



**NMHH**

**Nemzeti Média- és Hírközlési Hatóság**

# **Band introduction**

## **The 3400-3800 MHz band**

7 November 2017

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# 1. Summary

The 3400-3800 MHz frequency band offers a significant opportunity to install high-density and high-speed broadband wireless networks, which can provide innovative electronic communication services to end-users. There is rapidly growing demand for broadband services, therefore the utilisation of frequency bands – that are not used at present or are used for other purposes, but are suitable for such services – is crucially important for the owner of such frequencies, that is the Hungarian state.

Both fixed and mobile systems can be operated in the band.

During the 2016 sale of the 3400-3800 MHz band Vodafone gained a 2 × 30 MHz FDD spectrum in the 3400-3600 MHz band, and DIGI Távközlési és Szolgáltató Kft. acquired a 20 MHz TDD spectrum in the 3600-3800 MHz band.

In the 3400-3600 MHz band we have modified the access mode from FDD to TDD. The related NFFF<sup>1</sup> amendment was announced on 28 July 2017<sup>2</sup>.

Due to the transition from FDD to TDD, the authority has allocated the basic blocks acquired during the auction to the lower part of the band. With respect to the entire 3400-3800 MHz band, a continuous spectrum of 110+200 = 310 MHz is still available for the operation of TDD systems (See figures in Section 3.3.).

The 5G systems, developed over the recent years as a new step of technological progress, does not only represent a new generation of mobile technology but also a whole new concept that integrates all previous technologies and enables the use of various applications.

At the WRC-15 the identification of frequency bands suitable for the use of 5G systems was determined as item 1.13 in the agenda for the next WRC (WRC-19). In this context, within the range of the specified possible frequency bands it is necessary to examine, which frequency bands may be the most suitable for introducing 5G systems. By the end of 2016 an EU mandate was elaborated<sup>3</sup>, in which, based on the RSPG's expert opinion on issues related to the 5G spectrum,<sup>4</sup> CEPT is requested to study the feasibility of a 5G introduction in respect of the bands specified in the document, taking into account the current spectrum uses. In accordance with the opinion of RSPG, the 700 MHz and 3400-3800 MHz bands, and the 26 GHz band (24.25-27.5 GHz) has been denoted by the mandate as the band marked for the early adoption of 5G (5G pioneer band).

This band is currently available for MFCN systems without type restrictions. The BEM<sup>5</sup> values applied to 5G systems may, however, differ from those applied to systems currently in use. According to the EU Commission mandate on 5G IMT tests – to be described in detail later – the CEPT is to elaborate the report containing the test results corresponding to the bands determined therein by June 2018.

As there still remains 310 MHz in the band to be allocated for MFCN, enough spectrum can be provided for several broadband applications.

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<sup>1</sup> NMHH Decree 7/2015 (XI.13.) on the national frequency allocation and the rules of using frequency bands

<sup>2</sup> NMHH Decree 8/2017 (VII. 28.) on the amendment of certain NMHH decrees concerning frequency management

<sup>3</sup> <https://ec.europa.eu/digital-single-market/en/news/radio-spectrum-cept-mandates-0>

<sup>4</sup> [http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion\\_5G.pdf](http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf)

<sup>5</sup> Limit values for out-of-block emissions (block edge mask)

## 2. Introduction

The 3400-3800 MHz frequency band offers a significant opportunity to install high-density and high-speed broadband wireless networks, which can provide innovative electronic communication services to end-users. There is steadily growing demand for broadband services, therefore the utilisation of frequency bands – that are not used at present or are used for other purposes, but are suitable for such services – is crucially important for the owner of such frequencies, that is the Hungarian state.

EU regulations have also obliged us to implement harmonised band use regulations in Hungary, which we have duly carried out and incorporated them into NMHH Decree 7/2015 (XI.13.) on the national frequency allocation and the rules of using frequency bands (hereinafter: NFFF). In addition, Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multi-annual radio spectrum policy programme (hereinafter: RSPG) required that, subject to market demand, the 3400-3800 MHz frequency band must be made available for wireless broadband systems which are capable of providing services with high data transfer speeds for subscribers (the population). Accordingly, a sales procedure was initiated for the frequency band in 2014, in which two service providers acquired entitlement to frequency use in 2016.

Due to the 3400-3800 MHz frequency band propagation characteristics and the harmonised technical conditions in place, feasible configurations with respect to the deployment of wireless broadband networks are as follows: small cell systems, fixed location wireless access systems, backhaul networks within wireless broadband networks, and the combinations of these. With the principle of technology neutrality in mind, fixed and mobile systems can be operated in the band with the aforementioned configurations.

The 5G systems, developed over the recent years as a new step of technological progress, does not only represent a new generation of mobile technology but also a whole new concept that integrates all previous technologies and enables the use of various applications. The principles underlying the technology have been elaborated so as to equally serve high-speed data transfer applications, high-reliability critical applications as well as devices that operate at low data transmission speeds but are installed in very large numbers.

At the WRC-15 the identification of frequency bands suitable for the use of 5G systems was determined as item 1.13 in the agenda for the next WRC (WRC-19). In this context, within the range of the specified possible frequency bands it is necessary to examine, which frequency bands may be the most suitable for introducing 5G systems. By the end of 2016 an EU mandate was elaborated<sup>6</sup>, in which, based on the RSPG's expert opinion on issues related to the 5G spectrum,<sup>7</sup> CEPT is requested to study the feasibility of a 5G introduction in respect of the bands specified in the document, taking into account the current spectrum uses. In accordance with the opinion of RSPG, the 700 MHz and 3400-3800 MHz bands, and the 26 GHz band (24.25-27.5 GHz) has been denoted by the mandate as the band marked for the early adoption of 5G (5G pioneer band).

This band is currently available for MFCN systems without type restrictions. The BEM values applied to 5G systems may, however, differ from those applied to systems currently in use. According to the EU Commission mandate on 5G IMT tests – to be described in detail later – the CEPT is to elaborate the report containing the test results corresponding to the bands determined therein by June 2018.

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<sup>6</sup> <https://ec.europa.eu/digital-single-market/en/news/radio-spectrum-cept-mandates-0>

<sup>7</sup> [http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion\\_5G.pdf](http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf)

### 3. Current use

#### 3.1. International regulation

On the international level, there are several documents regulating the use of the 3400-3800 MHz frequency band. Apart from the related documents of ITU and CEPT, two community decisions are available that contain the harmonised band use conditions. The EU legislation fundamentally determines our obligations as a member state, as well as the technical requirements to be applied in order to ensure harmonised usage of the frequency band. Commission Decision 2008/411/EC<sup>8</sup> was the first international regulatory document that defined obligations and mandatory technical parameters for the harmonised use of the 3400-3800 MHz frequency band, taking technology and service neutrality into consideration. This decision was amended by Commission Implementing Decision 2014/276/EU<sup>9</sup> which determined the obligations and the technical requirements based on the studies then available. Commission Implementing Decision 2014/276/EU had to be incorporated into Hungarian legislation by 30 June 2015, which has been duly carried out by the appropriate amendment of the NFFF.

##### 3.1.1. ITU

In the following, the allocation table according to the International Radio Regulations (hereinafter: RR) is shown for the 3400-3800 MHz band, and concerning the adjacent bands, according to Annex 1 of the NFFF.

	A	B	C	D
1	ALLOCATION TABLE FOR RR FREQUENCY BANDS			ALLOCATION VALID FOR HUNGARY
2	REGION 1	REGION 2	REGION 3	ACCORDING TO RR
3	<b>3100–3300 MHz</b>	RADIOLOCATING Satellite Earth research (active) Space research (active)		<b>3100–3300 MHz</b> RADIOLOCATING Satellite Earth research (active) Space research (active)
		5.149 5.428		5.149
4	<b>3300–3400 MHz</b> RADIOLOCATING	<b>3300–3400 MHz</b> RADIOLOCATING Amateur Fixed Mobile	<b>3300–3400 MHz</b> RADIOLOCATING Amateur	<b>3300–3400 MHz</b> RADIOLOCATING
	5.149 5.429 5.430	5.149	5.149 5.429	5.149
5	<b>3400–3600 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) Mobile 5.430A Radiolocating	<b>3400–3500 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) Amateur Mobile 5.431A Radiolocating 5.433	<b>3400–3500 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) Amateur Mobile 5.432B Radiolocating 5.433	<b>3400–3600 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) MOBILE, with the exception of aerial mobile 5.430A Aerial mobile Radiolocating
		5.282	5.282 5.432 5.432A	
6		<b>3500–3700 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) MOBILE, with the exception of aerial mobile Radiolocating 5.433	<b>3500–3600 MHz</b> FIXED SATELLITE FIXED (Space– Earth direction) MOBILE, with the exception of aerial mobile 5.433A Radiolocating 5.433	
	5.431			

<sup>8</sup> 2008/411/EC: Commission Decision of 21 May 2008 on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community

<sup>9</sup> 2014/276/EU: Commission Implementing Decision of 2 May 2014 on amending Decision 2008/411/EC on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community

	A	B	C	D
1	ALLOCATION TABLE FOR RR FREQUENCY BANDS			ALLOCATION VALID FOR HUNGARY ACCORDING TO RR
2	REGION 1	REGION 2	REGION 3	
7	3600–4200 MHz FIXED SATELLITE FIXED (Space–Earth direction) Mobile		3600–3700 MHz FIXED SATELLITE FIXED (Space–Earth direction) MOBILE, with the exception of aerial mobile Radiolocating  5.435	3600–4200 MHz FIXED SATELLITE FIXED (Space–Earth direction) Mobile
8		3700–4200 MHz FIXED SATELLITE FIXED (Space–Earth direction) MOBILE, with the exception of aerial mobile		

The mobile service allocation of the 3400 – 3600 MHz-es sub-band is described in footnote 5.430A, which states the following:

- The mobile service (except for aeronautical mobile) has a primary allocation in Hungary and all of her neighbours (in the RR table it is specified as a secondary service for Region 1)
- The sub-band is identified for IMT (however, applications with any other technology can also be used within the framework of the service).
- With respect to coordination, before a given country commissions a mobile service station (base or mobile), it has to prove using calculations that the spectral power density does not exceed the value of  $-154.5 \text{ dB(W/(m}^2 \text{ 4 kHz))}$  at a height of 3 m above the ground more than 20% of the time. In case of a mutual agreement with a neighboring country, this criterion may be departed from.
- The stations of the mobile service in the 3400-3600 MHz band cannot claim more protection against space stations, than provided for by Table 21-4 of the RR (2004 release),<sup>10</sup> specified by the following criterion:

Frequency band	Service*	Limit in dB(W/m <sup>2</sup> ) for angles of arrival ( $\delta$ ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
3 400-4 200 MHz	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	-152	$-152 + 0.5(\delta - 5)$	-142	4 kHz
3 400-4 200 MHz	Fixed-satellite (space-to-Earth) (non-geostationary-satellite orbit)	$-138 - Y_{17,18}$	$-138 - Y + (12 + Y)(\delta - 5)/20^{17,18}$	$-126^{18}$	1 MHz

Note: The footnote does not apply for the 3600-3800 MHz band, where the mobile service is secondary according to the RR.

Full text of the footnote:

<sup>10</sup> The table limits the spectral power density generated by space stations on the surface of Earth to protect terrestrial systems

**5.430A** Different category of service: in Albania, Algeria, Germany, Andorra, Saudi Arabia, Austria, Azerbaijan, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Botswana, Bulgaria, Burkina Faso, Cameroon, Cyprus, Vatican, Côte d'Ivoire, Croatia, Denmark, Egypt, Spain, Estonia, Finland, France, French Overseas Departments and Communities in Region 1, Gabon, Georgia, Greece, Guinea, Hungary, Ireland, Iceland, Israel, Italy, Jordan, Kuwait, Lesotho, Latvia, Macedonia, Liechtenstein, Lithuania, Malawi, Malta, Morocco, Mauritania, Moldova, Monaco, Mongolia, Montenegro, Mozambique, Namibia, Niger, Norway, Oman, Netherlands, Poland, Portugal, Qatar, Syria, Congo, Slovakia, Czech Rep., Romania, United Kingdom, San Marino, Senegal, Serbia, Sierra Leone, Slovenia, South Africa, Sweden, Switzerland, Swaziland, Togo, Chad, Tunisia, Turkey, Ukraine, Zambia and Zimbabwe, the band 3400–3600 MHz is allocated to the mobile, except aeronautical mobile, service on a primary basis subject to agreement obtained under No. 9.21 with other administrations and is identified for International Mobile Telecommunications (IMT). This identification does not preclude the use of this band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. At the stage of coordination the provisions of Nos. 9.17 and 9.18 also apply. Before an administration brings into use a (base or mobile) station of the mobile service in this band it shall ensure that the power flux density (pfd) produced at 3 m above ground does not exceed  $-154.5$  dB(W)/(m<sup>2</sup>·4 kHz) for more than 20 per cent of time at the border of the territory of any other administration. This limit may be exceeded on the territory of any country whose administration has so agreed. In order to ensure that the pfd limit at the border of the territory of any other administration is met, the calculations and verification shall be made, taking into account all relevant information, with the mutual agreement of both administrations (the administration responsible for the terrestrial station and the administration responsible for the earth station), with the assistance of the Bureau if so requested. In case of disagreement, the calculation and verification of the pfd shall be made by the Bureau, taking into account the information referred to above. Stations of the mobile service in the band 3400–3600 MHz shall not claim more protection from space stations than that provided in Table 21-4 of the Radio Regulations (2004 issue). (Edition of 2004). This allocation is effective from 17 November 2010. (WRC-12)

### **3.1.2. CEPT**

On the CEPT level, Decision ECC/DEC/(11)06 (last amended on 14 March 2014) specifies the base block allocation in the band and the emission limits out of the user block (block edge mask, BEM), which are also included in the corresponding Commission Implementing Decision.

The ECC/DEC/(07)02 decision specifies requirements concerning BWA systems.

The ECC/REC/(15)01 recommendation contains the coordination provisions concerning operating MFCN systems in the band (besides other bands).

Recommendation ERC/REC 14-03: Harmonised radio frequency channel arrangements and block allocations for low and medium capacity systems operating in the 3400–3600 MHz band

Recommendation ERC/REC 12-08: Harmonised radio frequency channel arrangements and block allocations for low, medium and high capacity systems operating in the 3600–4200 MHz band

ECC report 203: Least restrictive technical conditions for MFCN (including IMT) systems in the 3400–3600 MHz and the 3600–3800 MHz bands

ECC report 210: Compatibility studies concerning the DA2GC systems operating in the 5855–5875 MHz, 2400–2483.5 MHz and 3400–3600 MHz frequency bands.

ECC report 254: Operational directives concerning spectrum allocation concerning the implementation of the present ECC regulatory framework in the 3600–3800 MHz range

CEPT report 049: Spectrum harmonisation of the wireless terrestrial systems operating in the 3400–3800 MHz frequency band

### **3.1.3. EU**

Based on Decision 2008/411/EC, the band had to be made available for broadband mobile/fixed services. The decision defined the block edge mask applicable for MFCNs (Mobile/Fixed Communications Networks). However, this technical specification is obsolete, because the mask was

developed for earlier fixed systems. In the meantime, technologies supporting mobile service systems have evolved, and devices based on these, as well as international standards have been introduced. This made it necessary to change the requirements in Commission Implementing Decision 2014/276/EU. This decision defines in-block and out-of-block power limits (including block edge mask).

The technical requirements defined in Commission Implementing Decision 2014/276/EU are the following (in addition to the power limits for the user block):

- Size of blocks: 5 MHz (aligning with the channel spacing of LTE systems) for both the 3400-3600 MHz band and the 3600-3800 MHz band.
- In the 3400-3600 MHz frequency band, both the FDD (with a duplex spacing of 100 MHz), and the TDD modes are allowed, but TDD is the preferred mode. For an FDD allocation, the lower (protection of military systems in the range under 3400 MHz) and upper 10 MHz range of the duplex pair are non-allocable guard bands. An FDD mode of operation can only be used under certain conditions
- In the 3600-3800 MHz frequency band, only TDD access mode has been defined, therefore only TDD systems can be used here.

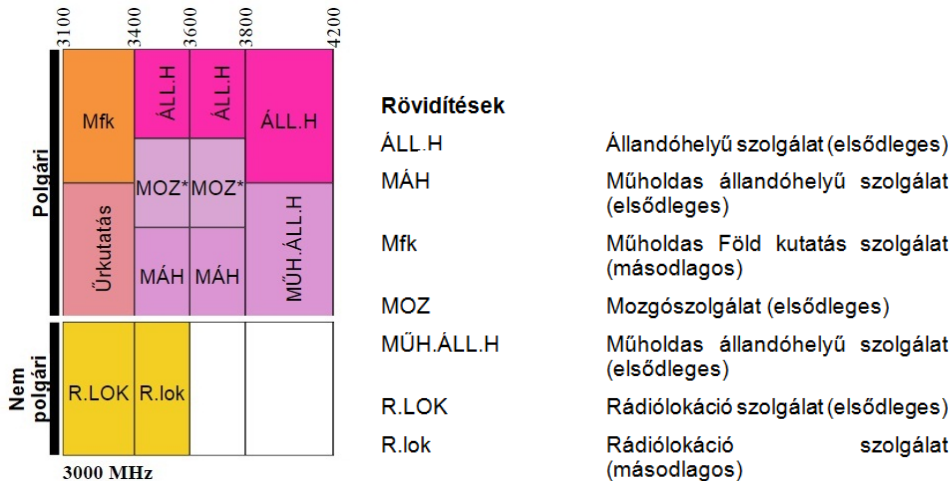
The RSPP aims to promote the wider availability of wireless broadband services for the benefit of citizens and consumers in the Union. Article 6 (2) of this Decision required Member States to make the bands covered by Decision 2008/411/EC (3400-3800 MHz) available under terms and conditions described in that decision, and requires that "subject to market demand, Member States shall carry out the authorisation process by 31 December 2012 without prejudice to the existing deployment of services, and under conditions that allow consumers easy access to wireless broadband services."

Accordingly, with regard to market demand, the NMHH made the band available for the systems specified by the EU decisions and has carried out the corresponding sales processes, as a result of which two service providers acquired entitlements to frequency use. Further information on the current use is available in Section 3.3.

## 3.2. National regulation

According to Annex 2 of the NFFF, the 3400-3800 MHz frequency band is primarily allocated for fixed, fixed satellite (space-Earth direction) and mobile (except for aeronautical mobile) services. Within these services only civil applications are allowed to operate. In addition to this, the 3400-3410 MHz sub-band has a secondary allocation for the radiolocating service, which allows only non-civil applications.





Polgári	Civilian
Nem polgári	Non-civilian
Úrkutatás	Space research
Rövidítések	Abbreviations
ÁLL.H Állandóhelyű szolgálat (elsődleges)	ÁLL.H Fixed service (primary)
MÁH Műholdas állandóhelyű szolgálat (elsődleges)	MÁH Satellite fixed services (primary)
Mfk Műholdas Föld kutatás szolgálat (másodlagos)	Mfk Satellite Earth research service (secondary)
MOZ Mozgószolgálat (elsődleges)	MOZ Mobile service (primary)
MÜH.ÁLL.H Műholdas állandóhelyű szolgálat (elsődleges)	MÜH.ÁLL.H Satellite fixed services (primary)
R.LOK Rádiólokáció szolgálat (elsődleges)	R.LOK Radiolocating service (primary)
R.lok Rádiólokáció szolgálat (másodlagos)	R.lok Radiolocating service (secondary)

Figure 1: Allocation of the 3400-3800 MHz frequency band for services

Primary services:

- **Mobile service:** The entire band is assigned to applications of the mobile service (except aeronautical mobile), which can be terrestrial electronic communications networks (BWA, MWA, LTE, WMAN, WiMAX). It must be noted here that according to the RR, the mobile service is secondary in the entire band, but footnote RR 5.430A defines a different allocation. According to this, the mobile service is primary in the 3400-3600 MHz band in Hungary, while in the 3600-3800 MHz band the mobile service has been determined as primary instead of secondary, deviating from the RR.
- **Fixed service:** The entire band is also assigned to fixed service applications, which can be terrestrial electronic communications networks:
  - Point-to-multipoint systems (BWA, FWA, NWA, WMAN, Metro, HiperMAN, WiMAX),
  - Point-to-point systems (BWA).
- **Satellite fixed services:** The entire band is assigned to fixed satellite service applications, where the following stations are allowed operate:
  - Coordinated VSAT (cannot claim protection against stations for applications of the same nature operating in the band), or
  - ROES.

Secondary services:

- **Radiolocating service:** The radiolocating service is a secondary service in the 3400-3410 MHz sub-band, in the framework of which various non-civilian radiolocating systems may operate - among others (primary ground radars, ground altitude measuring radars and meteorological radars) military radars (an important military band according to the public NJFA, and radars installed on board aircraft may operate up to 3410 MHz).

According to the latest effective NFFF, the entitled operator can use the awarded frequency band to build nationwide networks, and the frequency blocks can be used for providing public electronic communications services. The end-user stations can be fixed or mobile.

From a technological point of view, fixed point-to-multipoint networks often use traditional (not specified separately in the regulation) or WiMAX solutions. Nevertheless, given the requirement of effective spectrum use, it is advisable to support the introduction of the LTE technology for the mobile service systems to be used in the future with regulatory tools, with regard to spectrum efficiency and high transmission speeds.

**Band use conditions and frequency management requirements for terrestrial electronic communications networks in Annex 3 of the NFFF for the 3.5 GHz and 3.7 GHz bands according to the regulation in force:**

Band allocation and the characteristics of the frequency blocks

The 3400-3600 MHz band is divided into 5 MHz TDD basic blocks, therefore 40 basic blocks can be found in the band, of which bands 1 and 2 are guard bands. The guard bands are not allocable.

The 3600-3800 MHz band is divided into 5 MHz TDD basic blocks, therefore 40 basic blocks can be found in the band.

A basic block forms a user block if the basic block and all basic blocks in neighbouring frequencies have different licensees, or if it is a neighbouring basic block in at least two frequencies, if its licensee is the same.

The detailed rules concerning the emission requirements in and out of the user block can be found in the respective section of Annex 3 of the NFFF.

Radio applications that can be operated in the band

Fixed and mobile systems, and networks (MFCN) can be operated in the band. The fixed services may have point-to-point or point-to-multipoint structures. Electronic communication services can be provided in the frequency band. Only TDD systems may be operated in the frequency band.

Provisions and restrictions concerning the right to frequency use

Entitlement to frequency use may be acquired through tendering procedures and is of nationwide coverage. Secondary trading is allowed; the entitlement to frequency use and the right of frequency use may be transferred and leased either partially or entirely; partial transfer or lease relating to frequencies shall be completed in form of blocks. The duration of the right of frequency use is a minimum of 9 and a maximum of 20 years, with the actual duration determined by the announcement documentation of the tendering procedure and the resolution concluding it, or a public contract. The mode of frequency management is block allocation. In the NFFF, we determined a maximum and a minimum of the spectrum, whose detailed regulation is found in the corresponding section of Annex 3.

End-user stations

The user stations operating in the framework of the mobile service are end user stations. User stations operating in the framework of fixed services may be fixed or transportable end-user stations or user stations that do not represent electronic transmission endpoints. User stations that do not constitute electronic transmission endpoints may serve wired and wireless electronic communications networks alike.

#### Rules concerning intra-station interference

If interference should arise between stations operating in two different blocks of the band, the provisions of the agreement between the licensees of the stations should be followed, in order to terminate interference. If no such agreement is in force, the duty of taking action to eliminate the interference is on the operator of the station that was registered later and is causing the interference, and the station subject to interference that has a later registration date is not entitled to protection from interference.

### **3.3. Actual use**

#### **Results of the 2016 auction:**



- in the 3400-3600 MHz band: Vodafone Magyarország Zrt. acquired 2×30 MHz of FDD spectrum
- in the 3600-3800 MHz band: DIGI Távközlési és Szolgáltató Kft. acquired 20 MHz of TDD spectrum

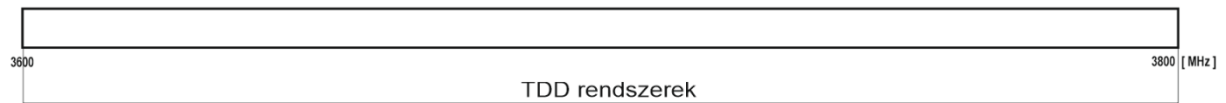
During the 2016 sale of the 3400-3800 MHz band Vodafone gained a 2 × 30 MHz FDD spectrum in the 3400-3600 MHz band, and DIGI Távközlési és Szolgáltató Kft. acquired a 20 MHz TDD spectrum in the 3600-3800 MHz band.

In the 3400-3600 MHz band we have modified the access mode from FDD to TDD. The related NFFF amendment was announced on 28 July 2017.

Due to the transition from FDD to TDD, the authority has allocated the user blocks that have been generated from the basic block acquired during the auction to the lower part of the band. In summary, regarding the full 3400-3800 MHz band, 110+200, i.e. a total of 310 MHz coherent spectrum is still available for the operation of TDD systems, which means that sufficient spectrum can be provided to a large number of broadband MFCN applications.

**Current allocation of the 3400-3800 MHz frequency band**

Operator	User block	Bandwidth	Expiry of entitlement
	3410 – 3470 MHz (TDD)	6 x (2 x 5) = 60 MHz	15.06.2034
	3470 – 3490 MHz (TDD)	4 x 5 = 20 MHz	15.06.2034



védősáv	guard band
TDD rendszerek	TDD systems

**Figure 2: User blocks in the 3400-3800 MHz frequency band**

## 4. Future use

At the WRC-15 the identification of frequency bands suitable for the use of 5G systems was determined as item 1.13 in the agenda for the next WRC (WRC-19). In this context, within the range of the specified possible frequency bands it is necessary to examine, which frequency bands may be the most suitable for introducing 5G systems. By the end of 2016 an EU mandate was elaborated<sup>11</sup>, in which, based on the RSPG's expert opinion on issues related to the 5G spectrum,<sup>12</sup> CEPT is requested to study the feasibility of a 5G introduction in respect of the bands specified in the document, taking into account the current spectrum uses. In accordance with the opinion of RSPG, the 700 MHz and 3400-3800 MHz bands, and the 26 GHz band (24.25-27.5 GHz) has been denoted by the mandate as the band marked for the early adoption of 5G (5G pioneer band).

This band is currently available for MFCN systems without type restrictions. The BEM values applied to 5G systems may, however, differ from those applied to systems currently in use. According to the EU Commission mandate on 5G IMT tests – to be described in detail later – the CEPT is to elaborate the report containing the test results corresponding to the bands determined therein by June 2018. The 5G system includes several various application types, each of which may be considered for this band. As there still remains 310 MHz in the band to be allocated for MFCN, enough spectrum can be provided for several broadband applications.

It must be noted, however, that applications and systems requiring real large spectra will be implemented in higher frequency bands, typically in bands above the 24 GHz band, as forecasts suggest that several hundreds of MHzs of continuous spectrum would be required per service provider for 5G applications with high spectrum requirements.

### 4.1. International regulation

#### 4.1.1. ITU

The 5G tests are underway in the ITU-R<sup>13</sup> WP 5D group, but not for this band, but only for the higher bands. Identification requests for 5G for this band is a European specialty.

#### 4.1.2. CEPT

Based on the EU mandate, the examination at CEPT is ongoing concerning the band: the ECC PT1 workgroup deals with whether the band is suitable for 5G, and if so, how it can the use of various parts of the band in different countries be managed. According to the EU mandate, the CEPT report draft will have to be prepared by March 2018, and the final report by June 2018.

#### 4.1.3. EU

The new harmonisation process has started. The EU aims to have the 5G systems introduced as soon as possible, and indicated the 3400-3800 MHz band among the first, therefore the EU mandate also lists this band as the pioneer band, concerning which the ECC PT1 has started investigations. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – 5G for Europe Action Plan COM(2016) 588, with which the Commission targets the soonest possible European establishment of 5G networks and the launch of commercial services in a coordinated manner. The Commission

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<sup>11</sup> <https://ec.europa.eu/digital-single-market/en/news/radio-spectrum-cept-mandates-0>

<sup>12</sup> [http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion\\_5G.pdf](http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf)

<sup>13</sup> International Telecommunication Union Radiocommunication Sector



stresses to make the spectrum and the standards available as quickly as possible, and in a coordinated manner.

## **4.2. National regulatory plans**

There are presently two licensees in the band, using MFCN systems without restriction on application type. The BEM values applied to 5G systems may differ from those applied to systems currently in use. The compatibility and the usability of the 5G systems in the band is examined by CEPT at European level, based on the corresponding EU mandate. Elaboration of the national regulation may begin when the results of the international examination will be available.

The legal regulation amendment described in Section 3.3. and the relocation of the user block resulted in no further band rearrangement and determination of transitional period being necessary, as the user blocks were allocated in the frequency band to make spectrum utilisation as efficient as possible and to make enough spectrum available to satisfy further demand in the band.

## 5. International frequency use and coordination

### 5.1. Current use

In Hungary, MFCN systems may be used in the allocated blocks, but there is no such use as yet in the frequency band according to our knowledge (the allocated frequency block can be found in Section 3.3.).

According to the EFIS database, the neighbouring countries have reported the use of the following applications in the 3400-3800 MHz band:

	AUT	HRV	ROU	SRB	SVK	SVN	UKR
<i>Application</i> <sup>14</sup>	TRA-ECS	IMT	TRA-ECS, BWA, Fixed, MFCN, FSS Earth stations	BWA, Fixed, MFCN	TRA- ECS, MFCN, Fixed PMP	TRA-ECS, FSS Earth stations	N/A
<i>Expiry of entitlement</i> <sup>15</sup>	2019 (Digital cellular(regional))	2023 (BWA(WiMAX), regional)	N/A (2015 PMP)	N/A	2025 (MFCN, national, regional)	2021,2022 (MFCN, regional)	N/A

### 5.2. Coordination status

Coordination agreements for MFCN systems (“Technical Arrangement on border coordination for terrestrial systems capable of providing electronic communications services in the frequency band 3400-3800 MHz”) have been concluded with Austria, Slovenia, Croatia, Serbia and Slovakia. The technical basis of the agreement was provided by the ECC/REC/(15)01 recommendation.

Earlier, only fixed systems operated in the band, concerning which coordination agreements base on preferred allocation have been concluded with all neighbouring countries. The coordination trigger value in this case has been determined according to the corresponding provision of the Radio Regulations, as no CEPT recommendation existed concerning coordination of fixed systems.

As Commission Implementing Decision 2014/276/EU states that MFCN systems may operate in the band by putting FDD and TDD system to operation in the lower sub-band (3400-3600 MHz), while exclusively operating TDD systems in the upper sub-band (3600-3800 MHz), therefore provisions for both FDD and TDD systems have been specified in the agreement concerning MFCN systems. Different trigger values have been determined for TDD systems in synchronous and asynchronous networks.

Concerning the old fixed systems, the same trigger values were provided as in the old agreement, and as long as the licences corresponding to these are valid, they will remain protected. All signatory countries had the possibility to provide in the annex of the agreement the stations they wish to continue protecting. As soon as the licences corresponding to these expire – and the entitlement to protection is terminated – the signatory neighbouring countries must be notified.

Therefore, the agreement concerning the MFCN systems is as yet not signed with Romania and Ukraine, but there are valid preferred band allocation agreements signed earlier for the application of FWA for the 3410-3500/3510-3600 MHz band.

<sup>14</sup> Name of the application given in EFIS (only the applications significant from the aspect of band use are indicated).

<sup>15</sup> The system type actually given based on EFIS “Right of Use” search



If the band is identified for 5G systems and it is found that the present BEM values and coordination trigger values are suitable, decision may be possible on whether the existing agreement should be reviewed. For the time being – as the BEM has been specified for MFCN systems operating with 5 MHz based channel spacing and the coordination agreement also concerns these – we do not see the need for amending the agreement. Decision may be made on this if the tests for the 5G systems are completed.



## 6. Other potential sources of interference

When deploying land/central stations and repeater stations, interference caused by military radars licensed earlier and operating in the 2700-3100 MHz band must be taken into account.

The impacts of military radar stations in their proximity must be considered when the system at hand is being designed and its stations deployed. At this phase, it is recommended to carry out measurements on site, as interference impact of radar stations is detectable, if at all, to a small extent due to local geographic features in wave propagation, low duty cycle and ground cover.

The table below contains a list of radar stations relevant as regards interference.

Location	Geographic coordinates of the site (VGS-84)		Operating frequency band
	North	North	
Kup	47°15'08"	17°28'04"	2.7 – 3.1 GHz
Juta	46°23'37"	17°44'09"	2.7 – 3.1 GHz
Medina	46°28'18"	18°37'08"	2.7 – 3.1 GHz
Békéscsaba	46°41'06"	21°00'44"	2.7 – 3.1 GHz

## 7. Frequency fees

### 7.1. One-time fees

For determining the one-time fees, various economic principles and international examples must be taken into account. The determination of the one-time fee will play a role in the preparation of the sales procedure, when we will know what exactly the band can be used for and with what concept we work with.

### 7.2. Usage fees

For determining the fees to be paid after the use of the 3400-3800 MHz frequency band, the calculation methodology determined in Section 20 titled "Fees to be paid for service type bands with block allocation, sold at an auction or a tender" and Annex 9 of the NMHH Decree 1/2011 (III. 31.) on frequency reservation and usage fees (hereinafter: the Fee Decree) is applicable.

Frequency Range	Band Multiplier Value
In case of entitlements to frequency use acquired in the 3400-3800 MHz frequency range before 1 January 2014	0.004
In case of entitlements to frequency use acquired in the 3400-3800 MHz frequency range after 1 January 2014	0.12

Calculation method:

- A uniform fee of HUF 7500/kHz per month shall apply to all frequency band sold and acquired.
- This fee shall be multiplied by the cumulative frequency in kHz of bands sold and acquired, and by the band multiplier.
- When defining the amount expressed in kHz of the bands sold and acquired, both parts of duplex bands shall be taken into account.

According to Section 20, Paragraph (4) of the Fee Decree, in order to support investments, the party acquiring entitlement to frequency use in the tendering procedure started after 1 March 2013 in the 3400-3600 MHz and 3600-3800 MHz frequency band shall be entitled to a 50% discount on the band fee defined according to Paragraph (2) for a term of 4 years from the day following acquisition. Among the frequency bands listed above, the discount for supporting investment is not granted for any frequency band in which the enterprise being awarded the entitlement to frequency use already has an entitlement to frequency use at the time of the tender announcement.

It is possible to determine rules different from the multipliers according to Annex 9 of the Fee Decree in the announcement documentation. In view of this, it is necessary to deliberate the effective regulation's provisions and the possibilities of different regulations according to the documentation.

In the preparatory phase of the band sales for 2016, the payable fee was determined by taking economic aspects and international examples into consideration (also taking the mobile use options into consideration besides the fixed ones), whose amendment is naturally possible at the time of the next sales.

## 8. Standards

The listing and brief description of the relevant effective standards and the other expected EN, 3GPP or other standards.

### Standards concerning fixed systems:

- For point-to-multipoint systems:
  - MSZ EN 301 753
  - MSZ EN 302 326-2
  - MSZ EN 302 326-3
- Point-to-point systems:
  - MSZ EN 302 217-2-2
  - MSZ EN 302 217-4-2

### Standards concerning mobile systems:

- MWA
  - MSZ EN 302 623
  - MSZ EN 302 774

The 3GPP Release 14 includes all E-UTRA bands<sup>16</sup>, concerning which the band use characteristics are provided, among others equipment of what channel width may be used in which band, which band's carrier may be aggregated with which band's carrier, how many carriers may be aggregated, and so on. The detailed description of the 3400-3600 MHz band (FDD: Band 22; TDD: Band 42) and the 3600-3800 MHz band (Band 43) can be found in the annex. The substantial information can be found in the tables below concerning carrier aggregation. The tables show that in case of aggregating three or more carriers, what carrier bands may be aggregated with carriers found in the 3400-3600 MHz TDD (Band 42) band.

In Band 42 a total of 5 carriers can be aggregated (i.e. a maximum of a 100 MHz-es aggregated channel may be used).

In Band 43, 2 carriers can be aggregated (i.e. a maximum of a 40 MHz-es aggregated channel may be used).

The Band 22 carrier may only be aggregated with a carrier of band 2500-2570/2620-2690 MHz.

The usable channel bandwidths for each of the three bands are: 5, 10, 15, 20 MHz.

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<sup>16</sup> 3GPP TS 36.101 V14.3.0 (2017-03)



Band identifier	Frequency band			
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz		
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz		
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz		
8	880 MHz – 915 MHz	925 MHz – 960 MHz		
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz		
19	830 MHz – 845 MHz	875 MHz – 890 MHz		
20	832 MHz – 862 MHz	791 MHz – 821 MHz		
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz		
28	703 MHz – 748 MHz	758 MHz – 803 MHz		
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz		
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz		
46	5150 MHz – 5925 MHz	5150 MHz – 5925 MHz		

Table 1: Bands of carriers that can be aggregated with 3400-3600 MHz TDD band carriers (in case of 2 carriers)



1920-1980/ 2110-2170	1710-1785/ 1805-1880	2500-2570/ 2620-2690	880-915/ 925-960	1427.9-1447.9/ 1475.9-1495.9	830-845/ 875-890	832-862/ 791-821	1447.9-1462.9/ 1495.9-1510.9	703-748/ 758-803	2300-2400	2496-2690/ 2496-2690	5150-5925
X	X										
X		X									
X					X						
X						X					
X							X				
X								X			
X										X	
	X	X									
	X				X						
	X					X					
	X						X				
	X							X			
	X									X	
		X				X					
					X		X				
							X	X			
								X		X	

Table 2: Bands of carriers that can be aggregated with 3400-3600 MHz TDD band carriers (in case of 3 carriers)



1920-1980/ 2110-2170	1710-1785/ 1805-1880	2500-2570/ 2620-2690	880-915/ 925-960	1427.9-1447.9/ 1475.9-1495.9	830-845/ 875-890	832-862/ 791-821	1447.9-1462.9/ 1495.9-1510.9	703-748/ 758-803	2300-2400	2496-2690/ 2496-2690	5150-5925
X	X	X									
X	X				X						
X	X					X					
X	X						X				
X	X							X			
X		X				X					
X					X		X				
X							X	X			
	X	X				X					
	X				X		X				
	X							X		X	

**Table 3: Bands of carriers that can be aggregated with 3400-3600 MHz TDD band carriers (in case of 4 carriers)**

In case of 5 carriers, the carriers of the following band may be aggregated with 3400-3600 MHz TDD band carriers: 1920-1980/ 2110-2170 MHz, 1710-1785/ 1805-1880 MHz, 2500-2570/ 2620-2690 MHz, 832-862/ 791-821 MHz.

## Related documents

- [1] 2008/411/EC: Commission Decision of 21 May 2008 on the harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community
- [2] 2014/276/EU: Commission Implementing Decision of 2 May 2014 on amending Decision 2008/411/EC on the harmonisation of the 3400 - 3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community
- [3] ECC/DEC/(07)02: ECC Decision of 30 March 2007 on availability of frequency bands between 3400–3800 MHz for the harmonised implementation of Broadband Wireless Access systems (BWA)
- [4] ECC/DEC/(11)06: Harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the bands 3400–3600 MHz and 3600–3800 MHz
- [5] ECC/DEC/(12)01: Exemption from individual licensing and free circulation and use of terrestrial and satellite mobile terminals operating under the control of networks
- [6] ECC/REC/(15)01: Cross-border coordination for mobile / fixed communications networks (MFCN) in the frequency bands: 1452-1492 MHz, 3400-3600 MHz and 3600-3800 MHz
- [7] MSZ EN 301 753: Fixed Radio Systems. Multipoint equipment and antennae. Generic harmonised standard for multipoint digital fixed radio systems and antennas covering the essential requirements under Article 3(2) of the Directive 1999/5/EC
- [8] MSZ EN 302 217-2-2: Fixed Radio Systems. Characteristics and requirements for point-to-point equipment and antennas. Part 2-2: Digital systems that operate in frequency coordinated frequency bands. Harmonised European standard covering the essential requirements of Article 3 Section (2) of the R&TTE Directive
- [9] MSZ EN 302 217-4-2: Fixed Radio Systems. Characteristics and requirements for point-to-point equipment and antennas. Part 4-2: Antennas. Harmonised European standard covering the essential requirements of Article 3 Section (2) of the R&TTE Directive
- [10] MSZ EN 302 326-2: Fixed radio systems. Multipoint equipment and antennas. Part 2: The essential requirements of Article 3(2) of the R&TTE Directive for digital multipoint radio equipment.
- [11] MSZ EN 302 326-3: Fixed radio systems. Multipoint equipment and antennas. Part 3: Harmonised European standard covering the essential requirements of Article 3(2) of the R&TTE Directive for Multipoint Radio Antennas.
- [12] MSZ EN 302 623: Broadband wireless access systems (BWA) in the 3400 - 3800 MHz frequency band. Mobile terminal devices. Harmonised European standard covering the essential requirements of Article 3 Section (2) of the R&TTE Directive
- [13] MSZ EN 302 774: Broadband wireless access systems (BWA) in the 3400 - 3800 MHz frequency band. Base stations. Harmonised European standard covering the essential requirements of Article 3 Section (2) of the R&TTE Directive
- [14] 3GPP TS 36.101 V14.3.0 (2017-03)



## **ANNEX**

*3GPP TS 36.101 V14.3.0 (2017-03) – for the 3400-3800 MHz band*



Table 5.5-1 E-UTRA operating bands

E-UTRA Operating Band	Uplink (UL) operating band BS receive UE transmit	Downlink (DL) operating band BS transmit UE receive	Duplex Mode
	$F_{UL\_low} - F_{UL\_high}$	$F_{DL\_low} - F_{DL\_high}$	
1	1920 MHz – 1980 MHz	2110 MHz – 2170 MHz	FDD
2	1850 MHz – 1910 MHz	1930 MHz – 1990 MHz	FDD
3	1710 MHz – 1785 MHz	1805 MHz – 1880 MHz	FDD
4	1710 MHz – 1755 MHz	2110 MHz – 2155 MHz	FDD
5	824 MHz – 849 MHz	869 MHz – 894MHz	FDD
6 <sup>1</sup>	830 MHz – 840 MHz	875 MHz – 885 MHz	FDD
7	2500 MHz – 2570 MHz	2620 MHz – 2690 MHz	FDD
8	880 MHz – 915 MHz	925 MHz – 960 MHz	FDD
9	1749.9 MHz – 1784.9 MHz	1844.9 MHz – 1879.9 MHz	FDD
10	1710 MHz – 1770 MHz	2110 MHz – 2170 MHz	FDD
11	1427.9 MHz – 1447.9 MHz	1475.9 MHz – 1495.9 MHz	FDD
12	699 MHz – 716 MHz	729 MHz – 746 MHz	FDD
13	777 MHz – 787 MHz	746 MHz – 756 MHz	FDD
14	788 MHz – 798 MHz	758 MHz – 768 MHz	FDD
15	Reserved	Reserved	FDD
16	Reserved	Reserved	FDD
17	704 MHz – 716 MHz	734 MHz – 746 MHz	FDD
18	815 MHz – 830 MHz	860 MHz – 875 MHz	FDD
19	830 MHz – 845 MHz	875 MHz – 890 MHz	FDD
20	832 MHz – 862 MHz	791 MHz – 821 MHz	FDD
21	1447.9 MHz – 1462.9 MHz	1495.9 MHz – 1510.9 MHz	FDD
<b>22</b>	<b>3410 MHz – 3490 MHz</b>	<b>3510 MHz – 3590 MHz</b>	<b>FDD</b>
23 <sup>1</sup>	2000 MHz – 2020 MHz	2180 MHz – 2200 MHz	FDD
24	1626.5 MHz – 1660.5 MHz	1525 MHz – 1559 MHz	FDD
25	1850 MHz – 1915 MHz	1930 MHz – 1995 MHz	FDD
26	814 MHz – 849 MHz	859 MHz – 894 MHz	FDD
27	807 MHz – 824 MHz	852 MHz – 869 MHz	FDD
28	703 MHz – 748 MHz	758 MHz – 803 MHz	FDD
29	N/A	717 MHz – 728 MHz	FDD <sup>2</sup>
30	2305 MHz – 2315 MHz	2350 MHz – 2360 MHz	FDD
31	452.5 MHz – 457.5 MHz	462.5 MHz – 467.5 MHz	FDD
32	N/A	1452 MHz – 1496 MHz	FDD <sup>2</sup>
33	1900 MHz – 1920 MHz	1900 MHz – 1920 MHz	TDD
34	2010 MHz – 2025 MHz	2010 MHz – 2025 MHz	TDD
35	1850 MHz – 1910 MHz	1850 MHz – 1910 MHz	TDD
36	1930 MHz – 1990 MHz	1930 MHz – 1990 MHz	TDD
37	1910 MHz – 1930 MHz	1910 MHz – 1930 MHz	TDD
38	2570 MHz – 2620 MHz	2570 MHz – 2620 MHz	TDD
39	1880 MHz – 1920 MHz	1880 MHz – 1920 MHz	TDD
40	2300 MHz – 2400 MHz	2300 MHz – 2400 MHz	TDD
41	2496 MHz – 2690 MHz	2496 MHz – 2690 MHz	TDD
<b>42</b>	<b>3400 MHz – 3600 MHz</b>	<b>3400 MHz – 3600 MHz</b>	<b>TDD</b>
<b>43</b>	<b>3600 MHz – 3800 MHz</b>	<b>3600 MHz – 3800 MHz</b>	<b>TDD</b>
44	703 MHz – 803 MHz	703 MHz – 803 MHz	TDD
45	1447 MHz – 1467 MHz	1447 MHz – 1467 MHz	TDD
46	5150 MHz – 5925 MHz	5150 MHz – 5925 MHz	TDD <sup>8,9</sup>
47	5855 MHz – 5925 MHz	5855 MHz – 5925 MHz	TDD
48	3550 MHz – 3700 MHz	3550 MHz – 3700 MHz	TDD
...			
64	Reserved		
65	1920 MHz – 2010 MHz	2110 MHz – 2200 MHz	FDD
66	1710 MHz – 1780 MHz	2110 MHz – 2200 MHz	FDD <sup>4</sup>

67	N/A	738 MHz – 758 MHz	FDD <sup>2</sup>
68	698 MHz – 728 MHz	753 MHz – 783 MHz	FDD
69	N/A	2570 MHz – 2620 MHz	FDD <sup>2</sup>
70	1695 MHz – 1710 MHz	1995 MHz – 2020 MHz	FDD <sup>10</sup>

**Table 5.5A-1: Intra-band contiguous CA operating bands**

E-UTRA CA Band	E-UTRA Band (Table 5.5.1)
CA_42	42

**Table 5.5A-3: Intra-band non-contiguous CA operating bands (with two sub-blocks)**

E-UTRA CA Band	E-UTRA Band (Table 5.5)
CA_42-42	42

**Table 5.5A-2: Inter-band CA operating bands (two bands)**

E-UTRA CA Band	E-UTRA Band (Table 5.5.1)
CA_1-42	1, 42
CA_3-42	3, 42
CA_7-22	7, 22
CA_7-42	7, 42
CA_7-42-42	7, 42
CA_8-42	8, 42
CA_11-42	11, 42
CA_19-42	19, 42
CA_20-42	20, 42
CA_20-42-42	20, 42
CA_21-42	21, 42
CA_28-42	28, 42
CA_40-42	40, 42
CA_41-42	41, 42
CA_42-46	42, 46
NOTE 1: The frequency range in band 28 is restricted for this CA band combination to 703-733 MHz for the UL and 758-788 MHz for the DL NOTE 2: The frequency range in band 28 is restricted for this CA band combination to 718-748 MHz for the UL and 773-803 MHz for the DL	

**Table 5.5A-2a: Inter-band CA operating bands (three bands)**

E-UTRA CA Band	E-UTRA Band (Table 5.5.1)
CA 1-3-42	1, 3, 42
CA 1-7-42	1, 7, 42
CA 1-19-42	1, 19, 42
CA 1-20-42	1, 20, 42
CA 1-21-42	1, 21, 42
CA 1-28-42	1, 28, 42
CA 1-41-42	1, 41, 42
CA 3-7-42	3, 7, 42
CA 3-19-42	3, 19, 42
CA 3-20-42	3, 20, 42
CA 3-21-42	3, 21, 42
CA 3-28-42	3, 28, 42
CA 3-41-42	3, 41, 42
CA 7-20-42	7, 20, 42
CA 19-21-42	19, 21, 42
CA 21-28-42	21, 28, 42
CA 28-41-42	28, 41, 42

**Table 5.5A-2b: Inter-band CA operating bands (four bands)**

E-UTRA CA Band	E-UTRA Band (Table 5.5)
CA 1-3-7-42	1, 3, 7, 42
CA 1-3-19-42	1, 3, 19, 42
CA 1-3-20-42	1, 3, 20, 42
CA 1-3-21-42	1, 3, 21, 42
CA 1-3-28-42	1, 3, 28, 42
CA 1-7-20-42	1, 7, 20, 42
CA 1-19-21-42	1, 19, 21, 42
CA 1-21-28-42	1, 21, 28, 42
CA 3-7-20-42	3, 7, 20, 42
CA 3-19-21-42	3, 19, 21, 42
CA 3-28-41-42	3, 28, 41, 42

**Table 5.5A-2c: Inter-band CA operating bands (five bands)**

E-UTRA CA Band	E-UTRA Band (Table 5.5)
CA 1-3-7-20-42	1, 3, 7, 20, 42

**Table 5.6.1-1: E-UTRA channel bandwidth**

E-UTRA Band	E-UTRA band / Channel bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
22			Yes	Yes	Yes	Yes
42			Yes	Yes	Yes	Yes
43			Yes	Yes	Yes	Yes

**Table 5.6A.1-1: E-UTRA CA configurations and bandwidth combination sets defined for intra-band contiguous CA**

E-UTRA CA configuration	Uplink CA configurations (NOTE 3)	E-UTRA CA configuration / Bandwidth combination set						
		Component carriers in order of increasing carrier frequency					Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_42C	CA_42C	5, 10, 15, 20	20				40	0
		20	5, 10, 15					
		10, 15, 20	20				40	1
		20	10, 15					
CA_42D	CA_42C	5,10,15,20	20	20			60	0
		20	20	5,10,15				
		10, 15, 20	20	20			60	1
		20	20	10, 15				
CA_42E	CA_42C	5,10,15,20	20	20	20		80	0
		20	20	20	5,10,15			
CA_42F	CA_42C	5, 10, 15, 20	20	20	20	20	100	0
		20	20	20	20	5, 10, 15, 20		
CA_43C	-	5	20				40	0
		10	15, 20					
		15	10, 15, 20					
		20	5, 10, 15, 20					

**Table 5.6A.1-2: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (two bands)**

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	Uplink CA configurations (NOTE 4)	E-UTRA Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_1A-42A	CA_1A-42A	1			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_1A-42C	CA_1A-42A	1			Yes	Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_3A-42A	CA_3A-42A	3			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_3A-42C	CA_3A-42A	3			Yes	Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_7A-22A	-	7				Yes	Yes	Yes	40	0
		22			Yes	Yes	Yes	Yes		
CA_7A-42A	-	7			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_7A-42A-42A	-	7			Yes	Yes	Yes	Yes	60	0
		42	See CA_42A-42A Bandwidth Combination Set 0 in Table 5.6A.1-3							
CA_8A-42A	-	8	Yes	Yes	Yes	Yes			30	0
		42			Yes	Yes	Yes	Yes		
CA_8A-42C	-	8	Yes	Yes	Yes	Yes			50	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_11A-42A	-	11			Yes	Yes			30	0
		42			Yes	Yes	Yes	Yes		
CA_11A-42C	-	11			Yes	Yes			50	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_19A-42A	CA_19A-42A	19			Yes	Yes	Yes		35	0
		42			Yes	Yes	Yes	Yes		
CA_19A-42C	CA_19A-42A	19			Yes	Yes	Yes		55	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_20A-42A	-	20			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_20A-42A-42A	-	20			Yes	Yes	Yes	Yes	60	0
		42	See CA_42A-42A Bandwidth Combination Set 0 in Table 5.6A.1-3							
CA_20A-67A	-	20			Yes	Yes	Yes	Yes	40	0
		67			Yes	Yes	Yes	Yes		
CA_21A-28A	CA_21A-28A	21			Yes	Yes	Yes		25	0
		28			Yes	Yes				
CA_21A-42A	CA_21A-42A	21			Yes	Yes	Yes		35	0
		42			Yes	Yes	Yes	Yes		
CA_21A-42C	CA_21A-42A	21			Yes	Yes	Yes		55	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_28A-42A	CA_28A-42A	28			Yes	Yes	Yes	Yes	40	0
		42			Yes	Yes	Yes	Yes		
CA_28A-42C	CA_28A-42A	28			Yes	Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_40A-42A	-	40				Yes	Yes	Yes	40	0
		42				Yes	Yes	Yes		

CA_40A-42C	-	40				Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_40C-42C	-	40	See CA_40C Bandwidth combination set 1 in Table 5.6A.1-1						80	0
		42	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1							
CA_40C-42A	-	40	See CA_40C Bandwidth Combination Set 0 in Table 5.6A.1-1						60	0
		42				Yes	Yes	Yes		
CA_41A-42A	CA_41A-42A	41				Yes	Yes	Yes	40	0
		42				Yes	Yes	Yes		
CA_41A-42C	CA_41A-42A, CA_42C	41				Yes	Yes	Yes	60	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.6A.1-1							
CA_41A-42D	-	41				Yes	Yes	Yes	80	0
		42	See CA_42D Bandwidth combination set 1 in Table 5.6A.1-1							
CA_41C-42A	CA_41A-42A	41	See CA_41C Bandwidth Combination Set 0 in Table 5.6A.1-1						60	0
		42				Yes	Yes	Yes		
CA_41C-42C	CA_41A-42A, CA_42C	41	See CA_41C Bandwidth Combination Set 0 in Table 5.6A.1-1						80	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.6A.1-1							
CA_41C-42D	-	41	See CA_41C Bandwidth Combination Set 0 in Table 5.6A.1-1						100	0
		42	See CA_42D Bandwidth Combination Set 1 in Table 5.6A.1-1							
CA_41D-42A	-	41	See CA_41D Bandwidth combination set 0 in Table 5.6A.1-1						80	0
		42				Yes	Yes	Yes		
CA_41D-42C	-	41	See CA_41D Bandwidth Combination Set 0 in Table 5.6A.1-1						100	0
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.6A.1-1							
CA_42A-46A	-	42			Yes	Yes	Yes	Yes	40	0
		46						Yes		

**Table 5.6A.1-2a: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (three bands)**

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	Uplink CA configurations (NOTE 5)	E-UTRA Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_1A-3A-42A	CA_1A-3A, CA_1A-42A, CA_3A-42A	1			Yes	Yes	Yes	Yes	60	0
		3			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-42C	CA_1A-3A, CA_1A-42A, CA_3A-42A	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-7A-42A	-	1			Yes	Yes	Yes	Yes	60	0
		7				Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-19A-42A	CA_1A-19A <sup>6</sup> , CA_1A-42A, CA_19A-42A <sup>6</sup>	1			Yes	Yes	Yes	Yes	55	0
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-19A-42C	CA_1A-19A <sup>6</sup> , CA_1A-42A, CA_19A-42A <sup>6</sup>	1			Yes	Yes	Yes	Yes	75	0
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-20A-42A	-	1			Yes	Yes	Yes	Yes	60	0
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		28			Yes	Yes				
CA_1A-21A-42A	CA_1A-21A, CA_1A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	55	0
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-21A-42C	CA_1A-21A, CA_1A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	75	0
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-28A-42A	CA_1A-28A, CA_1A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	50	0
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-28A-42C	CA_1A-28A, CA_1A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	70	0
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-41A-42A <sup>10</sup>	-	1			Yes	Yes	Yes	Yes	60	0
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_1A-41A-42C <sup>10</sup>	-	1			Yes	Yes	Yes	Yes	80	0
		41			Yes	Yes	Yes	Yes		
CA_1A-41A-42C <sup>10</sup>	-	42	See CA_42C Bandwidth combination Set 1 in Table 5.6A.1-1							
		1			Yes	Yes	Yes	Yes	80	0
		41	See CA_41C Bandwidth combination Set 0 in Table 5.6A.1-1							
42				Yes	Yes	Yes				
CA_1A-41C-42A <sup>10</sup>	-	1			Yes	Yes	Yes	Yes	100	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.6A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.6A.1-1							
CA_3A-7A-42A	-	3			Yes	Yes	Yes	Yes	60	0

		7			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_3A-19A-42A	CA_3A-19A, CA_3A-42A, CA_19A-42A <sup>6</sup>	3			Yes	Yes	Yes	Yes	55	
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_3A-19A-42C	CA_3A-19A, CA_3A-42A, CA_19A-42A <sup>6</sup>	3			Yes	Yes	Yes	Yes	75	
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
		20			Yes	Yes	Yes	Yes		
CA_3A-20A-42A	-	32			Yes	Yes	Yes	Yes	60	
		3			Yes	Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
CA_3A-21A-42A	CA_3A-21A, CA_3A-42A, CA_21A-42A	28			Yes	Yes			55	
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_3A-21A-42C	CA_3A-21A, CA_3A-42A, CA_21A-42A	3			Yes	Yes	Yes	Yes	75	
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
		28			Yes	Yes	Yes	Yes		
		41			Yes	Yes	Yes	Yes		
		28			Yes	Yes	Yes	Yes		
		41	See CA_41C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_3A-28A-42A	CA_3A-28A <sup>6</sup> , CA_3A-42A, CA_28A-42A	3			Yes	Yes	Yes	Yes	50	
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_3A-28A-42C	CA_3A-28A <sup>6</sup> , CA_3A-42A, CA_28A-42A	3			Yes	Yes	Yes	Yes	70	
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_3A-41A-42A	-	3			Yes	Yes	Yes	Yes	60	
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_3A-41A-42C	-	3			Yes	Yes	Yes	Yes	80	
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth combination set 1 in Table 5.6A.1-1							
CA_3A-41C-42A	-	3			Yes	Yes	Yes	Yes	80	
		41	See CA_41C Bandwidth combination set 0 in Table 5.6A.1-1							
		42				Yes	Yes	Yes		Yes
CA_3A-41C-42C	-	3			Yes	Yes	Yes	Yes	100	
		41	See CA_41C Bandwidth combination set 0 in Table 5.6A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.6A.1-1							
CA_7A-20A-42A	-	7				Yes	Yes	Yes	60	
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
		30			Yes	Yes				
		66			Yes	Yes	Yes	Yes		
CA_19A-21A-42A	CA_19A-21A, CA_19A-42A <sup>6</sup> , CA_21A-42A	19			Yes	Yes	Yes		50	
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_19A-21A-	CA_19A-21A,	19			Yes	Yes	Yes		70	



42C	CA_19A-42A <sup>b</sup> , CA_21A-42A	21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_21A-28A-42A	CA_21A-28A, CA_21A-42A, CA_28A-42A	21			Yes	Yes	Yes		45	0
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_21A-28A-42C	CA_21A-28A, CA_21A-42A, CA_28A-42A	21			Yes	Yes	Yes		65	0
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_28A-41A-42A		28			Yes	Yes			50	0
		41				Yes	Yes	Yes		
		42				Yes	Yes	Yes		
CA_28A-41A-42C	-	28			Yes	Yes			70	0
		41				Yes	Yes	Yes		
		42	See CA_42C Bandwidth Combination Set 1 in Table 5.6A.1-1							
CA_28A-41C-42A	-	28			Yes	Yes			70	0
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.6A.1-1							
		42				Yes	Yes	Yes		
CA_28A-41C-42C	-	28			Yes	Yes			90	0
		41	See CA_41C Bandwidth combination set 0 in Table 5.6A.1-1							
		42	See CA_42C Bandwidth combination set 1 in Table 5.6A.1-1							

**Table 5.6A.1-2b: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (four bands)**

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	Uplink CA configurations (NOTE 5)	E-UTRA Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_1A-3A-7A-42A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-19A-42A	CA_1A-3A, CA_1A-19A <sup>6</sup> , CA_1A-42A, CA_3A-19A, CA_3A-42A, CA_19A-42A <sup>6</sup>	1			Yes	Yes	Yes	Yes	75	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-19A-42C	CA_1A-3A, CA_1A-19A <sup>6</sup> , CA_1A-42A, CA_3A-19A, CA_3A-42A, CA_19A-42A <sup>6</sup>	1			Yes	Yes	Yes	Yes	95	0
		3			Yes	Yes	Yes	Yes		
		19			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-3A-20A-42A	-	1			Yes	Yes	Yes	Yes	80	0
		3			Yes	Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
CA_1A-3A-21A-42A	CA_1A-3A, CA_1A-21A, CA_1A-42A, CA_3A-21A, CA_3A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	75	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-21A-42C	CA_1A-3A, CA_1A-21A, CA_1A-42A, CA_3A-21A, CA_3A-42A, CA_21A-42A	1			Yes	Yes	Yes	Yes	95	0
		3			Yes	Yes	Yes	Yes		
		21			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-3A-28A-42A	CA_1A-3A, CA_1A-28A, CA_1A-42A, CA_3A-28A <sup>6</sup> , CA_3A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	70	0
		3			Yes	Yes	Yes	Yes		
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-3A-28A-42C	CA_1A-3A, CA_1A-28A, CA_1A-42A, CA_3A-28A <sup>6</sup> , CA_3A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	90	0
		3			Yes	Yes	Yes	Yes		
		28			Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-21A-28A-42A	CA_1A-21A, CA_1A-28A, CA_1A-42A, CA_21A-28A, CA_21A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	65	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
		42			Yes	Yes	Yes	Yes		
CA_1A-21A-28A-42C	CA_1A-21A, CA_1A-28A, CA_1A-42A, CA_21A-28A, CA_21A-42A, CA_28A-42A	1			Yes	Yes	Yes	Yes	85	0
		21			Yes	Yes	Yes			
		28			Yes	Yes				
		42	See CA_42C Bandwidth Combination Set 0							

	CA_21A-42A, CA_28A-42A	in Table 5.6A.1-1								
		5	7	Yes	Yes	Yes	Yes			
CA_1A-7A- 20A-42A	-	1		Yes	Yes	Yes	Yes	80	0	
		7			Yes	Yes	Yes			
		20		Yes	Yes	Yes	Yes			
		42		Yes	Yes	Yes	Yes			
CA_1A-19A- 21A-42A	CA_1A-19A <sup>6</sup> , CA_1A-21A, CA_1A-42A, CA_19A-21A, CA_19A-42A <sup>6</sup> , CA_21A-42A	1		Yes	Yes	Yes	Yes	70	0	
		19		Yes	Yes	Yes				
		21		Yes	Yes	Yes				
		42		Yes	Yes	Yes	Yes			
CA_1A-19A- 21A-42C	CA_1A-19A <sup>6</sup> , CA_1A-21A, CA_1A-42A, CA_19A-21A, CA_19A-42A <sup>6</sup> , CA_21A-42A	1		Yes	Yes	Yes	Yes	90	0	
		19		Yes	Yes	Yes				
		21		Yes	Yes	Yes				
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_1A-21A- 28A-42C	-	1		Yes	Yes	Yes	Yes	85	0	
		21		Yes	Yes	Yes				
		28		Yes	Yes					
		42	See CA_42C Bandwidth combination set 0 in Table 5.6A.1-1							
CA_3A-7A- 20A-42A	-	3		Yes	Yes	Yes	Yes	80	0	
		7			Yes	Yes	Yes			
		20		Yes	Yes	Yes	Yes			
		42		Yes	Yes	Yes	Yes			
CA_3A-19A- 21A-42A	-	3		Yes	Yes	Yes	Yes	70	0	
		19		Yes	Yes	Yes				
		21		Yes	Yes	Yes				
		42		Yes	Yes	Yes	Yes			
CA_3A-28A- 41A-42A	-	3		Yes	Yes	Yes	Yes	70	0	
		28		Yes	Yes					
		41			Yes	Yes	Yes			
		42			Yes	Yes	Yes			
CA_3A-28A- 41A-42C	-	3		Yes	Yes	Yes	Yes	90	0	
		28		Yes	Yes					
		41			Yes	Yes	Yes			
		42	See CA_42C Bandwidth combination set 1 in Table 5.6A.1-1							
CA_3A-28A- 41C-42A	-	3		Yes	Yes	Yes	Yes	90	0	
		28		Yes	Yes					
		41	See CA_41C Bandwidth Combination Set 0 in Table 5.6A.1-1							
		42			Yes	Yes	Yes			

- NOTE 1: The CA Configuration refers to a combination of an operating band and a CA bandwidth class specified in Table 5.6A-1 (the indexing letter). Absence of a CA bandwidth class for an operating band implies support of all classes.
- NOTE 2: For each band combination, all combinations of indicated bandwidths belong to the set.
- NOTE 3: For the supported CC bandwidth combinations, the CC downlink and uplink bandwidths are equal.
- NOTE 4: A terminal which supports a DL CA configuration shall support all the lower order fallback DL CA combinations and it shall support at least one bandwidth combination set for each of the constituent lower order DL combinations containing all the bandwidths specified within each specific combination set of the upper order DL combination.
- NOTE 5: Uplink CA configurations are the configurations supported by the present release of specifications.
- NOTE 6: If the UE supports any uplink CA configuration for corresponding downlink CA configuration it shall support this uplink CA configuration.

**Table 5.6A.1-2c: E-UTRA CA configurations and bandwidth combination sets defined for inter-band CA (five bands)**

E-UTRA CA configuration / Bandwidth combination set										
E-UTRA CA Configuration	Uplink CA configurations (NOTE 5)	E-UTRA Bands	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz	Maximum aggregated bandwidth [MHz]	Bandwidth combination set
CA_1A-3A-7A-20A-42A	-	1			Yes	Yes	Yes	Yes	100	0
		3			Yes	Yes	Yes	Yes		
		7				Yes	Yes	Yes		
		20			Yes	Yes	Yes	Yes		
		42			Yes	Yes	Yes	Yes		

**Table 5.6A.1-3: E-UTRA CA configurations and bandwidth combination sets defined for non-contiguous intra-band CA (with two sub-blocks)**

E-UTRA CA configuration / Bandwidth combination set								
E-UTRACA configuration	Uplink CA configurations (NOTE 1)	Component carriers in order of increasing carrier frequency					Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_42A-42A	-	5, 10, 15, 20	5, 10, 15, 20				40	0
CA_42A-42C	-	5, 10, 15, 20	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1				60	0
		See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1		5, 10, 15, 20				
CA_42A-42D	-	5, 10, 15, 20	See CA_42D Bandwidth Combination Set 0 in Table 5.6A.1-1				80	0
		See CA_42D Bandwidth Combination Set 0 in Table 5.6A.1-1			5, 10, 15, 20			
CA_42C-42C	-	See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1		See CA_42C Bandwidth Combination Set 0 in Table 5.6A.1-1			80	0