issue History:

May 1993: Date first opened - Alternative #1 - Reference #1 - Argument_pro #1.1.
July 1993: Alternative #2, Reference #2, Argument_pro #2.1 and Argument_con 1.1.

Issue Status: Open

Issue Identification: 16.9 (Topic: Mobility).

- What are the requirements of the following functions related to Station Mobility ?
  - Coordination in ESS
  - Security
  - Management
  - Location

Alternatives:

1) - Network Layer Requirements - There are two basic requirements:
   a) - MAC Layer address of any Base Station from which the mobile station is currently associated.
   b) - The network layer should be notified whenever the mobile station experiences either an Association or a De-association event with respect to the Base Station.

References:

1) - P802.11-93/64 - Network Layer Requirements

Arguments:

Pro:

1.1) - There are two basic requirements from the network layer related to Mobility:

a) - The Network Layer protocol running in the Mobile Station should be able to obtain the MAC Layer address of any Base Station from which the mobile station is currently accepting service, if that MAC layer address is available to the MAC layer protocol.

b) - The Network Layer should be notified whenever the Mobile Station experiences either an Association event, or a De-association event, with respect to the Base Station.

With these two provisions, the protocol above Layer 2 can more effectively take the appropriate measures to insure continuous network connectivity.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1, Reference #1 and Argument-pro #1.1

Issue Status: Open

Issue Identification: 17.5 (Topic: Addressing).

What is meant by addressing?

Alternatives:

1) - Size
2) - IEEE 802
3) - Media Link Framing (MLF) address (Reference #4)

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol

2) - P802.11-93/22 - Further Exploration of Transactions and Name Spaces

3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

4) - P802.11-93/61 - Wireless LAN MAC Protocol: MAC-to-MAC Interface.

Arguments:

Pro:

2.1) - Wireless Stations should be identified by 48 bit unique IDs that are compatible with other IEEE 802 standards. All asynchronous service MPDUs carry the full 48 bit address in the WHAT protocol (see Reference #1). Time-bounded MPDUs use a short local identifier. However, the Call Setup message for Time-bounded connections contains the full 48 bit addresses of the source and destination.

2.2) - IEEE 802 addressing is required (supports the position of document 93/40 on the WHAT protocol - Reference #1). Wireless stations should be identified by 48 bit unique IDs that are compatible with other IEEE 802 standards. The 48 bit addresses of source and destination stations are contained in the four step transaction of the CODIAC protocol (Reference #3).

3.1) - With a one byte coding, there exist 255 different MLF addresses. This set is divided into several subsets according to table 2 of paper P802.11-93/61 (see Reference #4). The justification of defining some addresses ranges for Access Point(AP), for mobile stations and ad-hoc network are:

a) - it speeds up the connection establishment time: indeed a Mobile Station willing to 'get in touch' with an AP can take into account only the MPDU packets originating from an AP.
b) - In the same time, if an ad-hoc network is co-located with other wireless networks, it helps to discriminate between both; a mobile station pertaining to an ad-hoc network can easily discard any information that does not originate from a station of the same ad-hoc network.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Reference #1 and 2 - Argument_pro #2.1
May 1993: Reference #3 - Argument_pro #2.2
July 1993: Alternative #3, Reference #4 and Argument_pro #3.1

Issue Status: Open

Issue Identification: 17.6 (Topic: Addressing).

- How does Global Addressing and Directory services affect the MAC ?
Editor's note: Ref: 69 (92/58R1)

Alternatives:

Arguments:

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened

Issue Status: Open

Issue Identification: 17.7 (Topic: Addressing).

- Does the MAC supply a packet number to the PHY ?
Editor's note: Ref: 81 (92/58R1)

Alternatives:

Arguments:

Pro:

Con:

Related Issue Identification:

- 12.1 (Topic: Interfaces)

Issue Originator:

Issue History:

May 1992: First opened

Issue Status: Open

Issue Identification: 18.1 (Topic: Data Rates).

Should the MAC work equally well at all PHY data rates ?

Alternatives:

1) - Yes
2) - No

Arguments:

Pro:

1.1) - It is known now that all the PHY data rates are going to be about 1 Mbps as opposed to the original PAR range of 1-20 Mbps. Therefore this question isn't relevant until the state of the art of the PHY layers advances.

Con:

Related Issue Identification:

1) - 18.2 (Data Rates)

Issue Originator:

Issue History:

May 1992: Date first opened
July 1993: Alternatives #1 and #2, Argument_pro #1.1 and Proposal to close the Issue at the September meeting by adopting Alternative #1.

Issue Status: Open

Issue Identification: 18.2 (Topic: Data Rates).

Will the standard support one MAC driving multiple PHYs of different rates ?

Alternatives:

1) - Yes
2) - No

Arguments:

Pro:

1.1) - If one accepts the PAR demand for one MAC and one accepts that the different MAC's may decide on different data rates then the answer is yes. Since we know that the range of data rates is small this should not present implementation problems.

Con:

Related Issue Identification:

1) - 18.1 (Data Rates)

Issue Originator:

Issue History:

May 1992: Date first opened
July 1993: Alternatives #1 and #2, Argument_pro #1.1 and proposal to close the Issue at the September meeting by endorsing Alternative #1.

Issue Status: Open

Issue Identification: 18.3 (Topic: Data Rates).

Will the standard support PHY with variable rates ?

Alternatives:

1) - Yes
2) - No

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

Arguments:

Pro:

1.1) (See Reference #1) - RSYNC frames could be issued at different rates within a superframe, or different superframes could be issued. PSYNC could be issued at one rate while communication was going on at another.
Little consideration has been given to this issue at this time. However, this is a very important issue. First generation wireless LANs will be released at lower speeds than forthcoming generations, but they must coexist - it is not desirable tell customers they must upgrade their equipment because the company across the hall installed a newer, higher speed LAN.

1.2) - This group (July 93 'Data Rate' work group) can see no reason why the MAC should not support a PHY that is capable of operation at more than one rate. As we see the 802.3 parameter being changed to be specified in bits so that it is data rate independent so 802.11 should prepare for multiple data rates by scalable specifications.

Con:

Related Issue Identification:

1) - 18.2 (Topic: Data Rates)

Issue Originator:

Issue History:

May 1992: Date first opened
May 1993: Alternative #1 - Argument_pro #1.1
July 1993: Alternative #2, Argument_pro #1.2 and proposal to close the Issue at the September 1993 meeting by endorsing Alternative #1.

Issue Status: Open

Issue Identification: 18.4 (Topic: Data Rates).

Will the standard allow PHY data rate to vary as function of signal quality ?

Alternatives:

1) - Yes
2) - No

Arguments:

General:

1.0) - If the standard allows PHY data rate to vary, the criteria for changing should be up to the implementer.

2.0) - The PHY data rate may be varied if the PHY is capable of multiple rates (see Issue 18.3). However, if the issue means 'can the PHY make its own decision to adjust data rate based on signal quality' then the answer is NO. The MAC may decide to tell the PHY to change data rate based on signal quality indication.

Pro:

Con:

Related Issue Identification:

1) - 18.3 (Data Rates)
2) - 18.5 (Data Rates)

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Argument_general #1.0
July 1993: Alternative #1 and #2 and Argument_general #2.0.

Issue Status: Open

Issue Identification: 18.5 (Topic: Data Rates).

Is data rate 'agility' only a PHY matter ?

Alternatives:

1) - No
2) - Yes

Arguments:

Pro:

1.1) - If stations are functioning at various speeds the MAC must maintain (somehow) the mapping of stations to speeds because the PHY cannot interpret address fields on MSDUs.

1.2) - The standards for different PHY's may specify multiple data rates or a fixed data rate. However the decision to operate at or change data rates (for multiple rate PHY's) is made by the MAC.

Con:

Related Issue Identification:

1) - 18.4 (Data Rates)

Issue Originator:

Issue History:

May 1992: First opened
May 1993: Alternative #1 - Argument_pro #1.1.
July 1993: Alternative #2 and Argument_pro #1.2.

Issue Status: Open

Issue Identification: 18.6 (Topic: Data Rates).

How is data density affected by the bit rate (1 to 20 mbit/s) ?

Alternatives:

Arguments:

General:

1.0) - The Issue is viewed as meaningless and it is proposed to close it.

Pro:

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: Date first opened
July 1993: Argument_general #1.0 proposing to close the Issue at the September 1993 meeting.

Issue Status: Open

Issue Identification: 19.5 (Topic: Reliability).

What kind of error recovery mechanisms are to be incorporated into the MAC ?

Alternatives:

1) - Positive ACK with low retries.
2) - Segmentation and Reassembly procedures

References:

1) - P802.11-93/40 - The Wireless Hybrid Asynchronous Time-bounded MAC Protocol

2) - P802.11-93/70 - A distributed Access Protocol Proposal Supporting Time Bounded Services

3) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

4) - P802.11-93/61 - Wireless LAN MAC Protocol: MAC-to-MAC Interface

Arguments:

Pro:

1.1) - The 802.11 MAC should include a positive acknowledgement protocol with low level retries. This mechanism helps the MAC present approximately the same level of MSDU delivery reliability as other IEEE 802 protocols.

1.2) - Since the wireless medium is interference limited rather than noise limited, MAC level recovery is needed to restore the delivery reliability level to that defined by 802. This can not be accomplished by PHY level recovery.
Note that MAC level recovery is not particular to Broadcast/Multicast frames, which will result in a lower delivery reliability than the one specified in 802.

2.1) - The segmentation of Mac Service Data Unit (MSDU), among other reasons (see Reference #4), increase the probability of successful data transmission. Detailed error rate figure are specified in Reference #4.

Con:

Related Issue Identification:

Issue Originator:

Issue History:

May 1992: First opened
March 1993: Alternative #1 - Reference #1 - Argument_pro #1.1.
May 1993: References #2 and #3 - Argument_pro #1.2.
July 1993: Alternative #2, Reference #4 and Argument_pro #2.1

Issue Status: Open

Issue Identification: 20.3 (Topic: Data Unit Structure).

What is the MAC frame structure ?

Alternatives:

1) - The use of ATM as a sub-mac frame structure for wireless LAN. Contentions:
- Time Bounded services must have a guaranteed bandwidth mechanism.
- ATM is one such wired (fiber) LAN structure meeting this.
- WLAN must be able to work with ATM backbones.

2) - All frames of the CODIAC protocol proposal (Reference #1) have the following format:

a) - Preamble: 8n bits where n is to be determined
b) - Start delimiter (SD): 8 bits
c) - Destination Identifier (DID): 16 bits
d) - Frame Type (Type): 8 bits
e) - Control flags (Control): Access Point (AP), Sequence, Out-of-sequence, Retry, Hierarchical - 8 bits
f) - Information (Info): optional - 8m where 0 < = m < = to be determined.
g) - Frame Check Sequence (FCS): CRC 32 - 32 bits
h) - End Delimiter (ED): 8 bits

Notes:
i) - Minimum frame length (12 + n) octets
ii) - CRC coverage: Fields c) to f) included.
iii) - For details refer to Reference #1, section 4. - Frame Format

3) - The framing of the Wireless LAN MAC protocol (IBM Proposal) (Reference #2) has the following format:
- a) Start frame delimiter (SFD) -- Size: 8 bits - Value: X'7E'
- b) Destination Address (DA) -- Size: 8 bits - Value: variable
- c) Source Address (SA) -- Size: 8 bits - Value: variable
- d) Control Field (C) -- Size: 32 bits - Value: variable
- e) Data Length Field (L) -- Size: 8 bits - Value: variable
- f) Information Data (Data) -- Size: Variable - Value: Variable
- g) Frame Check Sequence (FCS) -- Size: 16 bits - Value: variable
- h) End Frame Delimiter (EFD) -- Size: 16 bits - Value: X'7E7F'

References:

1) - P802.11-93/54 - The CODIAC Protocol - Centralized or Distributed Integrated Access Control (CODIAC), A Wireless MAC Protocol.

2) - P802.11-93/61 - Wireless LAN MAC Protocol: MAC-to-MAC Interface

Arguments:

Pro:

1.1) - Bandwidth on demand - more efficient for MPEG for instance which as a reliable bit/sec. rate.

1.2) - Maps easily for future WANs (B-ISDN based).

1.3) - It is "modern & new".

2.1) - The frame structure is designed with the following goals:
(1) - to minimize the frame size while keeping a consistent frame structure;
(2) - to have a minimum size destination identifier at the start of the frame to allow destination determination of frames as quickly as possible;
(3) - to provide a level of error detection suitable to the high bit error rate of the wireless media.

3.1) - The advantage of having unique packet framing delimiters is twofold:
a) - The start frame and end frame delimiters can be used to automatically trigger in an RF/IR transceiver the start of transmission and the end of transmission.
b) - the uniqueness of packet frame delimiters allows to avoid false packet detection.

Con:

1.1) - ATM designs are based on two assumptions which are not true for WLAN:
- The bandwidth is plentiful (i.e. some efficiency can be sacrificed for self routing characteristics).
- The channel is reliable

1.2) - Use of specific ATM-MAC is an inefficient and unnecessary constraining structure for WLAN.

1.3) - Present frame based (fixed length) MAC proposal meets Time Bounded service needs.

Related Issue Identification:

Issue Originator: Jim Schuessler

Issue History:

May 1992: First opened
November 1992: Alternative #1, Argument-pro #1-1 to 1-3, Argument-con #1-1 to 1-3.
May 1993: Alternative #2 - Reference #1 - Argument_pro #2.1.
July 1993: Alternative #3, Reference #2 and Argument_pro #3.1.

Issue Status: Open

Issue Identification: 24.10 (Topic: PHY Types).

- What modulation scheme will be used for Slow Frequency Hopping (SFH) PHY?

Alternatives:
1) - GFSK

Arguments:

Pro:

1.1) - This is the simplest possible scheme consistent with 1 Mbit/s raw signalling rate and FCC Part 15.247.

Con:

1.1) - There may be schemes that offer higher raw signalling rates without.... (editor's note: The remaining of the text is missing from the document available to the editor)

Related Issue Identification:

Issue Originator: PHY Group

Issue History:

March 1993: Date first opened
July 1993: Alternative #1, Argument_pro #1.1, Argument_con #1.1 and decision to close the Issue by endorsing the Alternative (see Motion's text below) - Result: yes-30, no-4, abstain-7.

Motion:
All 802.11 2.4 - 2.5 GHz band Frequency Hopping PHYs shall be capable of operating using GFSK with BT = .5 and a minimum deviation of 160 Khz with a data rate of 1 Mbit/s.

Modulation techniques for higher data rates are for further study by 802.11 PHY committee.

A Means for negotiating a switch to higher data rates from the data rate defined above is also for further study.

Issue Status: CLOSE (07/93)

Issue Identification: 24.11 (Topic: PHY Types).

~~1) - How will Hopping synchronization, acquisition and tracking be accomplished in the Frequency Hopping (FH) and their terms defined?~~

2) - How will:
a) - synchronization, acquisition and tracking be accomplished when using Frequency Hopping (FH) PHY?; and
b) - their terms defined as they relate to FH?

Alternatives:

1) - The MAC makes decision related to PHY control when the appropriate information is only known by the MAC.

Arguments:

Pro:

1.1) - The MAC must make decisions regarding PHY control where information is used that only the MAC has.
The PHY will not interpret received information with the exception of any that is in the PHY header or any non-data symbols. All information received by the PHY will be passed to the MAC other than the PHY header and any non-data symbols.

The following synchronization and acquisition functions must be commanded by the MAC:
- some sort of timing reference,
- what pattern sequence is to be used,
- what state the PHY should be in (e.g. sync hunt, receiver on/off).

Con:

1.1) - The MAC should not directly control very time critical operations of the PHY or the MAC; implementation will be difficult.
Trying to control from the MAC all the FH parameters that some suggest, will make the MAC too complex and delay the standard too much. If the MAC must control these parameters, incorporate what is now the top PHY sub-layer into the MAC and don't worry that breaks with tradition.

Related Issue Identification:

Issue Originator: 802.11 PHY Group

Issue History:

May 1993: Date first opened
July 1993: New Issue text (#2), Alternative #1, Argument-pro #1.1 and Argument_con #1.1.

Issue Status: Open

Issue Identification: 24.12 (Topic: PHY Types).

What are the values in the Template defined in the current version of P802.11-93/83 (reference #1) related to Direct Sequence Spread Spectrum (DSSS) PHY?

Alternatives:

References:
1) - P802.11-93/83 - Draft Proposal for a Frequency Hopping and Direct Sequence Spread Spectrum PHY Standard.

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator: 802.11 PHY Group

Issue History:
July 1993: Date first opened

Issue Status: Open

Issue Identification: 24.13 (Topic: PHY Types).

What are the values in the Template defined in the current version of P802.11-93/83 (reference #1) related to Frequency Hopping Spread Spectrum (FHSS) PHY?

Alternatives:

References:
1) - P802.11-93/83 - Draft Proposal for a Frequency Hopping and Direct Sequence Spread Spectrum PHY Standard.

Arguments:
Pro:

Con:

Related Issue Identification:

Issue Originator: 802.11 PHY Group

Issue History:
July 1993: Date first opened

Issue Status: Open

Issue Identification: 25.7 (Topic: Channel).

How to coordinate spectrum use between Extended Service Set (ESS)?

Alternatives:

References:

Arguments:
Pro:

Related Issue Identification:

Issue Originator: B. Crowder

Issue History:
July 1993: Date first opened

Issue Status: Open