
**IEEE P802.11
Wireless LANs**

**Proposed Change in Method of
MAC Transmit At FH Dwell Boundary**

Date: January 10, 1996

Author: Ad-Hoc Group addressing PHY Recommendation

Background

Subclause 6.4 states "If, when transmitting or retransmitting a fragment, there is not enough time remaining in the dwell time to allow transmission of the fragment plus the acknowledgement, the station shall wait until after the next dwell boundary before transmitting or retransmitting that fragment."

This has the effect of concentrating transmission attempts immediately following the dwell boundary, which increase the probability of collisions.

This paper proposes small changes in the MAC and FH PHY dwell boundary processing to alleviate this situation.

Description of Proposed Change

When a STA decides it is ready to transmit - i.e. the NAV is clear, the medium is free, the backoff timer has expired - it evaluates whether there is enough time remaining in the dwell to send the pending fragment and receive an ACK in response.

If there is not enough time remaining in the dwell, the STA takes the following actions:

- 1) set the NAV for the time until the end of hop;
- 2) select a random backoff time, using the present CW (without incrementing to the next value in the series).

From this point on normal MAC mechanisms are followed. The backoff timer will not be decremented until the NAV expires, which will be following the hop. This will randomize transmission attempts, alleviating congestion after the hop.

During the hop the PHY will indicate CCA busy. This allows STAs to follow normal backoff procedures because the hop in progress appears to be an instance of medium busy.

Proposed Draft Text Changes

The majority of the changes fall into subclause 6.4 because that is where the description of action taken at dwell boundary currently resides.

6.2.5.4 Setting and Resetting the NAV

Change first sentence of first paragraph:

Reception of frames which contain a duration field ~~are the events that~~ shall set the NAV to a non-zero duration.

Add paragraph at the end of the subclause:

If, when transmitting or retransmitting a fragment, there is not enough time remaining in the dwell time to allow transmission of the fragment plus the acknowledgement, the NAV shall be to a duration that expires at the end of the hop time (the time remaining in the dwell plus the hop time).

6.4 Fragmentation

The MAC may fragment and reassemble MSDUs, directed and multicast/broadcast. The primary reason for fragmenting an MSDU is that it is larger than the PHY is capable of sending in one MPDU. The fragmentation and reassembly mechanisms allows for fragment retransmission.

The payload of a fragment shall be an equal number of octets for all fragments except the last. The payload of a fragment shall never be larger than aFragmentation_Threshold unless WEP is invoked for the MPDU.. However, it may be less than aFragmentation_Threshold for the last fragment of an MSDU. If WEP is active for the MPDU, then the MPDU will be expanded by IV and ICV (see clause 5.2), this can result in a fragment larger than aFragmentation_Threshold.

When data is to be transmitted, the number of octets in the payload (pre WEP processing) of the fragment shall be determined by aFragment_Threshold. Once a fragment is transmitted for the first time, its contents shall be fixed until it is successfully delivered to the immediate receiving station.

The number of data octets in the payload of a fragment shall depend on the values of the following variables at the instant the fragment is constructed for the first time:

- a) aFragment_Threshold
- b) The number of octets in the MSDU that have not yet been transmitted for the first time.

~~Since the control of the channel will be lost at a dwell time boundary and the station will have to contend for the channel after the dwell boundary, it is required that the acknowledgment of a fragment be transmitted before the station crosses the dwell time boundary. Hence, if there is not enough time remaining in the dwell time to transmit a fragment, the fragment shall not be transmitted~~

A station must be capable of receiving fragments of varying size.

If a fragment requires retransmission, its contents and length shall remain fixed for the lifetime of the MSDU at that station. After a fragment is transmitted once, contents and length of that fragment are not allowed to fluctuate to accommodate the dwell time boundaries. Each fragment shall contain a Sequence Control Field, which is comprised of a Sequence Number and Fragment Number. When a station is transmitting an MSDU, the Sequence Number shall remain the same for all fragments of that MSDU. The fragments shall be sent in order of lowest Fragment Number to highest Fragment Number, where the fragment number value starts at zero, and increases by one for each successive fragment. The Frame Control Field also contains a bit, the More Fragments bit, that is equal to zero to indicate the last (or only) fragment of the MSDU.

Since the control of the channel will be lost at a dwell time boundary and the station will have to contend for the channel after the dwell boundary, it is required that the acknowledgment of a fragment be transmitted before the station crosses the dwell time boundary. If, when transmitting or retransmitting a fragment, there is not enough time remaining in the dwell-time to allow transmission of the fragment plus the acknowledgment, the station shall defer the transmission by: ~~wait until after the next dwell boundary before transmitting or retransmitting that fragment.~~

- 1) setting the NAV to a duration that expires at the end of the hop time (the time remaining in the dwell plus the hop time);
- 2) selecting a random backoff time, using the present CW (without incrementing to the next value in the series).

The source station ~~shall~~will maintain a Transmit MSDU Timer for each MSDU being transmitted. The attribute aMax_Transmit_MSDU_Lifetime specifies the maximum amount of time allowed to transmit a MSDU. The timer starts on the attempt to transmit the first fragment of the MSDU. If the timer exceeds aMax_Transmit_MSDU_Lifetime then all remaining fragments are discarded by the source station and no attempt is made to complete transmission of the MSDU.

Clause 11

11.3.3.2 ????

