

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
23 July 2020 (23.07.2020)



(10) International Publication Number
WO 2020/150104 A1

- (51) **International Patent Classification:**
H04L 5/00 (2006.01) *H04W 72/04* (2009.01)
- (21) **International Application Number:**
PCT/US2020/013144
- (22) **International Filing Date:**
10 January 2020 (10.01.2020)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/792,340 14 January 2019 (14.01.2019) US
16/738,850 09 January 2020 (09.01.2020) US
- (71) **Applicant: QUALCOMM INCORPORATED** [US/US];
ATTN: International IP Administration, 5775 Morehouse
Drive, San Diego, California 92121-1714 (US).
- (72) **Inventors: FAN, Zhifei**; 5775 Morehouse Drive, San
Diego, California 92121-1714 (US). **LUO, Tao**; 5775
Morehouse Drive, San Diego, California 92121-1714 (US).
ZHANG, Xiaoxia; 5775 Morehouse Drive, San Diego, Cal-
ifornia 92121-1714 (US). **CHANDE, Vinay**; 5775 More-
house Drive, San Diego, California 92121-1714 (US).
SUN, Jing; 5775 Morehouse Drive, San Diego, Califor-
nia 92121-1714 (US). **CHENDAMARAI KANNAN, Aru-**

mugam; 5775 Morehouse Drive, San Diego, California
92121-1714 (US).

(74) **Agent: SCHRAMM, Paul** et al.; Holland & Hart LLP, P.O.
Box 11583, Salt Lake City, Utah 84147 (US).

(81) **Designated States** (*unless otherwise indicated, for every
kind of national protection available*): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP,
KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,
SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) **Designated States** (*unless otherwise indicated, for every
kind of regional protection available*): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

(54) **Title:** UPLINK CONTROL CHANNEL CODEBOOK DESIGN IN NEW RADIO UNLICENSED

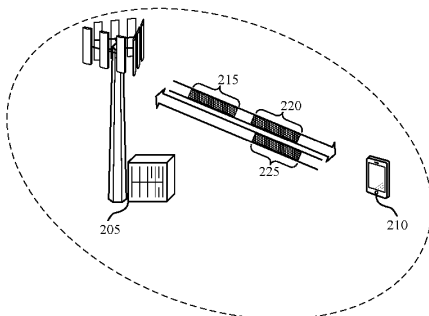


FIG. 2

(57) **Abstract:** Methods, systems, and devices for wireless commu-
nications are described. A user equipment (UE) may receive a plu-
rality of downlink grants for a corresponding plurality of data trans-
missions, wherein each downlink grant identifies resources for re-
ceiving the corresponding data transmission and indicates whether
the corresponding data transmission comprises a last data transmis-
sion for a reporting occasion. The UE may determine, based at least
in part on the received downlink grants, that a last downlink grant
for the last data transmission associated with the reporting occasion
was not received. The UE may transmit a feedback report during the
reporting occasion, wherein a format of the feedback report is based
at least in part on the last downlink grant for the last data transmis-
sion not being received.

WO 2020/150104 A1

[Continued on next page]

Published:

— with international search report (Art. 21(3))