

KT 4G and 5G Essential Patents
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Famly No.	ETSI	REF-NO	Country	Application/Issue No.	Application/issue date	Standard Tech Item	Detail tech items	Standard No.
1	O	P20130686	Provisional Application	10-2013-0114759	2013.09.26	[Rel-13 WI] LTE_MTCe2_L1	Resource allocation information for PDSCH repeated transmission	TS 36.211/36.212/36.213
		P20140028	KR Application	10-2014-0007262	2014.01.21			
		P20140028	KR Issue	10-1940344	2019.01.14			
		P20130686PC	PCT	PCT/KR2014/008216	2014.09.02			
		P20130686US	US Application	15/024,862	2016.03.25			
		P20130686US	US Issue	9,894,644	2018.02.13			
		P20130686CN	CN Application	201480053323.5	2016.03.25			
2		P20130686CN	CN Issue	CN105659511B	2019.02.12			
	O	P20130737	Provisional Application	10-2013-0118593	2013.10.04	[Rel-13 WI] LTE_MTCe2_L1	MTC PDCCH transmission	TS 36.211/36.212/36.213
		P20131006	Provisional Application	10-2013-0142479	2013.11.21			
		P20140221	KR Application	10-2014-0067128	2014.06.02			
		P20140221	KR Issue	10-1919636	2018.11.12			
		P20140221PC	PCT	PCT/KR2014/008995	2014.09.26			
		P20140221US	US Application	15/026,260	2016.03.31			
3		P20140221US	US Issue	9,998,269	2018.06.12			
		P20140221CN	CN Application	201480054504.X	2016.04.01			
		P20140221CN	CN Issue	CN105659514B	2018.06.01			
	O	P20130698	Provisional Application	10-2013-0115367	2013.09.27	[Rel-13 WI] LTE_MTCe2_L1	MTC PUCCH transmission	TS 36.211/36.212/36.213
		P20140216	KR Application	10-2014-0057938	2014.05.14			
		P20140216	KR Issue	10-1904572	2018.09.27			
		P20130698PC	PCT	PCT/KR2014/008765	2014.09.22			
4		P20130698US	US Application	15/025,262	2016.03.25			
		P20130698US	US Issue	10,181,931	2018.01.15			
		P20130698CN	CN Application	201480053321.6	2016.03.25			
		P20130698CN	CN Issue	CN105594139B	2019.10.25			
	O	P20150017	Provisional Application	10-2015-0008486	2015.01.19	[Rel-13 WI] LTE_MTCe2_L1	DL control channel for MTC	TS 36.211/36.212/36.213
		P20150734	Provisional Application	10-2015-0135899	2015.09.24			
		P20150844	KR Application	10-2016-0005012	2016.01.15			
5		P20150844	KR Issue	10-1856304	2018.05.02			
		P20150017PC	PCT	PCT/KR2016/000494	2016.01.18			
		P20150017US	US Application	15/544,363	2017.07.18			
		P20150017US	US Issue	10,306,546	2019.05.28			
		P20150017CN	CN Application	201680004482.5	2017.06.23			
		P20150017CN	CN Issue	CN107113149B	2020.12.08			
	O	P20150278	Provisional Application	10-2015-0068715	2015.05.18	[Rel-13 WI] LTE_MTCe2_L1	CQI feedback of MTC terminal	TS 36.211/36.212/36.213
6		P20150609	Provisional Application	10-2015-0114876	2015.08.13			
		P20160030	KR Application	10-2016-0027594	2016.03.08			
		P20160030	KR Issue	10-1956978	2019.03.05			
		P20150278PC	PCT	PCT/KR2016/005215	2016.05.17			
		P20150278US	US Application	15/569,133	2017.10.25			
		P20150278US	US Issue	10,341,806	2019.07.02			
		P20150278USC1	US Application(CA)	16/412,376	2019.05.14			
7		P20150278USC1	US Issue(CA)	10,728,693	2020.07.28			
		P20150278CN	CN Application	201680006425.0	2017.07.19			
		P20150278CN	CN Issue	CN107211238B	2020.11.06			
	O	P20150724	Provisional Application	10-2015-0135756	2015.09.24	[Rel-13 WI] LTE_MTCe2_L1 [Rel-13 WI] NB-IoT	M-PDCCH starting subframe	TS 36.211/36.212/36.213
		P20150865	Provisional Application	10-2015-0162286	2015.11.19			
		P20160287	KR Application	10-2016-0098858	2016.08.03			
		P20160287	KR Issue	10-1896766	2018.09.03			
8		P20150724US	US Application	15/260,373	2016.09.09			
		P20150724US	US Issue	10,085,249	2018.09.25			
		P20150724CN	CN Application	201610806693.2	2016.09.06			
		P20150724CN	CN Issue	CN106559161B	2019.01.04			
	O	P20160067	Provisional Application	10-2016-0014509	2016.02.04	[Rel-13 WI] NB-IoT	DL HARQ operation for NB-IoT terminal	TS 36.211/36.212/36.213
		P20160076	Provisional Application	10-2016-0015050	2016.02.05			
		P20160169	Provisional Application	10-2016-0039529	2016.03.31			
9		P20160548	KR Application	10-2016-0117138	2016.09.12			
		P20160548	KR Issue	10-1910245	2018.10.15			
		P20160067US	US Application	15/415,781	2017.01.25			
		P20160067US	US Issue	10,568,071	2020.02.18			
		P20160067CN	CN Application	201710021966.9	2017.01.12			
		P20160067CN	CN Issue	Pending				

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		P20160067CND1	CN Application(DA)	2023105561783	2023.05.17			
		P20160067CND1	CN Issue	Pending				
8	O	P20160068	Provisional Application	10-2016-0014508	2016.02.04	[Rel-13 WI] NB-IoT	Uplink control channel for NB-IoT terminal	TS 36.211/36.212/36.213
		P20160549	KR Application	10-2016-0123368	2016.09.26			
		P20160549	KR Issue	10-1888251	2018.08.07			
		P20160068US	US Application	15/421,468	2017.02.01			
		P20160068US	US Issue	11,082,957	2021.08.03			
		P20160068CN	CN Application	201710043604.8	2017.01.19			
		P20160068CN	CN Issue	CN 107040338 B	2020.11.06			
9	O	P20130687	Provisional Application	10-2013-0114763	2013.09.26	[Rel-12 WI] LTE_CA_TDD_FDD	HARQ/Scheduling Timing	TS 36.211/36.212/36.213
		P20130953	Provisional Application	10-2013-0138703	2013.11.15			
		P20140134	KR Application	10-2014-0027531	2014.03.10			
		P20140134	KR Issue	10-1561838	2015.10.14			
		P20140134P1	KR Application(DA)	10-2015-0139479	2015.10.05			
		P20140134P1	KR Issue(DA)	10-1645898	2016.07.28			
		P20130687PC	PCT	PCT/KR2014/008708	2014.09.18			
		P20130687US	US Application	15/024,873	2016.03.25			
		P20130687US	US Issue	10,432,361	2019.10.01			
		P20130687USC1	US Application(CA)	16/542,513	2019.08.16			
		P20130687USC1	US Issue(CA)	10,742,364	2020.08.11			
		P20130687CN	CN Application	201480053584.7	2016.03.28			
10	O	P20140587	Provisional Application	10-2014-0101467	2014.08.07	[Rel-13 WI] LTE_LAA	Unlicensed LTE	TS 36.211/36.212/36.213
		P20150161	KR Application	10-2015-0094846	2015.07.02			
		P20150161	KR Issue	10-1875255	2018.06.29			
		P20140587PC	PCT	PCT/KR2015/008037	2015.07.31			
		P20140587US	US Application	15/501,263	2017.02.02			
		P20140587US	US Issue	10,644,819	2020.05.05			
		P20140587USD1	US Application(DA)	16/832,151	2020.03.27			
		P20140587USD1	US Issue	Pending				
		P20140587CN	CN Application	201580042296.6	2017.02.06			
		P20140587CN	CN Issue	CN106664697B	2020.06.16			
11	O	P20160240	Provisional Application	10-2016-0051737	2016.04.27	[Rel-14 WI] eLAA_LTE	Multi-subframe scheduling method	TS 36.211/36.213
		P20160818	KR Application	10-2016-0171232	2016.12.15			
		P20160818	KR Issue	10-1963483	2019.03.22			
		P20160240US	US Application	15/497,362	2017.04.26			
		P20160240US	US Issue	10,412,731	2019.09.10			
		P20160240USC1	US Application(CA)	16/529,789	2019.08.02			
		P20160240USC1	US Issue(CA)	10,616,889	2020.04.07			
		P20160240CN	CN Application	201710280467.X	2017.04.26			
12	O	P20160683	Provisional Application	10-2016-0127089	2016.09.30	[Rel-14 WI] LTE_VoLTE_VILTE_enh	PUSCH enhancement mode	TS 36.211/36.212/36.213
		P20170199	KR Application	10-2017-0080594	2017.06.26			
		P20170199	KR Issue	10-2085195	2020.02.28			
		P20160683US	US Application	15/716,568	2017.09.27			
		P20160683US	US Issue	10,581,560	2020.03.03			
		P20160683CN	CN Application	201710795343.5	2017.09.06			
		P20160683CN	CN Issue	CN 107888333 B	2020.12.08			
13	O	P20160126	Provisional Application	10-2016-0030172	2016.03.14	[Rel-15 WI] LTE_sTTIandPT	DL control channel for short TTI	TS 36.211/36.212/36.213
		P20160855	KR Application	10-2017-0022956	2017.02.21			
		P20160855	KR Issue	10-2237525	2021.04.01			
		P20160126PC	PCT	PCT/KR2017/002535	2017.03.08			
		P20160126US(외)	US Application	16/084,594	2018.09.13			
		P20160126US(외)	US Issue	11,197,309	2021.12.07			
		P20160126CN	CN Application	201780017398.1	2018.09.14			
		P20160126CN	CN Issue	CN 108781154B	2021.12.14			
14	O	P20160143	Provisional Application	10-2016-0037224	2016.03.28	[Rel-15 WI] LTE_sTTIandPT	UL data channel for short TTI	TS 36.211/36.212/36.213
		P20160856	KR Application	10-2017-0022964	2017.02.21			
		P20160856	KR Issue	10-2065432	2020.01.07			
		P20160143PC	PCT	PCT/KR2017/002536	2017.03.08			
		P20160143US	US Application	16/088,914	2018.09.27			
		P20160143US	US Issue	10,892,867	2021.01.12			
		P20160143CN	CN Application	201780013601.8	2018.08.27			
		P20160143CN	CN Issue	CN 108702280 B	2021.09.24			
	O	P20160257	Provisional Application	10-2016-0055676	2016.05.04	[Rel-15 WI] LTE_sTTIandPT	short PUSCH and legacy SRS	TS 36.211/36.212/36.213
		P20160265	Provisional Application	10-2016-0058317	2016.05.12			
		P20170206	KR Application	10-2017-0056206	2017.05.02			
		P20170206	KR Issue	10-2120976	2020.06.03			

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15		P20170207	KR Application	10-2017-0056011	2017.05.02		
		P20170207	KR Issue	10-2093906	2020.03.20		
		P20160257PC	PCT	PCT/KR2017/00470 2	2017.05.02		
		P20160257US	US Application	16/098,812	2018.11.02		
		P20160257US	US Issue	11,431,460	2022.08.30		
		P20160257US	US reissue Application	18/820,247	2024.08.29		
		P20160257CN	CN Application	201780027159.4	2018.11.01		
		P20160257CN	CN Issue	CN 109075949 B	2021.12.14		
		P20170207P1	KR Application(DA)	10-2020-0031570	2020.03.13	[Rel-15 WI] LTE_sTTIandPT	DCI search space for sTTI TS 36.211/36.212/36.213
		P20170207P1	KR Issue(DA)	10-2121009	2020.06.03		
		P20160257USD1	US Application(DA)	16/179,863	2018.11.02		
		P20160257USD1	US Issue (DA)	11,431,461	2022.08.30		
		P20160257CND1	CN Application(DA)	201811307533.9	2018.11.05		
		P20160257CND1	CN Issue(DA)	CN 109547182 B	2021.07.23		
16	O	P20160645	Provisional Application	10-2016-0116784	2016.09.09	[Rel-15 WI] LTE_sTTIandPT	short PDSCH and short PUCCH TS 36.211/36.212/36.213
		P20170334	KR Application	10-2017-0098820	2017.08.04		
		P20170334	KR Issue	10-2120856	2020.06.03		
		P20160645PC	PCT	PCT/KR2017/00873 4	2017.08.11		
		P20160645US	US Application	16/331,969	2019.03.09		
		P20160645US	US Issue	11,115,976	2021.09.07		
		P20160645CN	CN Application	201780055337.4	2019.03.08		
17		P20160645CN	CN Issue	CN 109691000 B	2021.11.05		
	O	P20160670	Provisional Application	10-2016-0122509	2016.09.23	[Rel-15 WI] LTE_sTTIandPT	CQI estimation and feedback for short TTI TS 36.211/36.212/36.213
		P20170648	KR Application	10-2017-0118923	2017.09.15		
		P20170648	KR Issue	10-2186397	2020.11.27		
		P20160670PC	PCT	PCT/KR2017/01049 6	2017.09.22		
		P20160670US	US Application	16/335,717	2019.03.22		
		P20160670US	US Issue	10,849,111	2020.11.24		
18		P20160670CN	CN Application	201780058930.4	2019.03.25		
		P20160670CN	CN Issue	CN 109792315 B	2021.10.26		
	O	P20140174	Provisional Application	10-2014-0033579	2014.03.21	[Rel-12 WI] LTE_SC_enh_L1 (256QAM)	CQI configuration for 256QAM TS 36.212/36.213
		P20140196	Provisional Application	10-2014-0034955	2014.03.25		
		P20140207	Provisional Application	10-2014-0037394	2014.03.31		
		P20140784	KR Application	10-2014-0175190	2014.12.08		
		P20140784	KR Issue	10-1722300	2017.03.27		
		P20140174PC	PCT	PCT/KR2015/00202 1	2015.03.03		
		P20140174US	US Application	14/664,853	2015.03.21		
		P20140174US	US Issue	9,629,010	2017.04.18		
		P20140174USC1	US Application(CA)	15/454,020	2017.03.09		
		P20140174USC1	US Issue(CA)	10,009,161	2018.06.26		
		P20140174CN	CN Application	201580006948.0	2016.08.02		
19		P20140174CN	CN Issue	CN 106063214 B	2019.07.02		
		P20140174CND1	CN Application(DA)	201910480118.1	2019.06.04		
		P20140174CND1	CN Issue(DA)	CN 110149169 B	2021.12.14		
	O	P20150004	Provisional Application	10-2015-0002948	2015.01.08	[Rel-13 WI] LTE_SC_PTM	service continuity TS 36.331
		P20150843	KR Application	10-2016-0000376	2016.01.04		
		P20150843	KR Issue	10-1818833	2018.01.09		
		P20150004PC	PCT	PCT/KR2016/00005 3	2016.01.05		
		P20150004US	US Application	15/541,792	2017.07.06		
20		P20150004US	US Issue	11,330,573	2022.05.10		
		P20150004CN	CN Application	201680004054.2	2017.06.08		
		P20150004CN	CN Issue	CN 107005903 B	2021.01.15		
	O	P20150003	Provisional Application	10-2015-0002930	2015.01.08	[Rel-13 WI] LTE_SC_PTM	service continuity TS 36.331
		P20150842	KR Application	10-2015-0185653	2015.12.24		
		P20150842	KR Issue	10-1866619	2018.06.04		
		P20150003PC	PCT	PCT/KR2015/01447 9	2015.12.30		
		P20150003US	US Application	15/541,753	2017.07.06		
		P20150003US	US Issue	10,237,084	2019.03.19		
		P20150003CN	CN Application	201580066326.7	2017.06.06		
		P20150003CN	CN Issue	CN 107005820 B	2020.11.03		
	O	P20140677	Provisional Application	10-2014-0119263	2014.09.05	[Rel-13 WI] LTE_WLAN_radio	User plane mapping TS 36.331
		P20150247	KR Application	10-2015-0094021	2015.07.01		

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21		P20150247	KR Issue	10-1814248	2017.12.26		
		P20140677PC	PCT	PCT/KR2015/00933 3	2015.09.04		
		P20140677US	US Application	15/508,208	2017.03.02		
		P20140677US	US Issue	10,735,967	2020.08.04		
		P20140677CN	CN Application	201580047094.0	2017.03.02		
22		P20140677CN	CN Issue	CN 106717045 B	2021.03.05		
	O	P20150098	Provisional Application	10-2015-0032665	2015.03.09	[Rel-13 WI] LTE_CA_enh_b5C	PUCCH SCell activation time TS 36.321
		P20160023	KR Application	10-2016-0021712	2016.02.24		
		P20160023	KR Issue	10-1987525	2019.06.03		
		P20150098PC	PCT	PCT/KR2016/00228 1	2016.03.08		
		P20150098US	US Application	15/556,028	2017.09.06		
		P20150098US	US Issue	10,708,893	2020.07.07		
		P20150098CN	CN Application	201680013808.0	2017.09.05		
23		P20150098CN	CN Issue	CN 107431592 B	2020.07.07		
	O	P20130907	Provisional Application	10-2013-0135867	2013.11.08	[Rel-12 WI] LTE_SC_enh_dualC (PHY)(NR ONLY)	PUCCH/PUSCH Power control TS 36.211/36.212/36.213
		P20140043	Provisional Application	10-2014-0012709	2014.02.04		
		P20140224	KR Application	10-2014-0088948	2014.07.15		
		P20140224	KR Issue	10-1611825	2016.04.06		
		P20130907PC	PCT	PCT/KR2014/01056 5	2014.11.05		
		P20130907US	US Application	15/027,002	2016.04.04		
		P20130907US	US Issue	9,713,094	2017.07.18		
		P20130907USC1	US Application(CA)	15/617,137	2017.06.08		
		P20130907USC1	US Issue(CA)	10,178,626	2019.01.08		
		P20130907CN	CN Application	201480054086.4	2016.03.30		
		P20130907CN	CN Issue	CN 105594263 B	2019.11.01		
		P20130907CND	CN Application(DA)	201910949779.4	2019.10.08		
24		P20130907CND	CN Issue	110677905 B	2023.06.16		
	O	P20140253	Provisional Application	10-2014-0046986	2014.04.18	[Rel-12 WI] LTE_SC_enh_dualC (PHY)	UE capability for dual connectivity TS38.213/38.331
		P20141039	KR Application	10-2015-0021154	2015.02.11		
		P20141039	KR Issue	10-1674791	2016.11.03		
		P20140253US	US Application	14/687,865	2015.04.15		
		P20140253US	US Issue	10091736	2018.10.02		
		P20140253CN	CN Application	201510188805.8	2015.04.20		
25		P20140253CN	CN Issue	CN 105007616 B	2019.09.24		
	O	P20140175	Provisional Application	10-2014-0033589	2014.03.21	[Rel-12 WI] LTE_SC_enh_L1 (256QAM)(NR ONLY)	MCS configuration for 256QAM TS 36.212/36.213
		P20140197	Provisional Application	10-2014-0034957	2014.03.25		
		P20140208	Provisional Application	10-2014-0037398	2014.03.31		
		P20140325	Provisional Application	10-2014-0059630	2014.05.19		
		P20140785	KR Application	10-2014-0175182	2014.12.08		
		P20140785	KR Issue	10-1632354	2016.06.15		
		P20140175PC	PCT	PCT/KR2015/00202 2	2015.03.03		
		P20140175US	US Application	14/664,854	2015.03.21		
		P20140175US	US Issue	9461771	2016.10.04		
		P20140175CN	CN Application	201580006949.5	2016.08.02		
		P20140175CN	CN Issue	CN 106464647 B	2019.09.13		
		P20140175CND1	CN Application(DA)	201910768106.9	2019.08.20		
26		P20140175CND1	CN Issue(DA)	CN 110460409 B	2022.06.24		
	O	P20140174	Provisional Application	10-2014-0033579	2014.03.21	[Rel-12 WI] LTE_SC_enh_L1 (256QAM)	CQI configuration for 256QAM(NR) TS 36.212/36.213
		P20140196	Provisional Application	10-2014-0034955	2014.03.25		
		P20140207	Provisional Application	10-2014-0037394	2014.03.31		
		P20140784	KR Application	10-2014-0175190	2014.12.08		
		P20140784	KR Issue	10-1722300	2017.03.27		
		P20140174PC	PCT	PCT/KR2015/00202 1	2015.03.03		
		P20140174US	US Application	14/664,853	2015.03.21		
		P20140174US	US Issue	9,629,010	2017.04.18		
		P20140174USC1	US Application(CA)	15/454,020	2017.03.09		
		P20140174USC1	US Issue(CA)	10,009,161	2018.06.26		
		P20140174CN	CN Application	201580006948.0	2016.08.02		
		P20140174CN	CN Issue	CN 106063214 B	2019.07.02		
		P20140174CND1	CN Application(DA)	201910480118.1	2019.06.04		
		P20140174CND1	CN Issue(DA)	CN 110149169 B	2021.12.14		

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27	O	P20180014	Provisional Application	10-2018-0004091	2018.01.11	[Rel-15 WI] NR_newRAT	MCS configuration for NR URLLC	TS 38.211/38.212/38.213
		P20180305	Provisional Application	10-2018-0058965	2018.05.24			
		P20180507	KR Application	10-2018-0132306	2018.10.31			
		P20180507	KR Issue	10-2173331	2020.10.28			
		P20180014US	US Application	16/241,086	2019.01.07			
		P20180014US	US Issue	11,258,532	2022.02.22			
		P20180014USC1	US Application(CA1)	17/565,353	2021.12.29			
		P20180014USC1	US Issue(CA1)	RCE	2023.05.01			
		P20180014USC1C1	US Application(CA2)	18/355,882	2023.07.20			
		P20180014USC1C1	US Issue(CA2)					
		P20180305EP	EP Application	19150559.3	2019.01.07			
		P20180305EP	EP Issue	Issued	2024.12.13			
		P20180014CN	CN Application	201910011509.9	2019.01.07			
			CN Issue	CN 110034906 B	2022.08.30			
28	O	P20160508	Provisional Application	10-2016-0089972	2016.07.15	[Rel-15 WI] NR_newRAT	Initial access	TS 38.211/38.212/38.213
		P20170351	KR Application	10-2017-0087597	2017.07.11			
		P20170351	KR Issue	10-2178412	2020.11.09			
		P20160508PC	PCT	PCT/KR2017/007466	2017.07.12			
		P20160508US	US Application	16/316,774	2019.01.10			
		P20160508US	US Issue	10,791,530	2020.09.29			
		P20160508EP	EP Application	17827948.5	2017.07.12			
		P20160508EP	EP Issue	EP3462639B1	2023.08.30			
		P20160508EPD	EP Application(DA)	EP17827948A	2017.07.12			
		P20160508EPD	EP Issue(DA)					
		P20160508CN	CN Application	201780041919.7	2019.01.04			
		P20160508CN	CN Issue	CN 109417422 B	2022.02.18			
29	O	P20160720	Provisional Application	10-2016-0130101	2016.10.07	[Rel-15 WI] NR_newRAT	Set up a sync signal for frequency offset estimation	TS 38.214/38.211/38.300
		P20170649	KR Application	10-2017-0124261	2017.09.26			
		P20170649	KR Issue	10-2156672	2020.09.10			
		P20160720PC	PCT	PCT/KR2017/010863	2017.09.28			
		P20160720US	US Application	16/340,096	2019.04.05			
		P20160720US	US Issue	11,038,735	2021.06.15			
		P20160720USC1	US Application(CA1)	17/314,034	2021.05.06			
		P20160720USC1	US Issue(CA1)	11,569,958	2023.01.31			
		P20160720USC1C1	US Application(CA2)	18/078,965	2022.12.11			
		P20160720USC1C1	US Issue(CA2)	11,996,970	2024.05.28			
		P20160720USC1C1C1	US Application(CA3)	18/664,327	2024.05.15			
		P20160720USC1C1C1	US Issue(CA3)					
		P20160720EP	EP Application	17858693.9	2019.04.16			
		P20160720EP	EP Issue	EP3525408B1	2023.10.11			
		P20160720EPD	EP Application(DA)	EP23194258.2	2023.05.23			
		P20160720EPD	EP Issue(DA)					
		P20160720CN	CN Application	201780061902.8	2019.04.04			
		P20160720CN	CN Issue	CN 109792429 B	2021.12.14			
30	O	P20160696	Provisional Application	10-2016-0127093	2016.09.30	[Rel-15 WI] NR_newRAT	Set up a sync signal for frequency offset estimation	TS 36.211/36.212/36.213
		P20170667	KR Application	10-2017-0124195	2017.09.26			
		P20160696PC	PCT	PCT/KR2017/010811	2017.09.28			
		P20160696US	US Application	16/338,433	2019.03.29			
		P20160696US	US Issue	11,363,548	2022.06.14			
		P20160696EP	EP Application	17856779.8	2019.04.10			
		P20160696EP	EP Issue	EP3522405B1	2023.10.11			
		P20160696CN	CN Application	201780061059.3	2019.04.01			
		P20160696CN	CN Issue	CN 109906569 B	2021.05.11			
31	O	P20160768	Provisional Application	10-2016-0141451	2016.10.27	[Rel-15 WI] NR_newRAT	uplink control channel scheduling	TS 38.211/38.212/38.213
		P20170778	Provisional Application	10-2017-0130023	2017.10.11			
		P20170798	KR Application	10-2017-0139598	2017.10.25			
		P20170798	KR Issue	10-2057127	2019.12.12			
		P20160768PC	PCT	PCT/KR2017/011958	2017.10.27			
		P20160768US	US Application	16/344,947	2019.04.25			
		P20160768US	US Issue	11,115,157	2021.09.07			
		RE-P20160768US	Reissue	18/136,835	2023.04.24			
		RE-P20160768US	Reissue issue					

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		P20160768USC1	US Application(CA)	17/379,977	2021.07.19			
		P20160768USC1	US Issue	12,101,180	2024.09.24			
		P20160768USC2	CA Application	18/814,525	2024.08.25			
		P20160768USC2						
		P20160768EP	EP Application	17865477.8	2019.04.26			
		P20160768EP	EP issued	3518601	2023.04.07			
		P20160768CN	CN Application	201780062118.9	2019.04.08			
		P20160768CN	CN Issue	CN 109804692 B	2022.07.15			
32	O	P20160768	Provisional Application	10-2016-0141451	2016.10.27	[Rel-15 WI] NR_newRAT	uplink signal and downlink data channel scheduling	TS 38.211/38.212/38.213
		P20170778	Provisional Application	10-2017-0130023	2017.10.11			
		P20170142	Provisional Application	10-2017-0037553	2017.03.24			
		P20170428	Provisional Application	10-2017-0079911	2017.06.23			
		P20170808	KR Application(병합)	10-2017-0139885	2017.10.26			
		P20170808	KR Issue(병합)	10-2162591	2020.09.28			
		P20170142PC	PCT	PCT/KR2017/011968	2017.10.27			
		P20170142US	US Application	16/340,460	2019.04.09			
		P20170142US	US Issue	10,925,079	2021.02.16			
		RE-P20170142US	reissue	18/110,356	2023.02.15			
		RE-P20170142US	Reissue issue					
		P20170142EP	EP Application	17865212.9	2019.04.26			
		P20170142EP	EP Issue	EP13518600B1	2023.07.26			
		P20170142EPD	EP Application(DA)	23178353.1	2023.06.09			
		P20170142EPD	EP Issue(DA)					
33		P20170142CN	CN Application	201780066539.9	2019.04.26			
		P20170142CN	CN Issue	CN 109891988 B	2022.08.09			
	O	P20170142	Provisional Application	10-2017-0037553	2017.03.24	[Rel-15 WI] NR_newRAT	data channel scheduling	TS 38.211/38.212/38.213
		P20170428	Provisional Application	10-2017-0079911	2017.06.23			
		P20170800	KR Application	10-2017-0139604	2017.10.25			
		P20170800	KR Issue	10-2010019	2019.08.06			
		P20170428US	US Application	15/934,927	2018.03.23			
		P20170428US	US Issue	10,506,630	2019.12.10			
		P20170428USC1	US CA Application	18/783,375	2024.07.23			
34		P20170428USC1						
		P20170428CN	CN Application	201810251436.6	2018.03.26			
		P20170428CN	CN Issue	CN 108633076 B	2022.09.09			
	O	P20160836	Provisional Application	10-2016-0152659	2016.11.16	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170803	KR Application	10-2017-0151983	2017.11.15			
		P20170803	KR Issue	10-2156668	2020.09.10			
		P20160836PC	PCT	PCT/KR2017/012992	2017.11.16			
		P20160836US	US Application	16/349,874	2019.05.14			
		P20160836US	US Issue	11,405,942	2022.08.02			
35		P20160836CN	CN Application	201780069729.6	2019.05.10			
		P20160836CN	CN issue	CN109937600B	2023.06.23			
		P20160836CND	CN Application(DA)	2023106886354	2023.06.12			
		P20160836CND	CN Issue(DA)					
	O	P20160627	Provisional Application	10-2016-0112748	2016.09.01	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170169	KR Application	10-2017-0059543	2017.05.12			
		P20170169	KR Issue	10-2123233	2020.06.10			
		P20160627PC	PCT	PCT/KR2017/008944	2017.08.17			
		P20160627US	US Application	16/318,466	2019.01.17			
		P20160627US	US Issue	11,044,743	2021.06.22			
		P20160627USC1	US Application(CA1)	17/307,945	2021.05.04			
		P20160627USC1	US Issue (CA1)	11,765,735	2023.05.09			
		P20160627USC1C1	US Application(CA2)	18/369,192	2023.09.17			
		P20160627USC1C1	US Issue (CA2)					
		P20160627EP	EP Application	17846885.6	2018.12.28			
		P20160627EP	EP issued	3462796	2023.05.10			
		P20160627CN	CN Application	201780039745.0	2018.12.26			
		P20160627CN	CN Issue	CN 109328481 B	2022.03.18			
	O	P20170132	Provisional Application	10-2017-0035615	2017.03.21	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170866	Provisional Application	10-2017-0101169	2017.08.09			
		P20170935	KR Application	10-2018-0014576	2018.02.06			
		P20170935	KR Issue	10-2043996	2019.11.06			

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36		P20170935P1	KR Application(DA)	10-2019-0135870	2019.10.29			
		P20170935P1	KR Issue(DA)	10-2206761	2021.01.19			
		P20170132US	US Application	15/924,553	2018.03.19			
		P20170132US	US Issue	10,856,307	2020.12.01			
		P20170132CN	CN Application	201810236651.9	2018.03.21			
		P20170132CN	CN Issue	CN 108633073 B	2023.03.10			
37	O	P20170131	Provisional Application	10-2017-0033297	2017.03.16	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170479	Provisional Application	10-2017-0082920	2017.06.29			
		P20170622	Provisional Application	10-2017-0101782	2017.08.10			
		P20170132	Provisional Application	10-2017-0035615	2017.03.21			
		P20170866	Provisional Application	10-2017-0101169	2017.08.09			
		P20180049	KR Application	10-2018-0018656	2018.02.14			
		P20180049	KR Issue	10-2100483	2020.04.07			
		P20170479US	US Application	15/923,658	2018.03.16			
		P20170479US	US Issue	10,869,303	2020.12.15			
		RE-P20170479US	Reissue	18/080,772	2022.12.13			
		RE-P20170479US	Reissue issue					
		P20170479CN	CN Application	201810217863.2	2018.03.16			
	P20170479CN	CN Issue	CN 108633072 B	2022.08.26				
38	O	P20160835	Provisional Application	10-2016-0152845	2016.11.16	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170801	KR Application	10-2017-0150595	2017.11.13			
		P20170801	KR Issue	10-2129362	2020.06.26			
		P20160835PC	PCT	PCT/KR2017/012910	2017.11.15			
		P20160835US	US Application	16/349,347	2019.05.13			
		P20160835US	US Issue	10,897,720	2021.01.19			
		RE-P20160835US	reissue	18/098,656	2023.01.17			
		RE-P20160835US	Reissue issue					
		P20160835CN	CN Application	201780069670.0	2019.05.10			
		P20160835CN	CN Issue	CN 109964522 B	2023.06.02			
		P20160835CND	CN Application(DA)	202310564941	2023.05.18			
		P20160835CND	CN Issue(DA)					
39	O	P20170131	Provisional Application	10-2017-0033297	2017.03.16	[Rel-15 WI] NR_newRAT	eMBB/URLLC multiplexing	TS 38.211/38.212/38.213
		P20170479	Provisional Application	10-2017-0082920	2017.06.29			
		P20170622	Provisional Application	10-2017-0101782	2017.08.10			
		P20170934	KR Application	10-2018-0014571	2018.02.06			
		P20170934	KR Issue	10-2117970	2020.05.27			
		P20170131US	US Application	15/920,524	2018.03.14			
		P20170131US	US Issue	10,609,699	2020.03.31			
		P20170131USC1	US Application(CA1)	16/792,826	2020.02.17			
		P20170131USC1	US Issue(CA1)	11,044,718	2021.06.22			
		P20170131USC1C1	US Application(CA2)	17/307,978	2021.05.04			
		P20170131USC1C1	US Issue(CA2)	11,943,781	2023.06.29			
		P20170131USC1C1C1	US Application(CA3)	18/614,530	2024.03.22			
		P20170131USC1C1C1	US Issue(CA3)					
		P20170131CN	CN Application	201810217772.9	2018.03.16			
		P20170131CN	CN Issue	CN 108633071 B	2022.08.26			
40	O	P20160837	Provisional Application	10-2016-0152587	2016.11.16	[Rel-15 WI] NR_newRAT	UL control channel	TS 38.211/38.212/38.213
		P20170804	KR Application	10-2017-0153125	2017.11.16			
		P20170804	KR Issue	10-2195869	2020.12.21			
		P20160837PC	PCT	PCT/KR2017/013045	2017.11.16			
		P20160837US	US Application	16/461,640	2019.05.16			
		P20160837US	US Issue	11,240,785	2022.02.01			
		P20160837USC1	US Application(CA)	17/543,675	2021.12.06			
		P20160837USC1	US Issue	Pending				
		P20160837EP	EP Application	17871249.3	2019.05.27			
		P20160837EP	EP Issue	EP3544349B1	2024.02.14			
		P20160837CN	CN Application	201780070560.6	2019.05.15			
		P20160837CN	CN Issue	109964524 B	2023.04.18			
41	O	P20170011	Provisional Application	10-2017-0002589	2017.01.06	[Rel-15 WI] NR_newRAT	DL control channel	TS 38.211/38.212/38.213
		P20170296	Provisional Application	10-2017-0066632	2017.05.30			
		P20170933	KR Application	10-2018-0001157	2018.01.04			
		P20170933	KR Issue	10-2114096	2020.05.18			
		P20170011PC	PCT	PCT/KR2018/000221	2018.01.05			

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		P20170011US	US Application	16/464,135	2019.05.24			
		P20170011US	US Issue	11,160,051	2021.10.26			
		P20170011US	reissue	18/383,861	10/25/2023			
		P20170011EP	EP Application	18736364.3	2019.05.31			
		P20170011EP	EP issue	Pending				
		P20170011CN	CN Application	201880004512.1	2019.05.22			
		P20170011CN	CN Issue	CN 110024323 B	2022.02.22			
42	O	P20170531	Provisional Application	10-2017-0089654	2017.07.14	[Rel-15 WI] NR_newRAT	IFDMA-based beam management using CSI-RS for NR MIMO	TS 38.211/38.212/38.213
		P20180193	KR Application	10-2018-0054207	2018.05.11			
		P20180193	KR Issue	10-2128964	2020.06.25			
		P20170531US	US Application	16/027,937	2018.07.05			
		P20170531US	US Issue	10,715,290	2020.07.14			
		P20170531CN	CN Application	201810756991.4	2018.07.11			
		P20170531CN	CN issue	109257821 B	2023.04.07			
43	O	P20160807	Provisional Application	10-2016-0146955	2016.11.04	[Rel-15 WI] NR_newRAT	multi-beam scheduling	TS 36.211/36.212/36.213
		P20170669	KR application	10-2017-0135215	2017.10.18			
		P20170669	KR Issue	10-2130999	2020.07.01			
		P20160807PC	PCT	PCT/KR2017/012003	2017.10.27			
		P20160807US	US Application	16/347,571	2019.05.03			
		P20160807US	US issue	12,193,038	2025..1.07			
		P20160807USC1	US Application	18/896,876	2024.09.25			
		P20160807USC1	US issue					
		P20160807EP	EP Application	17867332.3	2019.05.13			
		P20160807EP	EP Issue	3537823	2024.05.15			
		P20160807CN	CN Application	201780067633.6	2019.04.30			
		P20160807CN	CN Issue	Pending				
44	O	P20160806	Provisional Application	10-2016-0146950	2016.11.04	[Rel-15 WI] NR_newRAT	RACH operation in a situation where NR Tx/Rx channel reciprocity cannot be used	TS 36.211/36.212/36.213
		P20170668	KR Application	10-2017-0135198	2017.10.18			
		P20170668	KR Issue	10-2092560	2020.03.18			
		P20160806PC	PCT	PCT/KR2017/011989	2017.10.27			
		P20160806US	US Application	16/347,568	2019.05.03			
		P20160806US	US Issue	10,966,253	2021.03.30			
		P20160806USC1	US Application(CA1)	17/176,149	2021.02.15			
		P20160806USC1	US Issue	12,022,518	2024.06.25			
		P20160806USC1C1	US Application(CA2)	18/665,591	2024.05.16			
		P20160806USC1C1	US Issue					
		P20160806USC1C1C1	US Application(CA3)	19/031,874	2025.01.18			
		P20160806USC1C1C1	US Issue					
		P20160806EP	EP Application	17866547.7	2019.05.13			
		P20160806EP	EP Issue	3537794	2021.09.08			
		P20160806DE	DE Application	17866547.7	2019.05.13			
		P20160806DE	DE Issue	3537794	2021.09.08			
		P20160806GB	GB Application	17866547.7	2019.05.13			
		P20160806GB	GB Issue	3537794	2021.09.08			
		P20160806FR	FR Application	17866547.7	2019.05.13			
		P20160806FR	FR Issue	3537794	2021.09.08			
		P20160806CN	CN Application	201780067632.1	2019.04.30			
		P20160806CN	CN Issue	CN 109891979 B	2023.06.06			
		P20160806CND	CN Application(DA)	2023105653319	2023.05.16			
		P20160806CND	CN Issue(DA)					
45	O	P20170594	Provisional Application	10-2017-0095980	2017.07.28	[Rel-15 WI] NR_newRAT	PUCCH frequency hopping	TS 38.211/38.212/38.213
		P20170621	Provisional Application	10-2017-0102577	2017.08.11			
		P20180204	KR Application	10-2018-0057278	2018.05.18			
		P20180204	KR Issue	10-2117968	2020.05.27			
		P20170594US	US Application	16/048,210	2018.07.27			
		P20170594US	US Issue	10,594,460	2020.03.17			
		P20170594CN	CN Application	201810801096.X	2018.07.20			
46		P20170594CN	CN Issue	CN 109309558 B	2021.10.08			
	O	P20170764	Provisional Application	10-2017-0128188	2017.09.29	[Rel-15 WI] NR_newRAT	PUCCH resource mapping	TS 38.211/38.212/38.213
		P20170916	Provisional Application	10-2017-0162728	2017.11.30			
		P20180207	KR Application	10-2018-0077270	2018.07.03			
		P20180207	KR Issue	10-2114949	2020.05.19			
		P20180207P1	KR Application(DA)	10-2020-0042931	2020.04.08			
		P20180207P1	KR Issue(DA)	10-2246988	2021.04.26			
		P20170764US	US Application	16/147,530	2018.09.28			
		P20170764US	US Issue	10,638,463	2020.04.28			

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		P20170764USD1	US Application(DA)	16/826,482	2020.03.23			
		P20170764USD1	US Issue (DA)	11,219,000	2022.01.04			
		P20170764CN	CN Application	201811148762.0	2018.09.29			
		P20170764CN	CN Issue	CN 109586883 B	2021.11.05			
47	O	P20170795	Provisional Application	10-2017-0128513	2017.10.02	[Rel-15 WI] NR_newRAT	PUCCH multiplexing	TS 38.211/38.212/38.213
		P20180084	Provisional Application	10-2018-0022186	2018.02.23			
		P20180208	KR Application	10-2018-0096773	2018.08.20			
		P20180208	KR Issue	10-2102319	2020.04.13			
		P20170795US	US Application	16/149,344	2018.10.02			
		P20170795US	US Issue	10,715,283	2020.07.14			
		P20170795CN	CN Application	201811168010.0	2018.10.08			
		P20170795CN	CN Issue	CN 109600212 B	2021.08.31			
48	O	P20160645	Provisional Application	10-2016-0116784	2016.09.09	[Rel-15 WI] LTE_sTTlandPT	short PDSCH and short PUCCH	TS 36.211/36.212/36.213
		P20170334	KR Application	10-2017-0098820	2017.08.04			
		P20170334	KR Issue	10-2120856	2020.06.03			
		P20160645PC	PCT	PCT/KR2017/00873 4	2017.08.11			
		P20160645US	US Application	16/331,969	2019.03.09			
		P20160645US	US Issue	11,115,976	2021.09.07			
		P20160645US	US Reissue Application	18/243,055	2023.09.06			
		P20160645US	US Issue					
		P20160645CN	CN Application	201780055337.4	2019.03.08			
		P20160645CN	CN Issue	CN 109691000 B	2021.11.05			
49	O	P20170314	Provisional Application	10-2017-0068023	2017.05.31	[Rel-15 WI] LTE_sTTlandPT(NR ONLY)	Scheduling request through short PUCCH in sTTI	TS 36.211/36.212/36.213
		P20170670	KR Application	10-2017-0135330	2017.10.18			
		P20170670	KR Issue	10-2156670	2020.09.10			
		P20170314US	US Application	15/990,917	2018.05.29			
		P20170314US	US Issue	10,616,916	2020.04.07			
		P20170314CN	CN Application	201810531289.8	2018.05.29			
		P20170314CN	CN Issue	CN 108988997 B	2021.04.02			
50	O	P20160663	Provisional Application	10-2016-0122503	2016.09.23	[Rel-15 WI] NR_newRAT	CP length configuration	TS 38.211/38.212/38.213
		P20170584	KR Application	10-2017-0118880	2017.09.15			
		P20170584	KR Issue	10-2127753	2020.06.23			
		P20170584P1	KR Application(DA)	10-2020-0072207	2020.06.15			
		P20170584P1	KR Issue(DA)	10-2222399	2021.02.24			
		P20160663PC	PCT	PCT/KR2017/01051 0	2017.09.22			
		P20160663US	US Application	16/317,102	2019.01.11			
		P20160663US	US Issue	10,764,099	2020.09.01			
		P20160663USD1	US Application(DA)	16/929,568	2020.07.15			
		P20160663USD1	US Issue (DA)	10,868,702	2020.12.15			
		P20160663EP	EP Application	17853481.4	2018.12.28			
		P20160663EP	EP issue	Final refused				
		P20160663CN	CN Application	201780041877.7	2019.01.04			
		P20160663CN	CN Issue	CN 109417529 B	2021.08.31			
51	O	P20160790	Provisional Application	10-2016-0143013	2016.10.31	[Rel-15 WI] NR_newRAT	symbol allocation	TS 38.211/38.212/38.213
		P20170799	KR Application	10-2017-0140898	2017.10.27			
		P20170799	KR Issue	10-2114940	2020.05.19			
		P20170799P1	KR Application(DA)	10-2020-0053315	2020.05.04			
		P20170799P1	KR Issue(DA)	10-2130803	2020.06.29			
		P20160790PC	PCT	PCT/KR2017/01210 5	2017.10.30			
		P20160790US	US Application	16/346,108	2019.04.29			
		P20160790US	US Issue	10,952,206	2021.03.16			
		P20160790USC1	US Application(CA)	17/170,922	2021.02.09			
		P20160790USC1	US Issue(CA)	11,540,272	2022.12.27			
		P20160790USC1C1	US Application(CA)	17/970604	2022.10.21			
		P20160790USC1C1	US Issue	12,069,622	2024.08.20			
		P20160790USC1C1C1	US Application(CA)	18/783,375	2024.07.24			
		P20160790USC1C1C1	US Issue					
		P20160790EP	EP Application	17865576.7	2019.05.10			
		P20160790EP	EP Issue	EP3534561B1	2023.07.26			
		P20160790EPD	EP Application(DA)	EP23180467A	2023.06.09			
		P20160790EPD	EP Issue(DA)					
		P20160790CN	CN Application	201780066665.4	2019.04.26			
		P20160790CN	CN Issue	CN 110114997 B	2021.12.10			
	O	P20170303	Provisional Application	10-2017-0065379	2017.05.26	[Rel-15 WI] NR_newRAT	PRB indexing for supporting wider bandwidth option	TS 38.211/38.212/38.213
		P20170451	Provisional Application	10-2017-0081411	2017.06.27			

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52		P20180017	KR Application	10-2018-0037938	2018.04.02			
		P20180017	KR Issue	10-2127755	2020.06.23			
		P20180017P1	KR Application(DA)	10-2020-0073684	2020.06.17			
		P20180017P1	KR Issue(DA)	10-2222396	2021.02.24			
		P20170303US	US Application	15/985,862	2018.05.22			
		P20170303US	US Issue	10,979,190	2021.04.13			
		P20170303USC1	US Application(CA1)	17/182,159	2021.02.22			
		P20170303USC1	US Issue(CA1)	11,671,218	2023.01.25			
		P20170303USC1C1	US Application(CA2)	18/329,200	2023.06.05			
		P20170303USC1C1	US Issue(CA2)	Pending				
		P20170303CN	CN Application	201810493891.7	2018.05.22			
		P20170303CN	CN Issue	CN 108966181 B	2021.07.23			
53	O	P20170304	Provisional Application	10-2017-0065387	2017.05.26	[Rel-15 WI] NR_newRAT	BWP activation detail	TS 38.211/38.212/38.213
		P20170463	Provisional Application	10-2017-0082568	2017.06.29			
		P20180097	KR Application	10-2018-0050090	2018.04.30			
		P20180097	KR Issue	10-2114919	2020.05.19			
		P20180097P1	KR Application(DA)	10-2020-0034779	2020.03.23			
		P20180097P1	KR Issue(DA)	10-2198758	2020.12.29			
		P20170304US	US Application	15/985,883	2018.05.22			
		P20170304US	US Issue	10,284,404	2019.05.07			
		P20170304USC1	US Application(CA)	16/357,686	2019.03.19			
		P20170304USC1	US Issue(CA)	10,616,024	2020.04.07			
		P20170304CN	CN Application	201810501797.1	2018.05.23			
		P20170304CN	CN Issue	ZL201810501797.1	2024.4.19			
54	O	P20170765	Provisional Application	10-2017-0128177	2017.09.29	[Rel-15 WI] NR_newRAT	BWP activation detail	TS 38.211/38.212/38.213
		P20170917	Provisional Application	10-2017-0162692	2017.11.30			
		P20180532	Provisional Application	10-2018-0084727	2018.07.20			
		P20180540	KR Application	10-2018-0092635	2018.08.08			
		P20180540	KR Issue	10-2156695	2020.09.10			
		P20170765US	US Application	16/147,638	2018.09.29			
		P20170765US	US Issue	10,721,765	2020.07.21			
		P20170765CN	CN Application	201811147708.4	2018.09.29			
		P20170765CN	CN Issue	CN 109586881 B	2021.11.12			
55	O	P20170743	Provisional Application	10-2017-0118409	2017.09.15	[Rel-15 WI] NR_newRAT	Configuration for CBG codebook	TS 38.211/38.212/38.213
		P20180159	KR Application	10-2018-0056950	2018.05.18			
		P20180159	KR Issue	10-2193191	2020.12.14			
		P20170743US	US Application	16/128,748	2018.09.12			
		P20170743US	US Issue	10,721,031	2020.07.21			
		P20170743CN	CN Application	CN201811018440A	2018.09.03			
		P20170743CN	CN Issue	Pending				
		P20170743CND	CN Application(DA)	CN202310675323	2018.09.03			
		P20170743CND	CN Issue(DA)					
56	O	P20170184	Provisional Application	10-2017-0047545	2017.04.12	[Rel-15 WI] NR_newRAT	CBG based retransmission	TS 38.211/38.212/38.213
		P20170239	Provisional Application	10-2017-0056477	2017.05.02			
		P20170507	Provisional Application	10-2017-0086107	2017.07.06			
		P20180096	KR Application	10-2018-0034955	2018.03.27			
		P20170184US	US Application	15/951,349	2018.04.12			
		P20170184US	US Issue	10,958,380	2021.03.23			
		P20170184USC1	US Application (CA)	17/173,097	2021.02.10			
		P20170184USC1	US Issue(CA)	Pending				
		P20170184USC1	US Application (CA2)	18/352,647	2023.07.14			
		P20170184USC1	US Issue(CA2)					
		P20170184CN	CN Application	201810318869.9	2018.04.11			
		P20170184CN	CN Issue	CN108696943B	2022.11.08			
57	O	P20170318	Provisional Application	10-2017-0067957	2017.05.31	[Rel-15 WI] NR_newRAT	TB-CRC setting and HARQ message processing	TS 38.211/38.212/38.213
		P20180018	KR Application	10-2018-0035572	2018.03.28			
		P20180018	KR Issue	10-2117669	2020.05.26			
		P20170318US	US Application	15/990,895	2018.05.29			
		P20170318US	US Issue	10,805,050	2020.10.13			
		P20170318CN	CN Application	201810524233.X	2018.05.28			
		P20170318CN	CN Issue	CN 108988984 B	2021.07.09			
	O	P20170741	Provisional Application	10-2017-0118757	2017.09.15	[Rel-15 WI] NR_newRAT	Power-boosting of NR DMRS	TS 38.211/38.212/38.213
		P20180195	KR Application	10-2018-0077435	2018.07.04			
		P20180195	KR Issue	10-2198015	2020.12.28			

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58		P20170741US	US Application	16/131,686	2018.09.14			
		P20170741US	US Issue	10,616,834	2020.04.07			
		P20170741CN	CN Application	201811085562.5	2018.09.17			
		P20170741CN	CN Issue	Pending				
		P20170741CND1	CN DA Application	2024106895216.00	2024.05.30			
59	O	P20130110	Provisional Application	10-2013-0034603	2013.03.29	[Rel-12 WI] LTE_SC_enh_dualC	Dual connectivity handover	TS 38.331/38.331/37.340
		P20130939	KR Application	10-2013-0136724	2013.11.12			
		P20130939	KR Issue	10-1632277	2016.06.15			
		P20130110PC	PCT	PCT/KR2014/00244 9	2014.03.24			
		P20130110US	US Application	14/779,957	2015.09.24			
		P20130110US	US Issue	9497666	2016.11.15			
		P20130110CN	CN Application	201480019499.9	2015.09.29			
60		P20130110CN	CN Issue	CN 105103613 B	2018.12.25			
	O	P20130124	Provisional Application	10-2013-0036870	2013.04.04	[Rel-12 WI] LTE_SC_enh_dualC	RLF detection	TS 37.340/38.331/36.331
		P20130843	Provisional Application	10-2013-0130502	2013.10.30			
		P20131105	KR Application	10-2013-0161241	2013.12.23			
		P20131105	KR Issue	10-1628874	2016.06.02			
		P20130124PC	PCT	PCT/KR2014/00290 2	2014.04.04			
		P20130124US	US Application	14/781,356	2015.09.30			
		P20130124US	US Issue	9,832,806	2017.11.28			
		P20130124CN	CN Application	201480020250.X	2015.10.08			
61		P20130124CN	CN Issue	CN 105103593 B	2019.04.19			
	O	P20160666	Provisional Application	10-2016-0122506	2016.09.23	[Rel-15 WI] LTE_LIGHT_CON [Rel-15 WI] NR_newRAT	state transition	TS 36.331/ TS38.331
		P20170333	KR Application	10-2017-0104068	2017.08.17			
		P20170333	KR Issue	10-2001301	2019.07.11			
		P20160666US	US Application	15/712,079	2017.09.21			
		P20160666US	US Issue	10,334,657	2019.06.25			
		P20160666CN	CN Application	201710864759.8	2017.09.22			
62		P20160666CN	CN Issue	CN 108307543 B	2021.06.15			
	O	P20160241	Provisional Application	10-2016-0054935	2016.05.03	[Rel-15 WI] LTE_LIGHT_CON [Rel-15 WI] NR_newRAT	connection establishment	TS 36.331
		P20170025	KR Application	10-2017-0044062	2017.04.05			
		P20170025	KR Issue	10-2016106	2019.08.23			
		P20160241US	US Application	15/498,607	2017.04.27			
		P20160241US	US Issue	10,420,067	2019.09.17			
		P20160241CN	CN Application	201710282167.5	2017.04.26			
63		P20160241CN	CN Issue	CN 107360561 B	2020.09.11			
	O	P20160251	Provisional Application	10-2016-0054930	2016.05.03	[Rel-15 WI] LTE_LIGHT_CON [Rel-15 WI] NR_newRAT	state transition	TS 36.331
		P20170076	KR Application	10-2017-0045815	2017.04.10			
		P20170076	KR Issue	10-2005910	2019.07.25			
		P20160251US	US Application	15/582,906	2017.05.01			
		P20160251US	US Issue	10,159,025	2018.12.18			
		P20160251CN	CN Application	201710291278.2	2017.04.28			
64		P20160251CN	CN Issue	CN 107343299 B	2021.01.05			
	O	P20160249	Provisional Application	10-2016-0054937	2016.05.03	[Rel-15 WI] NR_newRAT	CP procedure	TS 36.331/ TS38.331
		P20160250	Provisional Application	10-2016-0054936	2016.05.03			
		P20170178	KR Application	10-2017-0053295	2017.04.26			
		P20170178	KR Issue	10-2057212	2019.12.12			
		P20160249PC	PCT	PCT/KR2017/00443 2	2017.04.26			
		P20160249US	US Application	16/098,841	2018.11.02			
		P20160249US	US Issue	10,667,322	2020.05.26			
		P20160249CN	CN Application	201780027502.5	2018.11.02			
65		P20160249CN	CN Issue	CN 109076496 B	2021.09.03			
	O	P20170098	Provisional Application	10-2017-0030764	2017.03.10	[Rel-15 WI] NR_newRAT	BSR data volume	TS 38.321
		P20170317	Provisional Application	10-2017-0068074	2017.05.31			
		P20170896	Provisional Application	10-2017-0152149	2017.11.15			
		P20180044	KR Application	10-2018-0026611	2018.03.07			
		P20180044	KR Issue	10-2065137	2020.01.06			
		P20170098PC	PCT	PCT/KR2018/00275 0	2018.03.08			
		P20170098US	US Application	16/349,259	2019.05.10			
		P20170098US	US Issue	10,986,530	2021.04.20			
		RE-P20170098US	Reissue	18/136,835	2023,04,18			
		RE-P20170098US	Reissue issue					
		P20170098CN	CN Application	201880004237.3	2019.05.06			

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		P20170098CN	CN Issue	CN 109937587 B	2022.06.14			
66	O	P20170397	Provisional Application	10-2017-0076126	2017.06.15	[Rel-15 WI] NR_newRAT	BSR format detail	TS 38.321
		P20170930	KR Application	10-2018-0051293	2018.05.03			
		P20170930	KR Issue	10-2023672	2019.09.16			
		P20170397US	US Application	16/004,783	2018.06.11			
		P20170397US	US Issue	10,511,994	2019.12.17			
		P20170397CN	CN Application	201810612491.3	2018.06.14			
67		P20170397CN	CN Issue	CN 109151878 B	2021.12.14			
	O	P20170009	Provisional Application	10-2017-0002440	2017.01.06	[Rel-15 WI] NR_newRAT	NR duplicate trigger	TS 38.331
		P20170905	KR Application	10-2017-0169910	2017.12.12			
		P20170905	KR Issue	10-2016728	2019.08.26			
		P20170009US	US Application	15/862,095	2018.01.04			
		P20170009US	US Issue	10,448,386	2019.10.15			
68		P20170009CN	CN Application	201810011263.0	2018.01.05			
		P20170009CN	CN Issue	CN 108282823 B	2022.08.26			
	O	P20160264	Provisional Application	10-2016-0058157	2016.05.12	[Rel-15 WI] NR_newRAT	NR configuration failure	TS 37.340/38.331
		P20160472	Provisional Application	10-2016-0083270	2016.07.01			
		P20170196	KR Application	10-2017-0057549	2017.05.08			
		P20170196	KR Issue	10-2183826	2020.11.23			
		P20160264PC	PCT	PCT/KR2017/004873	2017.05.11			
		P20160264US	US Application	16/300,557	2018.11.10			
69		P20160264US	US Issue	10,721,118	2020.07.21			
		P20160264CN	CN Application	201780029131.4	2018.11.12			
		P20160264CN	CN Issue	CN109076383B	2023.06.27			
	O	P20170232	Provisional Application	10-2017-0054976	2017.04.28	[Rel-15 WI] NR_newRAT	STAUS PDU format	TS 38.322
		P20170929	KR Application	10-2018-0033007	2018.03.22			
		P20170929	KR Issue	10-2023539	2019.09.16			
70		P20170232US	US Application	15/963,422	2018.04.26			
		P20170232US	US Issue	10,880,222	2020.12.29			
		P20170232CN	CN Application	201810384302.1	2018.04.26			
		P20170232CN	CN Issue	CN 108810969 B	2021.10.26			
	O	P20160805	Provisional Application	10-2016-0146054	2016.11.03	[Rel-15 WI] NR_newRAT	slice mobility	TS 37.340/38.331
		P20170809	KR Application	10-2017-0142205	2017.10.30			
		P20170809	KR Issue	10-2108871	2020.05.04			
		P20170809P1	KR Application(DA)	10-2020-0051219	2020.04.28			
		P20170809P1	KR Issue(DA)	10-2133255	2020.07.07			
		P20160805PC	PCT	PCT/KR2017/012319	2017.11.02			
		P20160805US	US Application	16/346,987	2019.05.02			
		P20160805US	US Issue	11,044,777	2021.06.22			
		P20160805USC1	US Application(CA1)	17/314,064	2021.05.07			
		P20160805USC1	US issue(CA1)	11,627,631	2023.04.11			
		P20160805USC1C1	US Application(CA2)	18/298,204	2023.06.13			
		P20160805USC1C1	US issue(CA2)	12,108,482	2024.10.01			
71		P20160805EP	EP Application	17867340.6	2019.05.16			
		P20160805EP	EP Issue	3537760	2023.10.04			
		P20160805EPD	EP Application(DA)	EP23192739A	2023.06.09			
		P20160805EPD	EP Issue(DA)					
		P20160805CN	CN Application	201780068268.0	2019.05.05			
		P20160805CN	CN Issue	CN 109906630 B	2022.09.16			
	O	P20170082	Provisional Application	10-2017-0027919	2017.03.03	[Rel-15 WI] NR_newRAT-Core	NG Protocol, Mobility Management	TS 38.413 TS 38.300
		P20170715	KR Application	10-2018-0002228	2018.01.08			
		P20170715	KR Issue	10-2056256	2019.12.10			
		P20170082US	US Application	15/909,898	2018.03.01			
72		P20170082US	US Issue	11,012,911	2021.05.18			
	O	P20170144	Provisional Application	10-2017-0037934	2017.03.24	[Rel-15 WI] NR_newRAT-Core	NSA Network, MR-DC	TS 36.423 TS 37.340 TS 38.331
		P20180124	KR Application	10-2018-0033250	2018.03.22			
		P20180124	KR Issue	10-2174936	2020.10.30			
		P20170144PC	PCT	PCT/KR2018/003466	2018.03.23			
		P20170144US	US Application	16/347,572	2019.05.03			
73		P20170144US	US Issue	10,869,236	2020.12.15			
	O	P20170654	Provisional Application	10-2017-0107962	2017.08.25	[Rel-15 WI] NR_newRAT-Core	F1 protocol, CU CUPS, base station mobility control	TS 38.473
		P20180471	KR Application	10-2018-0088414	2018.07.30			
		P20180471	KR Issue	10-2115233	2020.05.20			

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		P20170654US	US Application	16/112,619	2018.08.24			
		P20170654US	US Issue	10,708,968	2020.07.07			
74	O	P20150254	Provisional Application	10-2015-0067848	2015.05.15	[Rel-15 WI] NR_newRAT-Core	CU-DU	TS 38.401/38.473
		P20150496	KR Application	10-2015-0099891	2015.07.14			
		P20150496	KR Issue	10-2106134	2020.04.23			
		P20150496PC	PCT	PCT/KR2016/006529	2016.06.20			
		P20150496US	US Application	15/744,823	2018.01.14			
		P20150496US	US Issue	10,616,932	2020.04.07			
75	O	P20170018	Provisional Application	10-2017-0005590	2017.01.12	[Rel-15 WI] NR_newRAT-Core	Inter-System inter-RAT handover	TS 23.502
		P20170938	KR Application	10-2018-0002947	2018.01.09			
		P20170938	KR Issue	10-2117098	2020.05.25			
		P20170018PC	PCT	PCT/KR2018/000518	2018.01.11			
		P20170018US	US Application	16/343,819	2019.04.22			
		P20170018US	US Issue	10,660,004	2020.05.19			
76	O	P20160282	Provisional Application	10-2016-0062068	2016.05.20	[Rel-15 WI] NR_newRAT-Core	RAN structure and F1 interface	TS 38.401 TS 38.473
		P20160481	KR Application	10-2016-0088331	2016.07.13			
		P20160481	KR Issue	10-2100491	2020.04.07			
		P20160481PC	PCT	PCT/KR2017/007452	2017.07.12			
		P20160481US	US Application	16/316,092	2019.01.08			
		P20160481US	US Issue	10,869,243	2020.12.15			
77	O	P20170238	Provisional Application	10-2017-0057299	2017.05.08	[Rel-15 WI] NR_newRAT-Core	F1 protocol, RRC information transmission	TS 38.473
		P20180146	KR Application	10-2018-0036753	2018.03.29			
		P20180146	KR Issue	10-2066689	2020.01.09			
		P20170238US	US Application	15/969,858	2018.05.03			
		P20170238US	US Issue	10,470,159	2019.11.05			
78	O	P20170389	Provisional Application	10-2017-0076924	2017.06.16	[Rel-15 WI] NR_newRAT-Core	F1 protocol, base station RRM	TS 38.473
		P20180250	KR Application	10-2018-0053053	2018.05.09			
		P20180250	KR Issue	10-2042036	2019.11.01			
		P20170389US	US Application	16/007,050	2018.06.13			
		P20170389US	US Issue	10,499,376	2019.12.03			
79	O	P20180026	Provisional Application	10-2018-0006980	2018.01.19	[Rel-15 WI] NR_newRAT-Core	dual connectivity	TS 38.425
		P20180533	KR Application	10-2018-0091232	2018.08.06			
		P20180533	KR Issue	10-2057139	2019.12.12			
		P20180026US	US Application	16/190,355	2018.11.14			
		P20180026US	US Issue	10,812,230	2020.10.20			
80	O	P20180202	Provisional Application	10-2018-0039897	2018.04.05	[Rel-15 WI] NR_newRAT-Core	data volume control	TS 37.340
		P20190047	KR Application	10-2019-0020835	2019.02.22			
		P20190047	KR Issue	10-2206773	2021.01.19			
		P20180202US	US Application	16/373,808	2019.04.03			
		P20180202US	US Issue	10,873,671	2020.12.22			
81	O	P20180557	Provisional Application	10-2018-0090004	2018.08.01	[Rel-15 WI] NR_newRAT-Core	load control	TS 36.423
		P20190287	KR Application	10-2019-0075402	2019.06.25			
		P20190287	KR Issue	10-2198010	2020.12.28			
		P20180557US	US Application	16/528,980	2019.08.01			
		P20180557US	US Issue	11,178,573	2021.11.16			
82	O	P20170234	Provisional Application	10-2017-0054983	2017.04.28	[Rel-15 WI] NR_newRAT-Core	NG protocol, session management	TS 38.413
		P20170673	KR Application	10-2018-0000256	2018.01.02			
		P20170673	KR Issue	10-1957087	2019.03.05			
		P20170234US	US Application	15/967,512	2018.04.30			
		P20170234US	US Issue	10,772,148	2020.09.08			