



US010142929B2

(12) **United States Patent**
Au et al.

(10) **Patent No.:** **US 10,142,929 B2**
(45) **Date of Patent:** **Nov. 27, 2018**

(54) **APPARATUS AND METHOD FOR A WIRELESS DEVICE TO RECEIVE DATA IN AN ECO STATE**

(71) Applicants: **Kelvin Kar Kin Au**, Kanata (CA);
Liqing Zhang, Ottawa (CA); **Jianglei Ma**, Ottawa (CA)

(72) Inventors: **Kelvin Kar Kin Au**, Kanata (CA);
Liqing Zhang, Ottawa (CA); **Jianglei Ma**, Ottawa (CA)

(73) Assignee: **HUAWEI TECHNOLOGIES CO., LTD.**, Shenzhen (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/649,995**

(22) Filed: **Jul. 14, 2017**

(65) **Prior Publication Data**

US 2017/0318530 A1 Nov. 2, 2017

Related U.S. Application Data

(63) Continuation of application No. 14/609,707, filed on Jan. 30, 2015, now Pat. No. 9,736,774.

(51) **Int. Cl.**
H04W 52/02 (2009.01)
H04W 68/00 (2009.01)

(52) **U.S. Cl.**
CPC ... **H04W 52/0209** (2013.01); **H04W 52/0216** (2013.01); **H04W 52/0229** (2013.01); **H04W 68/00** (2013.01); **Y02D 70/00** (2018.01); **Y02D 70/1262** (2018.01); **Y02D 70/146** (2018.01); **Y02D 70/164** (2018.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2007/0238438 A1	10/2007	Alon et al.
2008/0232373 A1	9/2008	Iyer et al.
2010/0322124 A1	12/2010	Luoma et al.
2012/0213137 A1	8/2012	Jeong et al.
2014/0192767 A1	7/2014	Au et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN	101193016 A	6/2008
CN	102421171 A	4/2012
CN	102612119 A	7/2012

(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 14/150,539, filed Jan. 8, 2014.

Primary Examiner — Diane Lo

(57) **ABSTRACT**

An apparatus and method for a wireless device to receive data in an eco state is provided. According to an embodiment of the disclosure, upon determining that data is to be transmitted to the wireless device in the eco state, a network node operates to transmit a unicast notification message to the wireless device in order to inform the wireless device of the impending data transmission. According to another embodiment of the disclosure, in response to receiving the unicast notification message, the wireless device operates to receive the data in accordance with the unicast notification message. To this end, the wireless device might for example try to receive data for a time period following the unicast notification message. Meanwhile, the wireless device may remain in the eco state.

42 Claims, 5 Drawing Sheets

