

EX-1022

INDEX OF CHALLENGED CLAIMS 1-20 OF

U.S. PATENT NO. 9,531,520

CLAIM	
1	[1pre] A method, implemented by a network device in a wireless network, for coordinating an uplink multi-user response transmission to a downlink multi-user transmission, the method comprising:
	[1a] generating, by the network device, a downlink multi-user frame addressed to a plurality of stations operating in the wireless network, the downlink multi-user frame including a plurality of resource units (RUs), wherein generating the downlink multi-user frame comprises: assigning each RU of the plurality of RUs to a respective station in the plurality of stations, and including a respective set of MAC Protocol Data Units (MPDUs) in each RU of the plurality of RUs, wherein an MPDU in one or more of the RUs in the plurality of RUs includes acknowledgement information indicating properties of a multi-user acknowledgement transmission that the station in the plurality of stations to which the RU is assigned is requested to transmit to acknowledge the downlink multi-user frame;
	[1b] transmitting the downlink multi-user frame to the plurality of stations over a wireless channel; and

CLAIM	
	[1c] receiving the uplink multi-user response transmission, the uplink multi-user response transmission including multi-user acknowledgement transmissions respectively and simultaneously transmitted by two or more stations in the plurality of stations, [1d] wherein the plurality of RUs respectively correspond to a plurality of simultaneous uplink transmissions, and each of the plurality of simultaneous uplink transmissions uses a sub-channel, spatial stream, or sub-channel and spatial stream combination that is not used by any other of the plurality of simultaneous uplink transmissions.
2	[2] The method of claim 1, wherein generating the downlink multi-user frame further comprises: including the acknowledgement information, for indicating properties of the multi-user acknowledgement transmission transmitted by each respective station in the plurality of stations to acknowledge the downlink multi-user frame, in a header of the one or more MPDUs.
3	[3] The method of claim 2, wherein the header is a MAC header of the one or more MPDUs.
4	[4] The method of claim 1, wherein one of the one or more MPDUs in each of the RUs of the plurality of RUs is a unicast trigger frame

CLAIM	
	that contains the acknowledgement information for the respective station in the plurality of stations.
5	[5] The method of claim 4, wherein the trigger frame instigates each respective station in the plurality of stations to transmit the multi-user acknowledgement transmission after an interframe spacing period following receipt of the downlink multi-user frame.
6	[6] The method of claim 1, further comprising: generating, by the network device, a multi-user block acknowledgement request frame to solicit acknowledgements from two or more stations of the plurality of stations; and transmitting the multi-user block acknowledgment request frame following transmission of the downlink multi-user frame.
7	[7] The method of claim 1, wherein the acknowledgement information includes one or more of: (1) an indication of whether the acknowledgement transmission is multi-user or single user, and (2) an indication of whether the acknowledgment transmission is immediate or non-immediate, and further includes resource scheduling information when the multi-user acknowledgement transmission is indicated.

CLAIM	
8	[8pre] A method, implemented by a first station in a wireless network, for transmitting an uplink acknowledgment, the method comprising:
	[8a] receiving a downlink multi-user frame addressed to a plurality of stations, including the first station, and received from an access point in the wireless network;
	[8b] processing a first MAC Protocol Data Units (MPDU) in the downlink multi-user frame to determine acknowledgement information indicating properties of a first multi-user acknowledgement frame;
	[8c] generating the first multi-user acknowledgment frame based on the acknowledgement information; and
	[8d] transmitting the first multi-user acknowledgment frame to the access point to acknowledge the downlink multi-user frame,
	[8e] wherein the first multi-user acknowledgment frame is transmitted simultaneously to a second multi-user acknowledgement frame transmitted by a second station.
9	[9] The method of claim 8, wherein the first MPDU is located in a first resource unit of the downlink multi-user frame allocated to the first station, wherein the downlink multi-user frame includes a second resource unit that contains a second MPDU that includes

CLAIM	
	acknowledgement information for the second multi-user acknowledgement frame.
10	[10] The method of claim 9, wherein the first multi-user acknowledgement frame and the second multi-user acknowledgement frame together form a multi-user acknowledgement frame for acknowledging the downlink multi-user frame.
11	[11] The method of claim 8, wherein processing the first MPDU comprises: extracting the acknowledgement information indicating the properties of the first multi-user acknowledgement frame from a header of the first MPDU.
12	[12] The method of claim 11, wherein the header is a MAC header of the first MPDU.
13	[13] The method of claim 8, wherein processing the MPDU comprises: extracting the acknowledgement information indicating the properties of the first multi-user acknowledgement frame transmission from a payload of the first MPDU, wherein the first MPDU is a unicast trigger frame.
14	[14] The method of claim 13, further comprising: processing a second MPDU in a same resource unit as the first MPDU, wherein the second MPDU includes data intended for the first station.

CLAIM	
15	[15] The method of claim 13, wherein the trigger frame instigates the first station to transmit the first multi-user acknowledgement after an interframe spacing period following receipt of the downlink multi-user frame.
16	[16] The method of claim 8, further comprising: receiving a multi-user block acknowledgement request frame that solicits acknowledgements from the first and second station, wherein the first multi-user acknowledgement frame is transmitted after receipt of and in response to the multi-user block acknowledgement request frame.
17	[17] The method of claim 8, wherein the acknowledgement information includes one or more of: (1) an indication of whether the first multi-user acknowledgement frame is part of a multi-user or a single user transmission, and (2) an indication of whether the first multi-user acknowledgement frame is transmitted immediately following receipt of the downlink multi-user frame or upon receipt of a multi-user block acknowledgement request frame, and further includes resource scheduling information when the first multi-user acknowledgement frame is indicated as being part of the multi-user transmission.

CLAIM	
18	[18pre] A method, implemented by a first station in a wireless network, for transmitting an uplink acknowledgment, the method comprising:
	[18a] receiving a downlink multi-user frame addressed to a plurality of stations, including the first station, wherein the downlink multi-user frame is received from an access point in the wireless network;
	[18b] receiving a multi-user block acknowledgement request frame that solicits acknowledgements from the first station and a second station, wherein the multi-user block acknowledgement request frame includes acknowledgement information indicating properties of a first multi-user acknowledgement frame;
	[18c] generating the first multi-user acknowledgment frame based on the acknowledgement information; and
	[18d] acknowledging the receipt of the downlink multi-user frame by transmitting the first multi-user acknowledgement frame to the access point,
	[18e] wherein the first multi-user acknowledgement frame is transmitted simultaneously with a second multi-user acknowledgement frame generated and transmitted by the second station.

CLAIM	
19	[19] The method of claim 18, wherein the acknowledgement information includes one or more of: (1) an indication of whether the first multi-user acknowledgement frame is part of a multi-user or single user transmission and (2) resource scheduling information for the first multi-user acknowledgement transmission.
20	[20] The method of claim 18, wherein the acknowledgment scheduling information includes properties of the second multi-user acknowledgement frame generated and transmitted by the second station, wherein the first multi-user acknowledgement frame and the second multi-user acknowledgement together form a multi-user transmission.