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Alam et al.

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(54) **METHODS AND APPARATUS TO IMPROVE A NETWORK CONNECTION VIA A CONNECTED VEHICLE**

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(56) **References Cited**
U.S. PATENT DOCUMENTS

8,525,684 B2 9/2013 Fong et al.
8,611,317 B2 12/2013 Banerjee et al.
(Continued)

OTHER PUBLICATIONS

United States Patent and Trademark Office, "Non-Final Office Action", issued in connection with U.S. Appl. No. 14/850,563, dated May 17, 2016 (10 pages).
(Continued)

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(57) **ABSTRACT**
Methods and apparatus are disclosed to improve a network connection of a cellular-enabled device via a connected vehicle. An example method disclosed herein includes establishing a first connection between the cellular-enabled vehicle and the first cellular-enabled device using a short distance radio frequency protocol. The first connection is based on a first connection relationship. The example method also includes sending a registration message to the cellular-enabled vehicle from the cellular-enabled device. The example method also includes detaching the cellular-enabled device from the cellular network. The example method also includes routing first cellular data associated with the first cellular-enabled device to the cellular network via the cellular-enabled vehicle.

20 Claims, 7 Drawing Sheets

