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Trainin et al.

(54) PRIORITIZED ACCESS IN AWAKE WINDOW

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(56) References Cited

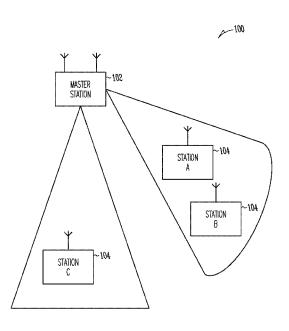
U.S. PATENT DOCUMENTS

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(57) ABSTRACT

Devices and methods of for wireless communication in a directional multi-gigabit (DMG) band are generally described. A device can detect a starting point of an awake window (AW). The device can encode a first announcement traffic indication message (ATIM) for directional transmission, after no more than a point coordination function (PCF) interframe space (PIFS) subsequent to the starting point, over a first beamformed link to a first station (STA). The device can encode a second ATIM for directional transmission subsequent to directional transmission of the first ATIM, within the AW and in a different direction than the directional transmission of the first ATIM, over a second beamformed link to a second STA. Other devices, systems and methods are also described.

13 Claims, 7 Drawing Sheets



^{*} cited by examiner