

**Proposed Revisions
to the
MAC Frame Formats
to
Support Wireless Distribution Systems**

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Abstract: This paper presents the changes to section 4 required to enable the use of 802.11 LANs as a distribution system for other 802.11 LANs sharing the same channel.

Action: Adopt the changes in this paper to replace the relevant portions of Section 4 of the current draft.

- 1. General**
- 2. General Description**
- 3. MAC Service Definition**

4. Frame and MPDU Formats

4.1. MAC Frame Formats

4.1.1. General Frame Format

The MAC frame format comprises a set of fields that shall occur in a fixed order in all frames. Some fields may be absent from some frame types.

A frame is an ordered octet string. The order of transmission of the octets of a frame shall be from left to right in the figures shown in this section

Figure 4-1 depicts the general MAC frame format and field order. The format of the MAC header for each of the frame types is defined subsequently. Following sections define each of the fields of the MAC header.

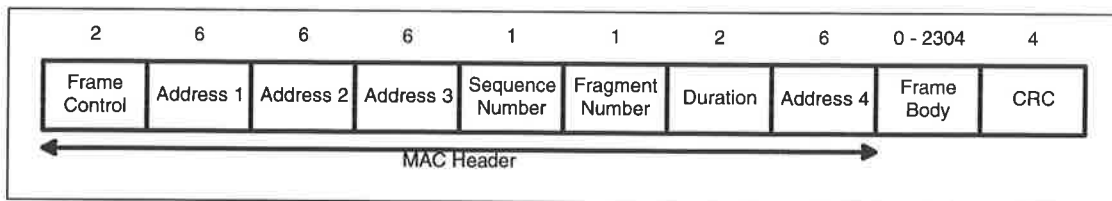


Figure 4-1: MAC Frame Format

4.1.2. Frame Fields

4.1.2.1. Frame Control Field

The Frame Control field shall consist of the following subfields: Protocol Version, Type, Subtype, To DS, From DS, More, Retry, and Power Management. The remaining subfields in the Frame Control field are reserved. All reserved bits and fields shall be sent as '0'. Reserved bits and fields shall be ignored on reception.

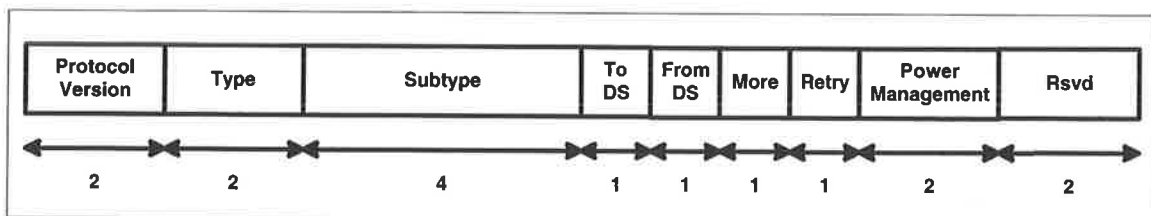


Figure 4-2: Frame Control Field

4.1.2.1.1. Protocol Version

4.1.2.1.2. Type and Subtype

4.1.2.1.3. To DS

This one bit field shall indicate that the frame is entering the distribution system in an infrastructure network. This bit shall be transmitted as a one only if the frame Type = Data and the the frame is entering the distribution system. It shall be transmitted as a zero, otherwise.

4.1.2.1.4. From DS

This one bit field shall indicate that the frame is exiting the distribution system in an infrastructure network. This bit shall be transmitted as a one only if the frame Type = Data and the frame is exiting the distribution system. It shall be transmitted as a zero, otherwise.

The possible To/From DS bit combinations are given in the following table:

To/From DS Values	Description
To DS = False From = DS False.	A Frame direct from one Station to another Station.
To DS = True From DS = False	Data Frame entering the DS.
To DS = False From DS = True	Data Frame exiting the DS.
To DS = True From DS = True	WDS frame being distributed From one AP to another AP.

Table 4-xx: To / From DS Combinations

4.1.2.1.5. More

4.1.2.1.6. Retry

4.1.2.1.7. Power Management

This two bit field shall indicate the power management state in which the station will be after the completion of the transmission of the frame. The values for this field are given in table 4-2.

Value	Description
00	CAM - Continuous Active Mode
01	PSP - Power Save, Polling
10	PSNP - Power Save, No Polling
11	TAM, Temporary Active Mode

Table 4-2: Power Management Values

4.1.2.2. Address Fields

There are four address fields in the MAC frame format. These fields are used variously to indicate the BSSID, source address, destination address, transmitting station address and receiving station address. The usage of the four address fields in each frame type will be indicated by the abbreviations BSSID, DA, SA, RA, TA indicating BSS Identifier, Destination Address, Source Address, Receiver Address and Transmitter Address, respectively. Some frames may omit some of the address fields.

4.1.2.2.1. Address Representation

Each Address field shall contain a 48-bit address as defined in section 5.2 of IEEE Std 802-1990.

4.1.2.2.2. Address Designation

A MAC Sublayer address is of one of two types:

- 1) Individual Address. The address associated with a particular station on the network.

- 2) Group Address. A Multidestination address, associated with one or more stations on a given network. There are two kinds of Group Addresses:
 - a) Multicast-Group Address. An address associated by higher-level convention with a group of logically related stations.
 - b) Broadcast Address. A distinguished, predefined multicast address that always denotes the set of all stations on a given local area network. All 1's in the Destination Address field shall be predefined to be the Broadcast address. This group shall be predefined for each communication medium to consist of all stations actively connected to that medium; it shall be used to broadcast to all the active stations on that medium. All stations shall be able to recognize the Broadcast Address. It is not necessary that a station be capable of generating the broadcast address.

The address space shall also be partitioned into locally administered and globally administered addresses. The nature of a body and the procedures by which it administers these global (U) addresses is beyond the scope of this standard. (Please refer to the IEEE Standard Overview and Architecture, IEEE Std 802-1990, ISBN 1-55937-052-1)

4.1.2.2.3. BSS Identifier

The BSS Identifier (BSSID) shall be a 48-bit field of the same format as an IEEE 802 MAC address. This field shall uniquely identify each BSS in an infrastructure LAN. The value of this field, in an infrastructure LAN, shall be the MAC address of the access point of the BSS. The mechanisms used to ensure the uniqueness of MAC addresses also create unique BSS Identifiers. The Individual/Group bit of the BSSID shall be transmitted as zero.

In an ad hoc LAN, this field shall be transmitted with the BSS ID of the ad hoc network. This field shall be a locally administered multicast-group address. The value of this field shall be chosen by the station that establishes the ad hoc LAN. Measures shall be taken in the selection of the value of this field to differentiate it from other ad hoc LANS in the vicinity.

4.1.2.2.4. Destination Address

The Destination Address (DA) field shall identify the IEEE MAC address of the station for which the frame is intended. This address may be either an individual or group address.

4.1.2.2.5. Source Address

The Source Address (SA) field identifies the IEEE MAC address of the station from which the frame was initiated. The Individual/Group bit shall always be transmitted as a zero.

4.1.2.2.6. Receiver Address

The Receiver Address (RA) field identifies the IEEE MAC address of the intended recipient of a wireless transmission. The Individual/Group bit shall always be transmitted as a zero.

4.1.2.2.7. Transmitter Address

The Transmitter Address (TA) field identifies the IEEE MAC address of the transmitter of a wireless transmission. The Individual/Group bit shall always be transmitted as a zero.

4.1.2.3. Sequence Number

4.1.2.4. Fragment Number

4.1.2.5. Duration

4.1.2.6. Frame Body

4.1.2.7. CRC

4.2. Format of Individual Frame Types

4.2.1. Control Frames

In the following descriptions, "immediately previous" frame means a frame, the reception of which concluded within the prior SIFS interval.

4.2.1.1. RTS Frame Format

The frame format for an RTS frame is shown in Figure 4-xx.

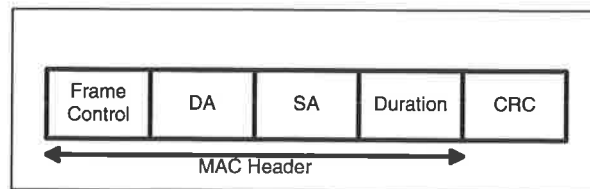


Figure 4-xx: RTS Frame

The DA of this frame shall be the address of the immediate station receiving the frame. In an infrastructure LAN, the DA shall be the address of the AP with which the station is associated. In an ad hoc LAN, the DA shall be the destination of the subsequent data or management frame. The SA shall be the address of the station transmitting the frame.

4.2.1.2. CTS Frame Format

The frame format for an CTS frame is shown in Figure 4-xx.

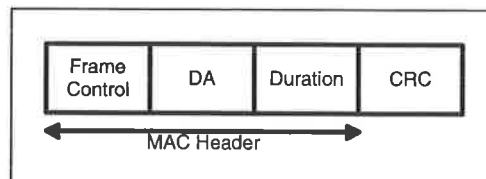


Figure 4-xx: CTS Frame

The DA of the CTS frame shall be taken from the SA field of the RTS frame to which the CTS is a response.

4.2.1.3. ACK Frame Format

The frame format for the ACK frame is shown in Figure 4-xx.

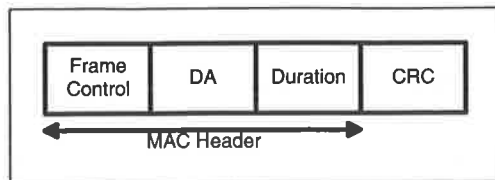


Figure 4-xx: ACK Frame

If the station is an AP, the DA of the ACK frame shall be the address contained in the Address 3 field (SA of a Data or Management frame from a STA, TA of a Wireless Distribution System frame) of the immediately previous frame. If the station is not an AP, the DA shall be the BSSID of the immediately previous data or management frame.

4.2.1.4. Poll Frame Format

The frame format for the Poll frame is shown in Figure 4-xx.

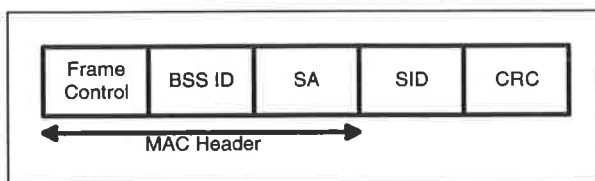


Figure 4-xx: Poll Frame

The BSSID shall be the address of the AP to which the Poll is directed. The SA shall be the address of the station transmitting the frame. The SID shall be the value assigned by the AP in the Associate Response frame.

4.2.2. DATA Frame Format

The frame format for a Data frame is independent of subtype and is shown in Figure 4-xx.

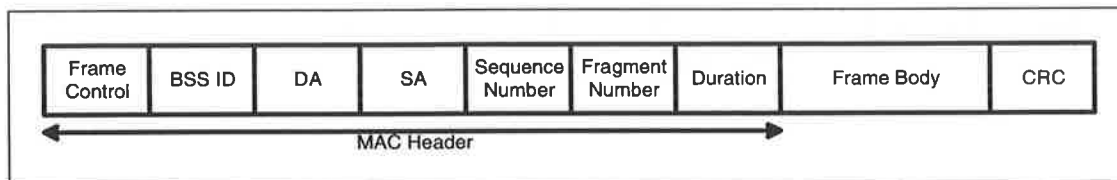


Figure 4-xx: DATA Frame

The BSSID of the Data frame shall be determined as follows:

- 1) If the station is an AP or is associated with an AP, the BSS Identifier shall be the address of the AP.
- 2) If the station is a member of an ad hoc LAN, the BSS Identifier shall be the BSS ID of the ad hoc LAN.

The DA shall be the destination of the frame, i.e. the destination of the MSDU.

The SA shall be the address of the station transmitting the frame.

The Frame Body shall be the MSDU or a fragment thereof.

4.2.3. Wireless Distribution System (WDS) Frame Format

The frame format for a WDS frame is independent of subtype and is shown in Figure 4-xx.

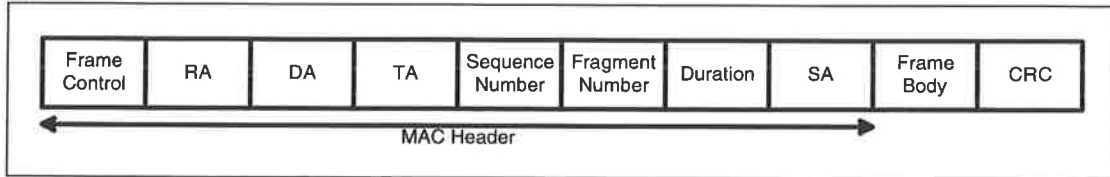


Figure 4-xx: WDS Frame

The RA shall be the address of the access point in the wireless distribution system that is the next immediate intended recipient of the frame.

The DA shall be the destination of the frame, i.e. the destination of the MSDU.

The TA shall be the address of the access point in the wireless distribution system that is transmitting the frame.

The SA shall be the address of the station originating the MSDU that is the frame body of this frame.

The Frame Body shall be the MSDU or a fragment thereof.

4.2.4. Management Frames

The frame format for a Management frame is independent of subtype and is shown in Figure 4-xx.

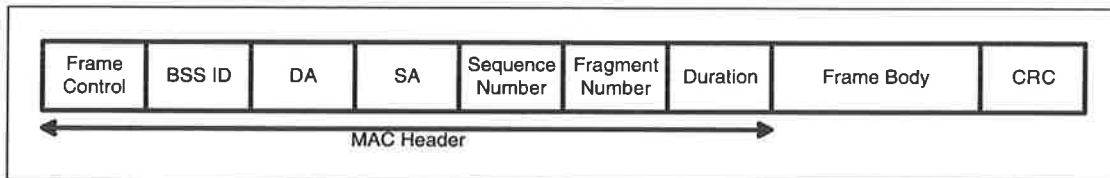


Figure 4-xx: Management Frame Format

The address fields for Management frames shall not vary by frame subtype.

The BSS Identifier of the Management frame shall be determined as follows:

- 1) If the station is an AP or is associated with an AP, the BSS Identifier shall be the address of the AP.
- 2) If the station is a member of an ad hoc LAN, the BSS Identifier shall be the BSS ID of the ad hoc LAN.

The DA shall be the destination of the frame.

The SA shall be the address of the station transmitting the frame.

The Frame Body shall be the information elements described for each management frame subtype, below.

