12. Support of the Internal Sublayer Service by specific MAC procedures

12.2 Support by IEEE Std 802.11 (Wireless LAN)

<< Editor's note: In Clause 12.2 and its subclauses, the notation "TBD" is used to denote information that is "To Be Determined". >>

The wireless LAN access method is specified in IEEE Std 802.11-2012. Clause 8 of that standard specifies frame formats, Clause 9 specifies the MAC sublayer function, and Clause 10 specifies the mandatory MAC sublayer management function. Following are the methods by which IEEE 802.11 LANs can support the ISS:

a) The portal method connects a Bridge to an IEEE 802.11 distribution system, which in turn provides connectivity to some number of IEEE 802.11 access points, and via those, to some number of attached IEEE 802.11 non-AP stations (12.2.1).
b) The infrastructure method connects a Bridge through an IEEE 802.11 access point to some number of associated IEEE 802.11 non-AP stations, using two instances of the ISS (one instance can be protected via encryption) per non-AP station, each providing a virtual point-to-point LAN (12.2.3).
c) The non-AP station method connects a Bridge through an IEEE 802.11 non-AP station to an IEEE 802.11 access point, using two instances of the ISS (one instance can be protected via encryption), each providing a virtual point-to-point LAN (12.2.4).

All three methods use the same mapping of ISS parameters to and from IEEE 802.11 service instance primitives (12.2.5). Security considerations are addressed in 12.2.2.

12.2.1 Support by IEEE Std 802.11 portal method

A Bridge to an IEEE 802.11 LAN ~~shall~~may connect to an IEEE 802.11 ~~P~~portal, which in turn connects to an IEEE 802.11 ~~D~~distribution ~~S~~system. For the purposes of bridging, the service interface presented at the ~~P~~portal is identical to the service interface presented at the IEEE 802.11 MAC SAP. An instance of an 8802-11 ~~D~~distribution ~~S~~system can be implemented from IEEE 802 LAN components. IEEE 802.11 ~~STA~~non-AP stations attach to the ~~D~~distribution ~~S~~system via one or more ~~an~~ IEEE 802.11 ~~A~~access ~~P~~points. A ~~b~~Bridge shall not connect to an IEEE 802.11 Independent BSS. For a description of the IEEE 802.11 architecture, see Clause 4 of IEEE Std 802.11-2012.

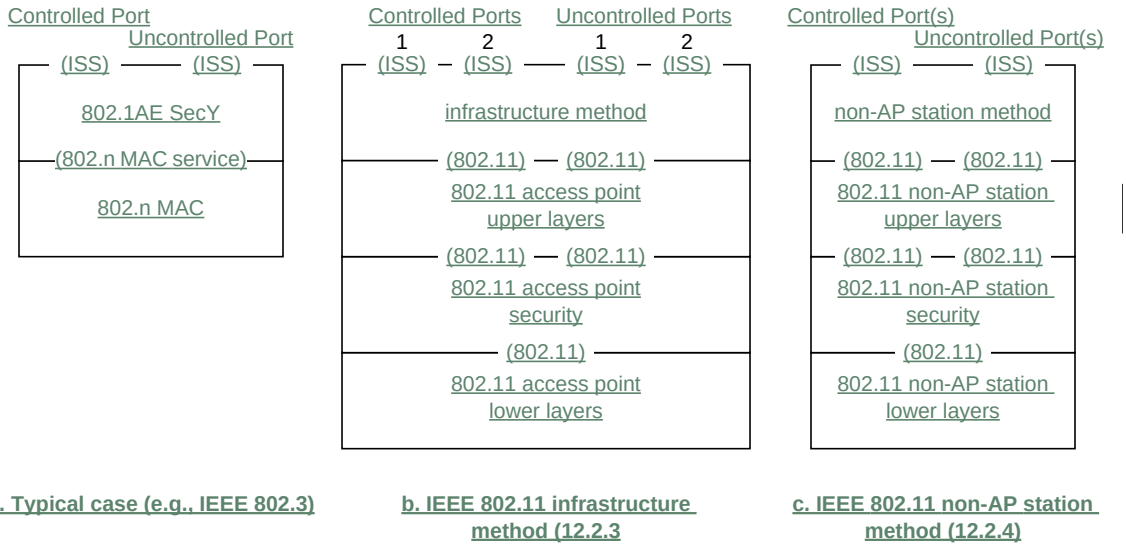
On receipt of an M_UNITDATA.request primitive, the portal constructs a MAC Service Data Unit and passes it to the MAC Data service for transmission (in accordance with the frame formats and procedures specified in IEEE Std 802.11-2012 Clauses 5, 8 and 9) using the parameters supplied ~~as specified below~~in 12.2.5.

On receipt of a valid MAC Service Data Unit (see IEEE Std 802.11-2012 Clauses 5, 8 and 9), the portal generates an M_UNITDATA.indication primitive with parameter values derived from the frame fields as specified ~~below~~in 12.2.5.

12.2.2 Security and the IEEE Std 802.11 infrastructure and non-AP station methods

As illustrated in Figure 12-1 (see also IEEE Std 802.1Q-2011 Figure 22-8 and IEEE Std 802.1AE-2006 Figure 10-1), the IEEE 802.1AE SecY layer provides two instances of the ISS to the layers above the SecY, and utilizes a single instance of the ISS to the layers below it. The two instances above the SecY are the Controlled Port and the Uncontrolled Port. The Controlled Port supplies cryptologically secured MAC service to other Controlled Ports, and the Uncontrolled Port supplies unsecured MAC service to other Uncontrolled Ports.

IEEE 802.11 necessarily places the equivalent security layer, with the equivalent ISS instance bifurcation, below the 802.11 SAP. (This is because IEEE 802.11 protects fragments of frames, not whole frames.) Therefore, as illustrated in Figure 12-1, the infrastructure method provides an Uncontrolled Port and a Controlled Port for every other non-AP station to which its access point is associated, and similarly, the non-AP station method provides an Uncontrolled Port and a Controlled Port for every access point or non-AP station to which its non-AP station is associated.



a. Typical case (e.g., IEEE 802.3) **b. IEEE 802.11 infrastructure method (12.2.3** **c. IEEE 802.11 non-AP station method (12.2.4)**

Figure 12-1—MAC security and IEEE 802.11 media

NOTE—The interfaces labeled "(802.11)" in Figure 12-1 are not identical; the topmost interfaces to the infrastructure and non-AP station methods are the 802.11 MAC Service interface. The other interfaces are internal to IEEE 802.11.

12.2.3 Support by IEEE Std 802.11 infrastructure method

A Bridge to an IEEE 802.11 LAN may connect to an IEEE 802.11 access point via the infrastructure method. The infrastructure method provides some number of instances of the ISS to the Bridge, an Uncontrolled Port, and as determined by the access point, perhaps an Uncontrolled Port, for each of the non-AP stations attached to that access point (see 12.2.2). Figure 12-1, part b, illustrates the infrastructure method applied to an access point with two attached non-AP station.

For the purposes of bridging, the service interface presented by the access point to the infrastructure method is identical to two instances of the service interface (a Controlled Port and an Uncontrolled Port) presented at the IEEE 802.11 MAC SAP, except that every M_UNITDATA.request and M_UNITDATA.indication primitive is accompanied by a station vector, specifying to which of the non-AP stations the request is directed, or from which the in id cation is presented. A request can be directed to any non-empty subset of the attached non-AP stations, including all of them. The station vector is supplied for a request primitive so that the access point can make the determination of whether to execute the request in a single transmission or more than one transmission, in order to balance considerations such as reliability of delivery versus bandwidth utilized. For the indication primitive, the station vector always indicates arrival from a single non-AP station.

The creation or deletion of ISS instances, and the scope of the station vector, is controlled by and limited to a single IEEE 802.11 access point. Each access point connected to a bridge requires a separate station vector and set of ISS instances. When a non-AP station becomes attached to an access point (IEEE 802.11 Clause TBD), one ISS instance is created if no data encryption is used between the access point and the non-AP

station, and two instances, one controlled (encrypted) and one uncontrolled (non-encrypted), if data encryption is used.

On receipt of one or more identical M_UNITDATA.request primitives on the ISS instances from the Bridge, the infrastructure method constructs a single MAC Service Data Unit and a station vector (indicating from which ISS instances the request primitive was received), and passes them to the MAC Data service for transmission (in accordance with the frame formats and procedures specified in IEEE Std 802.11-2012 Clauses 5, 8 and 9 and TBD) using the parameters supplied as specified in 12.2.5.

On receipt of a valid MAC Service Data Unit (see IEEE Std 802.11-2012 Clauses 5, 8 and 9), the infrastructure method generates an M_UNITDATA.indication primitive, with parameter values derived from the frame fields as specified in 12.2.5, on the instance of the ISS to the Bridge corresponding to the non-AP station from which the indication was received.

12.2.4 Support by IEEE Std 802.11 Non-AP station method

A Bridge to an IEEE 802.11 LAN may connect to an IEEE 802.11 non-AP station via any number of instances of the ISS using the non-AP station method. Each ISS instance connects either to an IEEE 802.11 access point or to another non-AP station. For an access point or non-AP station, the non-AP station method offers to the Bridge, as determined by the non-AP station, an Uncontrolled Port and perhaps a Controlled Port (see 12.2.2). Figure 12-1, part c, illustrates the non-AP station method applied to a non-AP station.

For the purposes of bridging, the service interface presented by the non-AP station to the non-AP station method is identical to two instances of the service interface (a Controlled Port and an Uncontrolled Port) presented at the IEEE 802.11 MAC SAP. A separate instance of the non-AP station interface is required for each IEEE 802.11 access point (at most one) or other non-AP station (zero or more) with which the non-AP station is associated.

The creation or deletion of ISS instances is controlled by the non-AP station. When the non-AP station becomes attached to an access point (IEEE 802.11 Clause TBD), an Uncontrolled Port is created if no data encryption is used between the access point and the non-AP station, and two instances, one Controlled Port and one Uncontrolled Port, if data encryption is used.

On receipt of an M_UNITDATA.request primitive on the ISS instance from the Bridge, the non-AP station method constructs a MAC Service Data Unit and passes it to the MAC Data service for transmission (in accordance with the frame formats and procedures specified in IEEE Std 802.11-2012 Clauses 5, 8, 9 and TBD) using the parameters supplied as specified in 12.2.5.

On receipt of a valid MAC Service Data Unit (see IEEE Std 802.11-2012 Clauses 5, 8, 9 and TBD), the infrastructure method generates an M_UNITDATA.indication primitive, with parameter values derived from the frame fields as specified in 12.2.5, on the instance of the ISS to the Bridge corresponding to the instance from which the indication was received.

12.2.5 IEEE Std 802.11 parameter mapping

When processing MSDU_from_LLC, the Type subfield of the Frame Control field specified in 8.2.4.1.3 of IEEE Std 802.11-2012 shall be encoded as Data in MAC frames (see Table 8-1 in IEEE Std 802.11-2012).

The destination_address parameter is encoded in MAC frames as the DA described in Table 8-19 of 8.3.2.1 of IEEE Std 802.11-2012.

The source_address parameter is encoded in MAC frames as the SA described in Table 8-19 of 8.3.2.1 of IEEE Std 802.11-2012.

The mac_service_data_unit parameter is encoded in the Frame Body field (8.2.4.7.1 of IEEE Std 802.11-2012) of MAC frames. The length of the MSDU shall be ~~□~~less than or equal to 2304 octets. The length is not encoded in MAC frames; rather, it is conveyed in the PHY headers.

The priority parameter is not encoded in MAC frames. The priority parameter provided in an M_UNITDATA.indication primitive shall take the value of the Default Priority parameter for the port through which the MAC Service Data Unit was received. The default value of this parameter is 0, it may be set by management, in which case the capability to set it to any of the values 0 through 7 shall be provided.

The Frame Check Sequence (FCS) field of MAC frames is calculated and encoded in accordance with 8.2.4.8 of IEEE Std 802.11-2012.

No special action, above that specified in IEEE ~~Std~~ 802.11, is required for the support of the MAC Internal Sublayer Service by the wireless LAN access method.