EXHIBIT M

(12) **United States Patent** (10) Patent No.: **US 8,792,432 B2**
Martin et al. (45) Date of Patent: **Jul. 29, 2014**

(54) **PRIORITIZING RACH MESSAGE CONTENTS**

(75) Inventors: **Brian Martin**, Farnham (GB); **Keiichi Kubota**, Weybridge (GB)

(73) Assignee: **Broadcom Corporation**, Irvine, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 435 days.

(21) Appl. No.: **13/026,512**

(22) Filed: **Feb. 14, 2011**

(65) **Prior Publication Data**

US 2012/0207102 A1 Aug. 16, 2012

(51) **Int. Cl.**
H04W 4/00 (2009.01)

(52) **U.S. Cl.**
USPC **370/329**; 370/331

(58) **Field of Classification Search**
USPC 370/329, 331; 455/436, 437, 438, 442, 455/443, 444
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,487,420	B1 *	11/2002	Jonsson	455/522
6,845,238	B1 *	1/2005	Muller	455/436
6,847,420	B2 *	1/2005	Lazarev et al.	349/96
2004/0228313	A1 *	11/2004	Cheng et al.	370/342
2008/0045213	A1 *	2/2008	Norris et al.	455/435.1

FOREIGN PATENT DOCUMENTS

EP	1 720 373	A1	11/2006
EP	1720373	A1 *	11/2006

OTHER PUBLICATIONS

3GPP TSG RAN WG2 Meeting #71, R2-104524, Madrid, Spain, Aug. 23-27, 2010, Nokia Corporation, "Addition of Optimised RACH Message Types", (16 pages).
3GPP TSG-RAN WG2 Meeting #71 bis, R2-105713, Xian, China, Oct. 11-15, 2010, Nokia Corporation, Nokia Siemens Networks, "Analysis on RACH Signalling", (6 pages).
3GPP TSG-RAN WG2 Meeting #72 bis, R2-110304, Dublin, Ireland, Jan. 17-21, 2011, Renesas Electronics Europe, "RACH Signalling Optimisation Considerations", (4 pages).
"Addition of optimised RACH message types", Nokia Corporation, 3GPP TSG-RAN WG2 Meeting #71, R2-104524, Aug. 2010, 15 pgs.
"Analysis on RACH signalling", Nokia Corporation, 3GPP TSG-RAN WG2 Meeting #71bis, R2-105713, Oct. 2010, 5 pgs.
"3rd Generation Partnership Project; Technical Specification Group Radio Access Network' Radio Resource Control (RRC); Protocol specification (Release 10)", 3GPP TS 25.331 V10.2.0, Dec. 2010, 42 pgs.
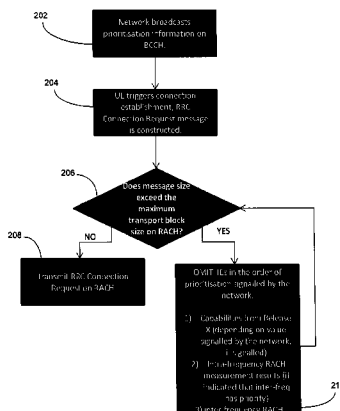
* cited by examiner

Primary Examiner — Andrew Lai
Assistant Examiner — Sumitra Ganguly
(74) *Attorney, Agent, or Firm* — Stanton IP Law

(57) **ABSTRACT**

A network/base station broadcasts an indication to direct a user equipment how to prioritize information for inclusion in an uplink message to be sent on a random access channel RACH. By example one value of the indication directs a user equipment UE to prioritize inter-frequency over intra-frequency neighbor cell measurements for inclusion in the uplink message; and another value (or absence) of the indication directs a UE to prioritize intra-frequency over inter-frequency neighbor cell measurements for inclusion in the uplink message. A UE receiving the broadcast indication constructs the uplink message which includes information that is prioritized in accordance with the indication so as not to exceed a maximum message size. There are also embodiments with second and/or further/third indications in the broadcast system information for more efficiently utilizing the available space in the RACH message, which by example is an RRC Connection Request message in which UE capability information may be prioritized higher or lower than the measurement information.

14 Claims, 4 Drawing Sheets

Figure 1

202

Network broadcasts prioritisation information on BCCH.

204

UE triggers connection establishment, RRC Connection Request message is constructed.

206

Does message size exceed the maximum transport block size on RACH?

208

NO

YES

Transmit RRC Connection Request on RACH

OMIT IEs in the order of prioritisation signalled by the network.

1) Capabilities from Release X (depending on value signalled by the network, if signalled)
2) Intra-frequency RACH measurement results (if indicated that inter-freq has priority)
3) inter-frequency RACH measurement results

210

Figure 2

310: receive a broadcast indication for prioritizing information for inclusion in an uplink message to be sent on a random access channel

312: construct the uplink message which includes information that is prioritized in accordance with the broadcast indication so as not to exceed a maximum message size

314:
- 1st value of the indication directs that inter-frequency neighbor cell measurements are prioritized over intra-frequency neighbor cell measurements for inclusion in the UL message;
- 2nd value of the indication (or lack of the indication altogether) directs that intra-frequency neighbor cell measurements are prioritized over inter-frequency neighbor cell measurements for inclusion in the UL message

316: receive a broadcast second indication in the system information for indicating support for different message types (different ones of the message types allow different volumes of the prioritized information)

318: receive a broadcast further indication in the system information for prioritizing neighbor cell measurement results over capabilities of the UE for inclusion in the UL message to be sent on the RACH

Figure 3B

302: broadcast an indication directing a UE how to prioritize information for inclusion in an uplink message to be sent on a random access channel

304:
- 1st value of the indication directs a UE to prioritize inter-frequency neighbor cell measurements over intra-frequency neighbor cell measurements for inclusion in the UL message;
- 2nd value of the indication or omission of the indication directs a UE to prioritize intra-frequency neighbor cell measurements over inter-frequency neighbor cell measurements for inclusion in the UL message

306: broadcast a second indication in the system information for indicating support for different message types

308: broadcast a further indication in the system information for prioritizing neighbor cell measurement results over capabilities of the user equipment for inclusion in the uplink message to be sent on the random access channel
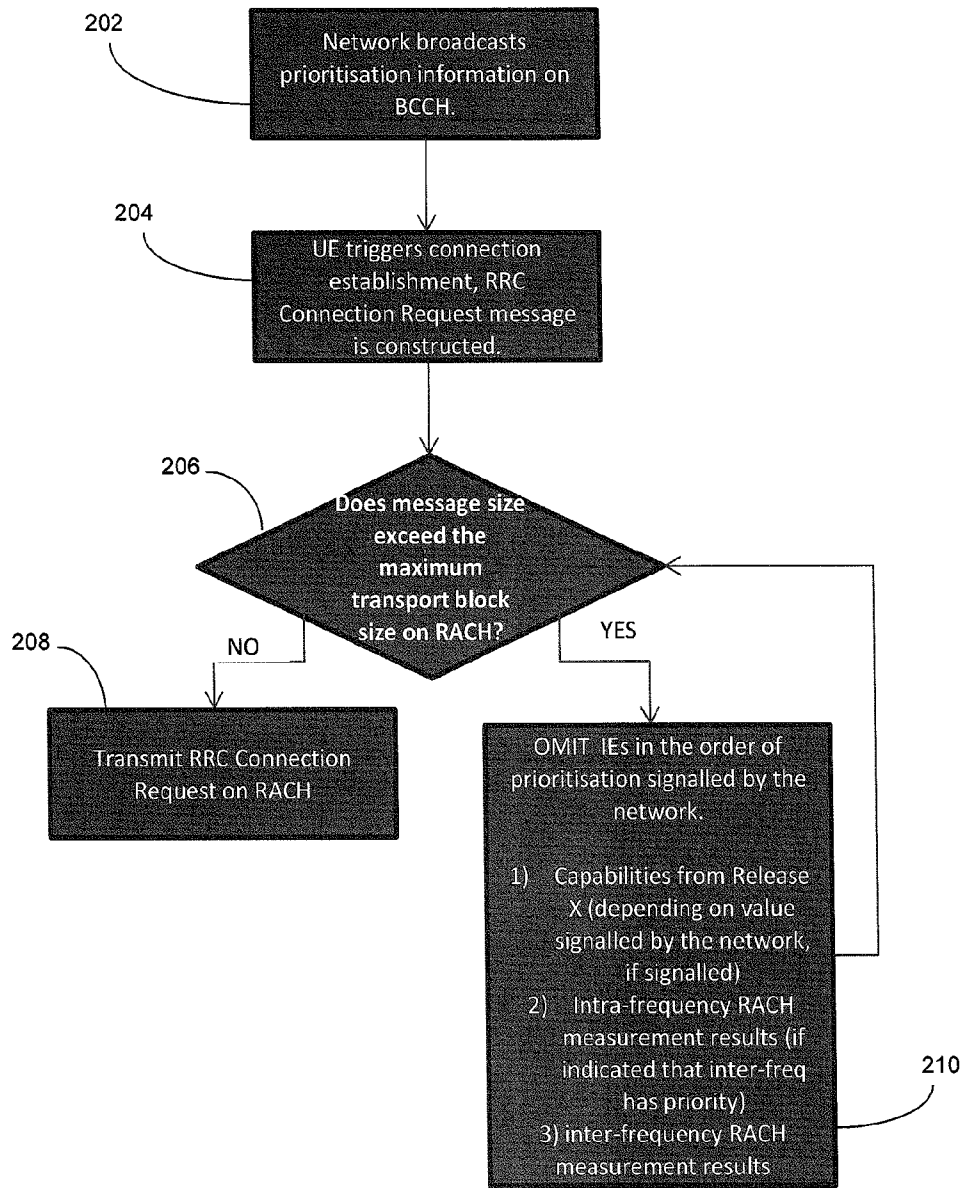
Figure 3A

DOCKET ALARM
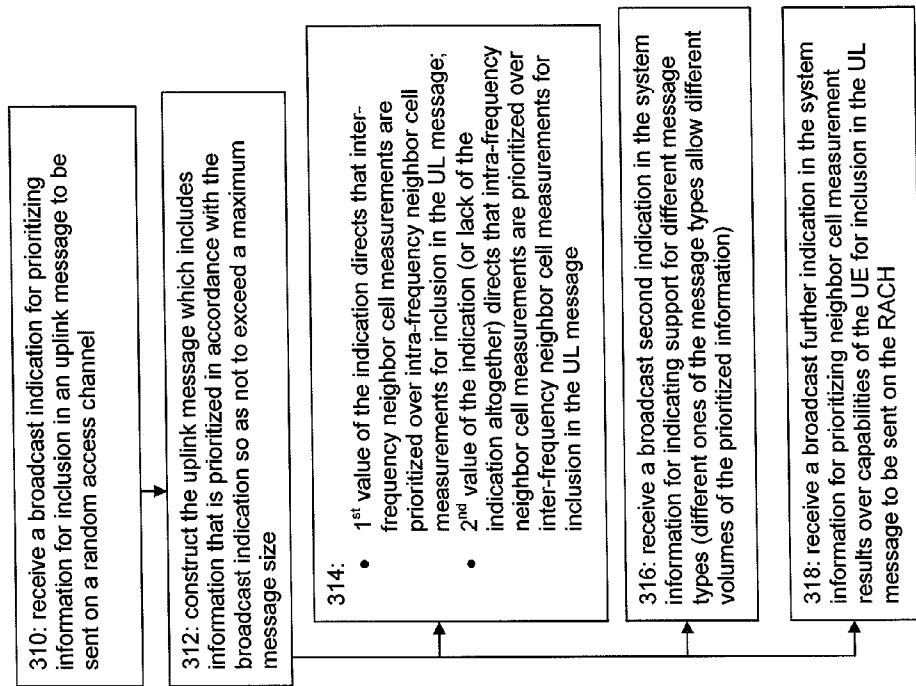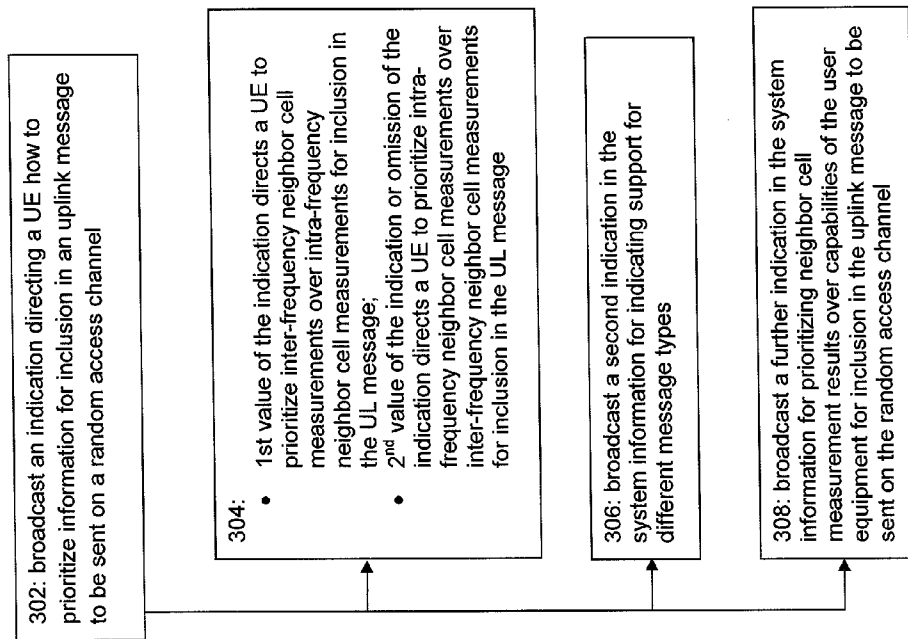
Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.