

CLAIMS

1. An apparatus for wireless communications, comprising: at least one processing system configured to split a first media access control (MAC) service data unit (MSDU) into a first plurality of MAC protocol data units (MPDUs), each having a unique MPDU sequence number and a separate MSDU sequence number associated with the first MSDU; and a first interface configured to output the first plurality of MPDUs for transmission to a recipient.
2. The apparatus of claim 1, wherein each MPDU has a control field comprising: an indication of the unique MPDU sequence number; an indication of the MSDU sequence number associated with the first MSDU; and an indication of whether the MPDU is a starting or ending MPDU of the first MSDU.
3. The apparatus of claim 1, wherein: the at least one processing system is further configured to generate at least one frame with a set of parameters for processing at least the first MSDU, said set of parameters being associated with at least an MPDU starting sequence number (SSN) and an MSDU SSN for a transmission window in which the first plurality of MPDUs are output for transmission; and the first interface is further configured to output the at least one frame for transmission to the recipient.
4. The apparatus of claim 3, wherein the set of parameters also comprises: an indication of how many bits are used for MPDU sequence numbers; and an indication of how many bits are used for MSDU sequence numbers.
5. The apparatus of claim 1, wherein the first plurality of MPDUs are output for transmission via an aggregated MPDU (A-MPDU).
6. The apparatus of claim 5, wherein: the at least one processing system is further configured to split at least a second media access control (MAC) service data unit (MSDU) into a second plurality of MAC protocol data units (MPDUs), each having a unique MPDU sequence number and a separate MSDU sequence number associated with the second MSDU; and the first interface is further configured to output the second plurality of MPDUs for transmission via the A-MPDU.
7. The apparatus of claim 1, further comprising a second interface configured to obtain one or more block acknowledgement frames from the recipient, the one or more block

acknowledgement frames indicating which of the first plurality of MPDUs were successfully received by the recipient, wherein: the at least one processing system is further configured to release the first MSDU from a transmit buffer if the one or more block acknowledgement frames indicate each of the first plurality of MPDUs was successfully received by the recipient.

8. The apparatus of claim 1, further comprising a second interface configured to obtain one or more block acknowledgement frames from the recipient, the one or more block acknowledgement frames indicating which of the first plurality of MPDUs were successfully received by the recipient, wherein: the at least one processing system is further configured to generate a frame including at least one of the first plurality of MPDUs that the one or more block acknowledgement frames indicate was not successfully received by the recipient; and the first interface is further configured to output the frame for transmission.

9. The apparatus of claim 1, further comprising a second interface configured to obtain one or more block acknowledgement frames from the recipient, the one or more block acknowledgement frames indicating which of the first plurality of MPDUs were successfully received by the recipient, wherein: the at least one processing system is further configured to split a second MSDU into a second plurality of MPDUs, each having a unique MPDU sequence number and a separate MSDU sequence number associated with the second MSDU; and the one or more block acknowledgement frames comprise an aggregated MPDU (A-MPDU) also including the second plurality of MPDUs.

10. The apparatus of claim 1, further comprising a second interface configured to obtain one or more block acknowledgement frames from the recipient, the one or more block acknowledgement frames indicating which of the first plurality of MPDUs were successfully received by the recipient, wherein: the at least one processing system is further configured to: discard at least one MSDU corresponding to at least one MPDU indicated by the one or more block acknowledgement frames as not being successfully received by the recipient, and generate at least one frame with values for an MPDU starting sequence number (SSN) and an MSDU SSN selected to cause the recipient to skip processing the discarded MSDU; and the first interface is further configured to output the at least one frame for transmission to the recipient.

11. The apparatus of claim 10, wherein the at least one frame comprises a block acknowledgement request frame.

12. An apparatus for wireless communications, comprising: a first interface configured to obtain a first plurality of media access control (MAC) protocol data unit (MPDUs), each having a unique MPDU sequence number and a separate MAC service data unit (MSDU) sequence

number; and at least one processing system configured to maintain a receive buffer based on the MPDU and MSDU sequence numbers of the first plurality of MPDUs.

13. The apparatus of claim 12, wherein: each MPDU has a control field comprising: a first indication of the unique MPDU sequence number; a second indication of the MSDU sequence number; and a third indication of whether the MPDU is a starting or ending MPDU of an MSDU; and the at least one processing system is configured to maintain the receive buffer by: detecting an MPDU is an ending MPDU of a first MSDU based on the third indication; determining, after the detection, whether all MPDUs associated with the first MSDU have been successfully received; and releasing the first MSDU from the receive buffer if the determination is that all MPDUs associated with the first MSDU have been successfully received.

14. The apparatus of claim 13, wherein the at least one processing system is configured to release the first MSDU only if the receive buffer does not include any MPDUs having control fields with second indications of MSDU sequence numbers that are lower than an MSDU sequence number of the first MSDU.

15. The apparatus of claim 12, wherein: the first interface is further configured to obtain at least one frame with a set of parameters associated with at least an MPDU starting sequence number (SSN) and an MSDU SSN; and the at least one processing system is configured to initialize a variable for a next expected sequence number based on the MSDU SSN and to initialize a variable for a starting MPDU sequence number based on the MPDU SSN .

16. The apparatus of claim 15, wherein: the set of parameters also indicates how many bits are used for the MPDU SSN and how many bits are used for the MSDU SSN; and the at least one processing system is configured to determine the MPDU SSN and the MSDU SSN based on the indicated number of bits.

17. The apparatus of claim 12, wherein: the first interface is further configured to obtain at least one frame indicating an MPDU starting sequence number (SSN) and an MSDU SSN; and the at least one processing system is configured to discard MPDUs, from the receive buffer, that have at least one of: an MSDU sequence number less than the indicated MSDU SSN or an MPDU sequence number less than the indicated MPDU SSN.

18. The apparatus of claim 17, wherein the at least one frame comprises a block acknowledgement request frame.

19. A wireless node, comprising: at least one processing system configured to split a first media access control (MAC) service data unit (MSDU) into a first plurality of MAC protocol data units (MPDUs), each having a unique MPDU sequence number and a separate MSDU sequence number associated with the first MSDU; and a transmitter configured to transmit the first plurality of MPDUs to a recipient.

20. The apparatus of claim 12, further comprising: a receiver configured to receive the first plurality of MPDUs, wherein the apparatus is configured as a wireless node.