These headers are here to provide targets for cross-references:

11.1 Service primitives and parameters

11.2 Status parameters

11.3 Point-to-point parameters

This is the suggested new header for Clause 12

12. Media Access Method Dependent Convergence Functions

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

In reviewing the 802.3 section to use as a guide for 802.11, it struck me that the stuff that used to be in 802.1D is out of date, left over from when a) the 802.3 MAC service did not match the ISS's needs and b) link aggregation was still in 802.3. Seems to me that the following would be a much better way to do 12.1. Offered for the consideration of the Task Group.

12.1 IEEE Std 802.3 (Ethernet) convergence function

The IEEE 802.3 convergence function presents a single instance of the ISS to upper layers, and utilizes a single instance of the IEEE 802.3 MAC service.

When the IEEE 802.3 convergence function receives an ISS M_UNITDATA.request primitive, it generates a corresponding IEEE 802.3 MA_DATA.request as follows:

a) The ISS M_UNITDATA destination_address, source_address, mac_service_data_unit and frame_check_sequence parameters are passed verbatim to the corresponding IEEE 802.3 MA_DATA parameters.
b) The ISS M_UNITDATA priority, drop_eligible, service_access_point_identifier, and connection_identifier parameters are ignored.

When the IEEE 802.3 convergence function receives an IEEE 802.3 MA_DATA.indication primitive, it generates a corresponding ISS M_UNITDATA.indication as follows:

a) The IEEE 802.3 MA_DATA destination_address, source_address, mac_service_data_unit, and frame_check_sequence parameters are passed verbatim.
b) The ISS M_UNITDATA drop_eligible parameter is False.
c) The ISS M_UNITDATA priority parameter shall take the value of the Default Priority parameter for the SAM on which the MA_DATA.indication was received. The default value of this parameter is 0. This parameter may be set by management in which case the capability to set it to any of the values 0 through 7 shall be provided.

<< I haven't figured out MAC_Enabled and MAC_Operational, but I'll bet they tie into explicit MAC-layer variables that are PHY-independent. 802.3 is pretty good about that. >>

<< The point-to-point parameters aren't in either 802.1AC-REV D0.1 or here. There may be a MAC-layer variable that is suitable, or maybe we have to call out particular clauses. >>

Here's the latest version of the 802.11 text. I've done my best to follow the instructions from the 802.1AC-REV D0.1 comment resolution, but found that difficult in places.

An earlier version of this text was reviewed (superficially) in the joint P802.1Qbz-P802.11ak, which resulted in additional changes. In particular, the idea to combine the two 802.11 MAC interfaces into a single interface, with a "controlled" parameter, was thought to be incorrect.

12.2 IEEE Std 802.11 (Wireless LAN) convergence functions

<< 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 5.2 of that standard specifies the IEEE 802.11 MAC service definition, Clause 4.3.4 introduces the distribution system, and IEEE Std 802.11ak-20XX Annex TBD specifies the points in the IEEE 802.11 architecture at which the MAC service is offered. Following are the media access method dependent convergence functions used with IEEE Std 802.11 and amendments:

a) The IEEE 802.11 portal convergence function connects to an IEEE 802.11 portal, which offers an instance of the IEEE 802.11 MAC service via the IEEE 802.11 distribution system. The distribution system in turn provides connectivity to some number of IEEE 802.11 access points and IEEE 802.11 mesh gates, and via those, to some number of associated IEEE 802.11 non-AP stations (12.2.1).
b) The IEEE 802.11 infrastructure convergence function connects to an IEEE 802.11 access point or IEEE 802.11 non-AP station through set of virtual point-to-point LANs, where each LAN connects to:
    1) zero or more associated IEEE 802.11 non-AP stations, when the LANs are provided by an access point; or
    2) one associated IEEE 802.11 access point and zero or more other non-AP stations, when the LANs are provided by a non-AP station.

NOTE 1—The native service provided by an IEEE 802.11 non-AP station (IEEE Std 802.11-2012 Clause 9.3.6) cannot be adapted to the ISS by a media access method dependent convergence function, because frames with a destination address that is a group address are reflected back to the non-AP station by its associated IEEE 802.11 access point. This behavior is prohibited for an ISS (11.1).

NOTE 2—No convergence function is defined for an IEEE 802.11 Independent BSS.

Both convergence functions defined in this clause use the same mapping of ISS parameters to and from IEEE 802.11 service instance primitives, which is defined in 12.2.3.

12.2.1 IEEE 802.11 portal convergence function

As shown in Figure 12-1, the IEEE 802.11 portal convergence function offers an instance of the ISS to upper layers, utilizing an IEEE 802.11 portal, which in turn connects to an IEEE 802.11 distribution system. The service interface presented at the portal is identical to the service interface presented at the IEEE 802.11 MAC SAP (IEEE 802.11-2012 Clause 5.2). The DS_SAP interface shown in Figure 12-1 is defined in IEEE 802.11-2012 Annex R. An instance of an IEEE 802.11 distribution system can be implemented from IEEE 802 LAN components. IEEE 802.11 non-AP stations are associated to the distribution system via one or

more IEEE 802.11 access points. For a description of the IEEE 802.11 architecture, see Clause 4 of IEEE Std 802.11-2012.

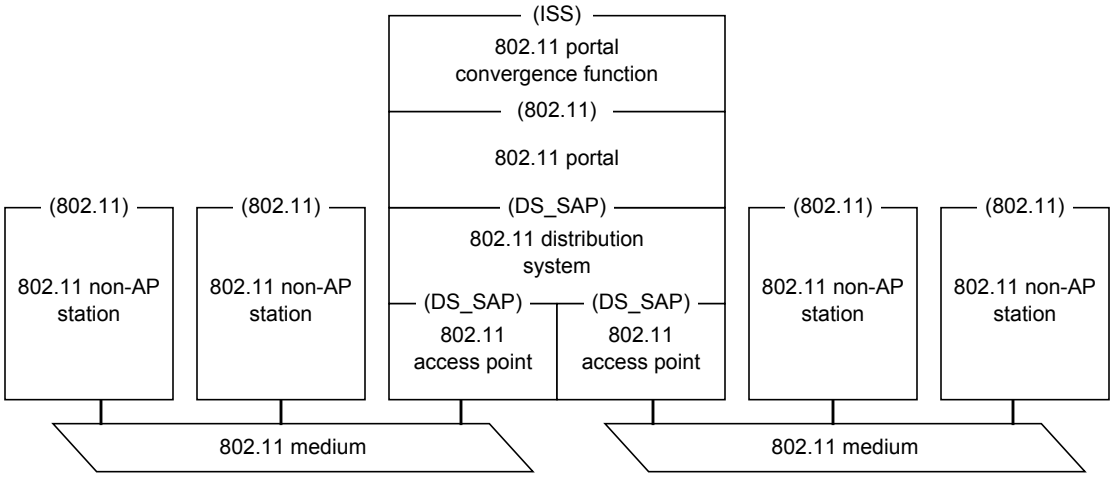

Figure 12-1—IEEE 802.11 portal method

The data parameter of the IEEE 802.11 MAC service offering access to an IEEE 802.11 portal is Length/Type encoded. IEEE Std 802.11-2012 Annex Q.6 specifies that the portal converts between the Length/Type encoding and the LLC encoding used on IEEE 802.11 media.

On receipt of an ISS M_UNITDATA.request primitive, the portal convergence function constructs an IEEE 802.11 MA-UNITDATA.request primitive, mapping the parameters as specified in 12.2.3.

On receipt of an IEEE 802.11 MA-UNITDATA.indication primitive, the portal convergence function generates an M_UNITDATA.indication primitive, mapping the parameters as specified in 12.2.3.

NOTE—As shown in Figure 12-1, the IEEE 802.11 portal convergence function does not supply the Controlled and Uncontrolled Ports of the IEEE 802.11 infrastructure convergence function (12.2.2). This is because the 802.11 portal is a service offered by the IEEE 802.11 distribution system, not a service whose peer is below the distribution system; the peers of a SecY attached to an IEEE 802.11 portal are the IEEE 802.11 non-AP stations associated to the IEEE 802.11 access points attached to the distribution system. Typically, the SecY would duplicate the function of the 802.11 security layer. (See also IEEE Std 802.11-2012 Figure R-1.)

The ISS MAC_Operational status parameter (11.2) for the IEEE 802.11 portal convergence fucntion is TRUE if the MAC_Enabled parameter is TURE, else MAC_Operational is FALSE.

If the adminPointToPointMAC parameter has the value Auto (11.3), then the operPointToPointMAC parameter for any ISS offered by the IEEE 802.11 portal convergence function is FALSE.

12.2.2 IEEE 802.11 infrastructure convergence function

The IEEE 802.1AE SecY layer is illustrated in Figure 12-2, which is a simplified version of IEEE Std 802.1AE-2006 Figure 10-1. The SecY provides two instances of the ISS to the layers above it, and utilizes a single instance of the ISS to access the layers below it. The two ISS instances above the SecY are the Controlled Port (**C**) and the Uncontrolled Port (**U**). The Controlled Port can supply cryptologically secured MAC service, and the Uncontrolled Port supplies unsecured MAC service.

The SecY is used on some IEEE 802 media, including IEEE 802.3, but not including IEEE 802.11, in the manner illustrated in part 1 of Figure 12-3. IEEE 802.11, however, necessarily places its security layer, with

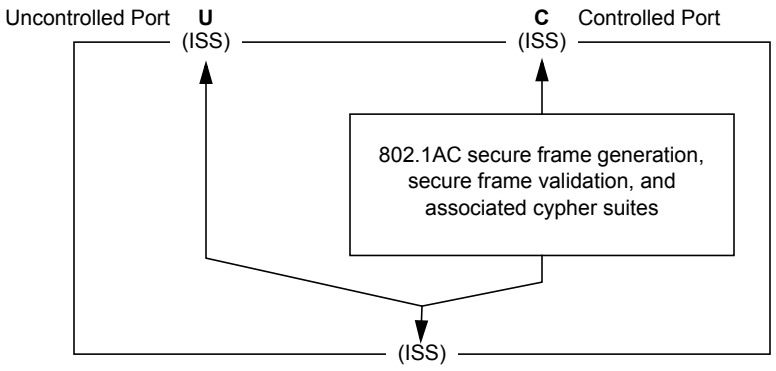

Figure 12-2—Simplified IEEE 802.1AE SecY

Controlled and Uncontrolled ports similar to those of the IEEE 802.1AE SecY, below the IEEE 802.11 SAP. This is because IEEE 802.11 systems protect fragments of frames, not whole frames, and those segments are created or assembled in layers between the SAP and the security layer. Therefore, the IEEE 802.1AE SecY is not typically used on IEEE 802.11 media. In order to utilize the IEEE 802.11 security layer, but provide the same services to the upper layers for IEEE 802.11 media that are provided by the SecY for other media, the IEEE 802.11 infrastructure convergence function provides an Uncontrolled Port and a Controlled Port for each virtual point-to-point LAN, which is to say, for each of the other 802.11 stations to which its access point or non-AP station is associated. This is illustrated in part 2 of Figure 12-3.

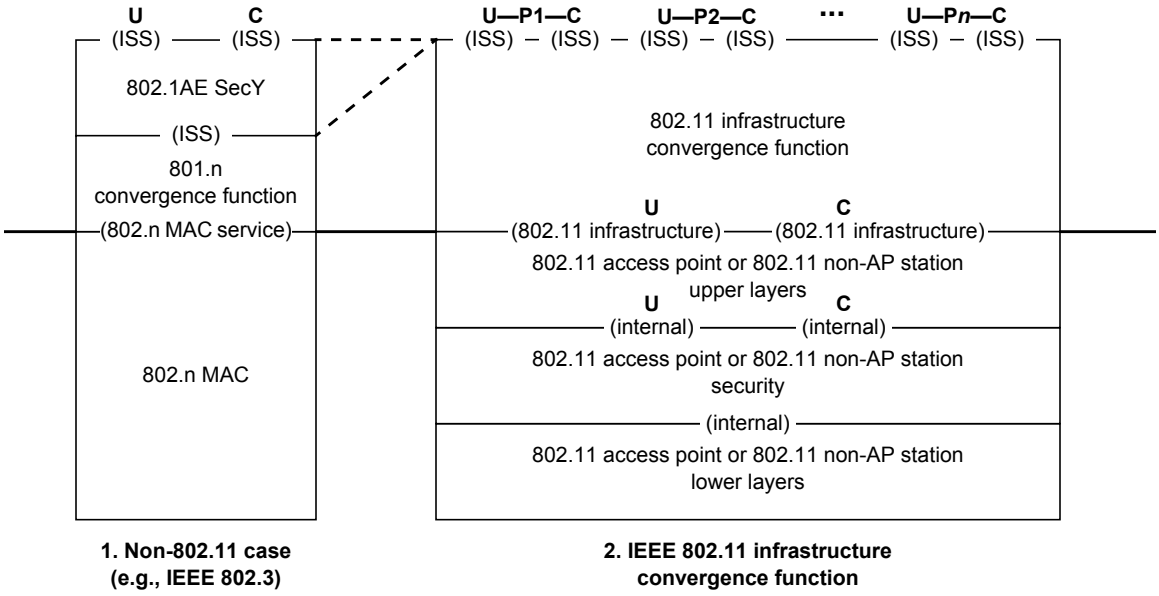

Figure 12-3—MAC security and IEEE 802.11 media

A system may connect to an IEEE 802.11 station via the IEEE 802.11 infrastructure convergence function. The infrastructure convergence function provides connections to zero or more virtual point-to-point LANs, each to another IEEE 802.11 station. The infrastructure convergence function offers two instances of the ISS to the system for each LAN, an Uncontrolled Port and an Uncontrolled Port. Figure 12-3, part 2, illustrates the infrastructure method applied to an IEEE 802.11 access point (or non-AP station) with ***n*** associated IEEE 802.11 stations.

The service interface presented by the 802.11 station (whether an access point or a non-AP station) to the infrastructure convergence function is identical to the two instances of the service interface, a Controlled Port and an Uncontrolled Port, presented by the IEEE 802.11 MAC SAP, except that every

MA-UNITDATA.request and MA-UNITDATA.indication primitive is accompanied by a station vector, specifying to which of the 802.11 stations the request is directed, or from which the indication is presented. A request can be directed to any non-empty subset of the associated 802.11 stations, including all of them. The station vector is supplied with a request primitive so that the 802.11 station 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 802.11 station.

The number of virtual point-to-point LANs implemented, and thus the number of Controlled and Uncontrolled Ports and ultimately, Bridge Ports, are an implementation choice. IEEE 802.11 non-AP stations can be associated and disassociated with IEEE 802.1 access points, and direct links among non-AP stations can be created or destroyed. An implementation can choose, as these events occur, to create and destroy virtual point-to-point LANs and ports, or it can manipulate the MAC_Operational parameters of the SAPs to make them available for use or not.

The data parameter of the IEEE 802.11 infrastructure MAC service, and the mac_service_data_unit parameter of the ISS, are Length/Type encoded. IEEE Std 802.11ak-20XX Clause TBD specifies that the infrastructure service interface converts between the Length/Type encoding and the LLC encoding used on IEEE 802.11 media.

Upon simultaneous receipt of one or more identical M_UNITDATA.request primitives on the ISS instances from the upper layers, the infrastructure convergence function constructs a single MAC Service Data Unit and a station vector, indicating from which ISS instances the request primitive was received, and constructs an IEEE 802.11 MA-UNITDATA.request primitive, mapping the parameters as specified in 12.2.3.

NOTE—IEEE Std 802.1Q Clause 8.6 discusses the process of forwarding frames through a bridge in terms of the creation, at the time a frame is received, of a vector of ports on which the frame can be output. The process of deciding on what port or ports the frame is to be output is described in terms of removing ports from this vector. In this model, the simultaneous transmission of identical frames on multiple ports is equivalent to the transmission of a single frame whose port vector specifies multiple transmission ports.

On receipt of a valid IEEE 802.11 MA-UNITDATA.indication primitive and station vector (see IEEE Std 802.11-2012 Clauses 5, 8 and 9), the infrastructure convergence function generates an M_UNITDATA.indication primitive on the ISS instance specified by the station vector, mapping the parameters as specified in 12.2.3.

The ISS MAC_Operational status parameter (11.2) for both the Controlled Port and the Uncontrolled Port offered by a given IEEE 802.11 infrastructure virtual LAN is TRUE if the IEEE 802.11 aceess point or non-AP station is both associated to (IEEE Std 802.11-2012 Clause 4.5.3.3) and authenticated to (IEEE Std 802.11-2012 Clause 4.5.4.2) the remote station, and the MAC_Enabled status parameter is TRUE, else MAC_Operational is FALSE.

If the adminPointToPointMAC parameter has the value Auto (11.3), then the operPointToPointMAC parameter for any ISS offered by the IEEE 802.11 infrastructure convergence function is TRUE.

12.2.3 IEEE 802.11 parameter mapping

When an ISS M_UNITDATA.request primitive is received, the IEEE 802.11 convergence function (12.2.1 or 12.2.2) generates a corresponding 802.11 MA-UNITDATA.request as follows:

a) The destination_address, source_address, priority, and frame_check_sequence parameters are passed verbatim as the destination address, source address, priority, and frame check sequence parameters, respectively.

b) The M_UNITDATA mac_service_data_unit parameter is passed verbatim as the MA-UNITDATA data parameter.
c) The ISS M_UNITDATA drop_eligible, service_access_point_identifier, and connection_identifier parameters are ignored.
d) The IEEE 802.11 MA-UNITDATA routing information parameter is null.
e) The value of the IEEE 802.11 MA-UNITDATA service class parameter is QoSNoAck.

When an IEEE 802.11 MA-UNITDATA.indication primitive is received, the IEEE 802.11 convergence function (12.2.1 or 12.2.2) generates a corresponding ISS M_UNITDATA.indication as follows:

a) The destination address, source address, priority, and frame check sequence parameters are passed verbatim as the destination_address, source_address, priority, and frame_check_sequence parameters, respectively.
b) The MA-UNITDATA data parameter is passed verbatim as the M_UNITDATA mac_service_data_unit parameter.
c) The ISS M_UNITDATA drop_eligible parameter is False.
d) The ISS M_UNITDATA service_access_point_identifier and connection_identifier parameters are null.
e) The IEEE 802.11 MA-UNITDATA routing information and service class parameters are ignored.