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(54) **DEVICES, SYSTEMS, AND/OR METHODS FOR MANAGING WIRELESS NETWORKS**

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This patent is subject to a terminal disclaimer.

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CPC ***H04W 74/04*** (2013.01); ***H04L 12/413*** (2013.01); ***H04W 48/12*** (2013.01); ***H04W 72/0446*** (2013.01); ***H04W 74/0808*** (2013.01); *H04W 84/12* (2013.01)

(58) **Field of Classification Search**

CPC H04W 74/04; H04W 72/0446

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,813,279	B1	11/2004	Trainin	
2003/0163579	A1	8/2003	Knauerhase et al.	
2004/0013128	A1	1/2004	Moreton et al.	
2004/0042434	A1	3/2004	Kennedy	
2004/0058686	A1*	3/2004	Odman	H04L 1/0007 455/450
2005/0068928	A1	3/2005	Smith et al.	

(Continued)

OTHER PUBLICATIONS

"ZigBee/IEEE 802.15.4 Summary," Sep. 10, 2004, 37 pages.

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(57) **ABSTRACT**

A method includes transmitting a first message during a first time interval of a frame from a device. Transmission of the first message is followed by a second time interval of the frame. The method further includes transmitting a second message during the second time interval. The second message is followed by a third time interval that is shorter than the second time interval. The third time interval includes a contention-free period, a contention period, or a combination thereof.

20 Claims, 5 Drawing Sheets