US010143002B2

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

(10) **Patent No.: US 10,143,002 B2**
(45) **Date of Patent: Nov. 27, 2018**

(54) **SYSTEM AND METHOD TO FACILITATE CENTRALIZED RADIO RESOURCE MANAGEMENT IN A SPLIT RADIO ACCESS NETWORK ENVIRONMENT**

(71) Applicant: **CISCO TECHNOLOGY, INC.**, San Jose, CA (US)

(72) Inventors: **Ritesh K. Madan**, Berkeley, CA (US); **Rohit Umesh Nabar**, Sunnyvale, CA (US)

(73) Assignee: **Cisco Technology, Inc.**, San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 114 days.

(21) Appl. No.: **14/993,859**

(22) Filed: **Jan. 12, 2016**

(65) **Prior Publication Data**

US 2017/0202005 A1 Jul. 13, 2017

(51) **Int. Cl.**
H04W 72/12 (2009.01)
H04W 28/16 (2009.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H04W 72/1231*** (2013.01); *H04L 47/26* (2013.01); *H04L 47/56* (2013.01); *H04L 47/6255* (2013.01); *H04W 28/16* (2013.01)

(58) **Field of Classification Search**
CPC H04W 24/08; H04W 72/1226–72/1236; H04W 28/16; H04W 72/1231; H04L 47/26; H04L 47/56; H04L 47/6255
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,141,565 A 10/2000 Feuerstein et al.
6,456,848 B1 9/2002 Freeman
(Continued)

FOREIGN PATENT DOCUMENTS

CN 1334999 A 2/2002
CN 101444125 A 5/2009
(Continued)

OTHER PUBLICATIONS

"ETSI TR 136 902 V9.3.1 (May 2011) Technical Report: LTE; Evolved Universal Terrestrial Radio Access Network 9E-UTRAN); Self-configuring and self-optimizing network (SON) use cases and solutions (3GPP TR 36.902 version 9.3.1 Release 9)," ETSI, European Telecommunications Standards Institute, 650 Route des Lucioles F-06921 Sophia Antipolis Cedex—France, May 2011; 23 pages.
(Continued)

Primary Examiner — Dung B Huynh
(74) *Attorney, Agent, or Firm* — Patterson + Sheridan, LLP

(57) **ABSTRACT**

A method is provided in one example embodiment and includes generating feedback information at a first remote access point (AP), wherein the feedback information is associated with one or more user equipment served by the first remote AP; determining constraints for the first remote AP at a central controller based on the feedback information received from the first remote AP and feedback information received from one or more other remote APs that neighbor the first remote AP, wherein the constraints are determined for a plurality of transmission time intervals (TTIs); and scheduling resource blocks (RBs) for the one or more user equipment served by the first remote AP for one or more of the plurality of TTIs based, at least in part, on constraints received from the central controller.

19 Claims, 9 Drawing Sheets