

ERO INFORMATION DOCUMENT

on

The use of the bands 3400-3600 MHz and 3600-3800 MHz in CEPT

This document summarizes the information collected by the ERO in August 2008 from administrations and operators concerning the use of bands 3400-3600 MHz and 3600-3800 MHz in CEPT as well as information from WiMAX Forum database reflecting the spectrum usage in the 3400–3600 and 3600–3800 MHz band across the majority of CEPT Countries based on FWA/BWA licensing as of September 2008.

INFORMATION COLLECTED BY THE ERO FROM ADMINISTRATIONS AND OPERATORS IN AUGUST 2008

Details are given about the following countries (32):

Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Luxembourg, Macedonia (FYROM), Malta, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

**ERO questionnaire
on the use of 3400-3600 MHz and 3600 - 3800 MHz bands**

In order to support the ECC PT1 efforts in the development of a future channelling arrangement for the bands 3400 – 3600 MHz and 3600 – 3800 MHz you are kindly requested to answer the questions below. A similar set of questions was issued by the JPT BWA two years ago, but since then the regulatory situation in these bands has changed substantially following the development of the ECC/DEC(07)02, the Commission Decision on harmonisation of the 3400-3800 MHz band and the identification of the lower of these two sub-bands for IMT by the WRC-07.

QUESTION 1:

Is mobile and/or fixed BWA/IMT allowed in your country in the listed below sub-bands?

3400-3600 MHz:

Yes

Austria

Belgium

Bosnia and Herzegovina

Bulgaria

Croatia

Czech Republic

Denmark

Estonia

Finland

France

Germany

Hungary

Iceland

Ireland

Italy

Latvia

Luxembourg

Macedonia (FYROM)

Malta

Montenegro

Norway

Poland

Portugal

Russian Federation*

Slovak Republic

Slovenia

Spain

Sweden

Switzerland

United Kingdom

No

Under consideration

Moldova

Netherlands

3600-3800 MHz:

Yes

Denmark

Estonia

Ireland

Latvia

Macedonia (FYROM)

Montenegro

Norway

Poland

Portugal

Slovenia

Sweden

United Kingdom

No

Austria

Belgium

Bulgaria

Finland

Italy

Luxembourg

Malta

Russian Federation

Spain

Switzerland

Under consideration

Bosnia and Herzegovina

Bulgaria

Croatia

Czech Republic

France

Germany

Hungary

Iceland

Moldova

Netherlands

Slovak Republic

Switzerland

Other

Austria: See reply below

Please provide any additional relevant information, e.g. if only part of the band is available for mobile and/or fixed BWA/IMT, then indicate the exact sub-bands.

Austria	<p>In Austria, the band 3410 – 3494 / 3510 – 3594 MHz was assigned to BWA-operators already in 2004. By year-end 2007, one of these operators (i. e. Telekom Austria) waived its license, and a new auctioning process for the relevant sub-band is presently in preparation. For more details, please refer to the homepage of the Austrian Telecommunications Regulatory Authority under: http://www.rtr.at/en/tk/Spektrum3500MHz</p> <p>At present there are no concrete plans for auctioning the band 3600 – 3800 MHz for BWA applications. This band is still used by a number of point-to-point microwave links in Austria, as well as in some neighboring countries. In addition, the band is used by the fixed satellite service, in particular at the Austrian national satellite gateway earth station in Aflenz (about 150 km south-west of Vienna). While we expect that the band can be freed from the use by point-to-point microwave links within the next 1 – 2 years, the site of the Austrian national satellite gateway earth station in Aflenz is to be protected on a permanent basis by defining an appropriate exclusion zone.</p> <p>The licenses granted in 2004 deviate to some extent from the parameters defined in EC Decision 2008/411/EC. Future licenses will, however, fully comply with the technical and operational requirements laid down in this Commission Decision.</p> <p>On request of some of the existing licensees (i.e. WiMAX Telecom GmbH and B-MAX Breitband GmbH), their existing licenses have already been amended to also include mobility (see the relevant license conditions under http://www.rtr.at/de/komp/KonsultationF5c04/F_0807-Ma%C3%9Fnahmenentwurf.pdf).</p> <p>Future BWA licenses will include full usage, including mobility, from the beginning.</p>
Belgium	3450-3500 MHz and 3550-3600 MHz
Bosnia & Herzegovina	The regulatory framework in B&H established by Communication Regulatory Agency provide regulatory regime for deploying BWA in Bosnia and Herzegovina. In line with the Rule for Utilization plan adopted 2007, the frequency sub-bands 3400-3600 MHz is allowed for fixed and mobile BWA. At present Utilization plan for the frequency sub band 3600-3800 MHz allowed only FWA systems.
Bulgaria	The band 3400-3600 MHz is available for mobile and/or fixed BWA/IMT. The band 3600-3800 MHz is not available for mobile and/or fixed BWA/IMT.
Croatia	For 3600-3800 MHz only parts of the band might be available when decided
Czech Republic	Most of the band 3400-3600 MHz: intensive use by broadband wireless access systems 3400-3410 MHz: guard band 3480-3500 / 3580-3600 MHz: fixed links for public telephone network
Denmark	Most of the 3600-3800 MHz: P-P fixed links
Estonia	Only FWA/BWA allowed. A number of licenses issued. In use are fixed or nomadic BWA; not restricted mobile.

Finland	Technology neutral – FDD or TDD. The sub-band is 3400-3410 MHz is used by Amateur and Fixed Service. 3410-3590 MHz currently for FWA only.
France	There are 3 licences for fixed BWA including nomadic of 2x15 MHz: 3465-3480 MHz x 3565-3580 MHz 3432.5-3447.5 MHz x 3532.5-3547.5 MHz 3480-3495 MHz x 3580-3595 MHz
Germany	BWA (Broadband Wireless Access). BWA includes in principle fixed, nomadic and mobile usage, although technology which provides mobility is expected for the future. The paired bands 3410-3494 MHz / 3510-3594 MHz are designated for BWA (2 x 84 MHz). 16 regions have been defined in Germany taking into account the borders of the administrative districts (counties) and economical areas. The amount of available spectrum is less in some regions because of “Wireless Local Loop” (WLL) licences which were granted in the year 2000. BWA (Broadband Wireless Access). The frequency range 3600-3800 MHz is under consideration for an extension to 3400-3600 MHz, the availability may be limited because of existing point-to-point links and earth station (FSS).
Hungary	The 3.5 GHz band is applicable for fixed and nomadic service in the range 3410-3494/ 3510-3594 MHz Mobile service will be used from 2009. The band 3600-3800 MHz is reserved for fixed, nomadic and mobile BWA including IMT. A frequency auction will be arranged depending on market demands.
Iceland	3.4 – 3.6 GHz used for FWA in Iceland
Ireland	Currently operators are only permitted to provide fixed/nomadic services however the existing Regulations will be amended to permit mobility in all of these bands.
Italy	The frequency band available for mobile and/or fixed BWA/IMT is the following: 3425-3500 MHz and 3525-3600 MHz
Luxembourg	Luxembourg is of the view that the consideration of the band 3.6 – 3.8 GHz for IMT is in the contradiction with the results of WRC – 07 (A.I. 1.4).
Macedonia (FYROM)	WiMax Licenses: 3410-3441.5 MHz (TDD); 3445-3476.5 MHz (TDD); 3480-3494 MHz / 3580 -3594 (FDD) 3510 -3541.5 MHz (TDD); 3545-3576.5 MHz (TDD)
Moldova	Fixed links
Montenegro	In the band 3400-3600 MHz and 3600-3800 MHz FWA is allowed, and the 3400-3600 MHz band is under consideration for IMT.
Netherlands	At this moment only the band 3500-3580 is available for fixed point-multi-point It is still under study which parts of the band 3400-3800 MHz can be made available for mobile BWA.
Norway	Frequencies from 3413,5 MHz – 3500 MHz and 3513,5 MHz – 3600 MHz are occupied till 31-12-2022 Frequencies from 3600 MHz – 3810 MHz are occupied till 31-12-2008, used for point-to-point/multipoint
Poland	3400-3600 MHz: Mobile and fixed 3600-3800 MHz: Fixed, the use of mobile BWA/IMT requires changes in the National Table of Frequency Allocations
Portugal	For the time being only part of the band is available for BWA

since there is 1 block of 2 x 28 MHz (3410 – 3438 MHz / 3510 – 3538 MHz), which were assigned during 2000, to the incumbent fixed operator, for FWA.

An auction is planned for 2009 for the assignment of 4 blocks of 2 x 28 MHz – in 9 regions - for BWA (fixed, mobile and nomadic) on a technology neutral basis. After the auction takes place and a “guard time” period is elapsed, the Rights of Use for FWA in this band will be extended, if so required, to BWA (fixed, mobile and nomadic).

Russian Federation*	The use of the band 3400-3600 MHz for BWA is restricted to fixed BWA systems in the bands 3400-3450 MHz and 3500-3550 MHz.
Slovak Republic	The whole band is available, BWA in consideration
Spain	The sub-band 3400-3600 MHz is designated to Fixed BWA systems.
Sweden	The whole band 3,4 – 3,8 GHz is available for fixed and mobile on a service and technology neutral basis. Parts of the spectrum in 3,6 – 3,8 GHz has not been awarded, but will probably be awarded during 2008-2009.
Switzerland	Exact band: 3410 – 3497.5 MHz / 3510 – 3597.5 MHz
United Kingdom	2 x 20 MHz in the 3400-3600 MHz band is licensed for BWA type services Other operational services still exist in 3400-3600 MHz such as ENG/OB (SAP/SAB) and Emergency Services, but not in the bands licensed to BWA. In the band 3600-3800 MHz, 84 MHz is licensed for FWA services. In 3600-3800 MHz operational; satellite services and point to point links exist.

* See “*Basic characteristics of FBWA in the bands 3400-3450 MHz and 3500-3550 MHz*” in Appendix 1

QUESTION 2:**If you answered "No" to Question 1, which other applications/systems are used in these sub-bands?**

Belgium	Microwave links are used in the band 3600-3800 MHz
Bulgaria	Fixed links are used in the band 3600-3800 MHz.
Finland	The band 3600-3800 MHz is heavily used by Fixed Service
France	P-P links for TV infrastructure (uni directional) 4 channels with 30 MHz bandwidth; 2 within 3400-3600 MHz and 2 within 3600-3800 MHz P-P links for the ministry of Interieur 6 FDD channels with 100 MHz duplex size and 1.75 MHz bandwidth within 3400-3600 MHz FSS Earth stations in the band 3600-3800 MHz
Germany	Other applications: Existing applications of the FS and FSS. After the introduction of BWA in the band 3600 - 3800 MHz, the availability for FSS will be limited. Existing and coordinated Earth stations of the FSS will be protected, the introduction of new Earth stations will be considered on a case-by-case basis, mainly for existing locations.
Luxembourg	The frequency band 3600-3800 MHz is actually allocated to the fixed service and fixed satellite service. Luxembourg is of the view that the consideration of the band 3.6 – 3.8 GHz for IMT is in the contradiction with the results of WRC – 07 (A.I. 1.4).
Malta	Currently, the band 3600 – 3800 MHz is being used by fixed P-P radio links.
Russian Federation	The major utilization of the bands 3600-3800 MHz and parts of the band 3400-3600 MHz is receiving earth stations in the fixed satellite service, which can be registered and not registered, used for civil and governmental purpose. The band 3400-3800 MHz can also be used by line-of-sight fixed links. There is around 1100 radio relay networks each consisting of several links (from 4 to 20).
Spain	The sub-band 3600-3800 MHz is designated to Point-to-Point FS systems.
Switzerland	Band 3600 – 3800 MHz: is an extension band for BWA but because of no high demand for BWA (2 x 17.5 MHz in the band 3410 – 3600 MHz still empty and the licensed blocks not heavily used) it is used for temporary ENG-OB.

a) do you consider refarming these bands for mobile and/or fixed BWA/IMT?**Yes**

Bosnia & Herzegovina	Public Broadcast Service in B&H has many transmission systems (point to point microwave links) in the 3400 – 3800 MHz frequency band, however the fact that prior to implementation of the Rules for utilization plan in the 3400-3800 MHz is a need to relocate the transmission systems and make the frequency band available for BWA with acceptable solution in the next 2 years.
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Bulgaria

Croatia

Finland

France

Germany

Macedonia (FYROM)
Moldova
Norway
United Kingdom
No
Hungary
Luxembourg
Malta
Russian Federation
Spain
Switzerland

b) If you answered "Yes" to a), on which time-frame?

3400 – 3600 MHz:	
Belgium	A draft royal decree to allow BWA in the whole band 3410-3600 MHz exists. (Q.1 2009)
Bulgaria	NA
Croatia	Already used
Finland	Current FWA user may apply change in their licensing condition i.e. include mobile and/or BWA/IMT. New licences will be granted according to ECC/DEC(07)02 and Commission Decision C(2008) 1873.
France	Under study depending on market demand.
Germany	In the longer term
Macedonia (FYROM)	No
Moldova	Under consideration
Netherlands	It is still under study which parts of the band 3400-3600 MHz can be made available for mobile BWA
Portugal	Expected until the end of this year.
Russian Federation	There is no plan to reform this band.
Slovenia	No other applications
United Kingdom	Re-farming maybe through direct NRA intervention or market managed through the use of spectrum trading. Timing will be set by parties involved in the trading process.
3600 – 3800 MHz:	
Belgium	No plan to reform this band.
Bulgaria	No final decision has been taken yet.
Croatia	Within 1 year, in accordance with market demand.
Finland	Band is heavily used for fixed links and the use will continue at least until 2015, therefore the band is available for mobile applications at the earliest in 2016.
France	Under study depending on market demand. P-P links for TV infrastructure could be used in the frequency band 3400-3800 MHz until 2011.
Germany	In the longer term
Italy	This frequency band is not available for mobile and/or fixed BWA/IMT as the following services are operating: fixed links of national broadcasting operators, fixed links of national telecommunication operators and fixed links of military applications.
Macedonia (FYROM)	2009
Malta	Currently, the re-farming of this band is not being considered.
Moldova	After implementation in the 3400-3600 MHz band
Netherlands	It is still under study which parts of the band 3600-3800 MHz can be made available for mobile BWA
Norway	Under consideration
Portugal	Expected until the end of this year.

Russian Federation	Not applicable
Slovenia	1 FS link on request
United Kingdom	Refarming maybe through direct NRA intervention or market managed through the use of spectrum trading. Timing will be set by parties involved in the trading process.

Comments:

France	P-P links for TV infrastructure could be used in the frequency band 3400-3800 MHz until 2011.
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Question 3:

If you answered "Yes" to Question 1, which channelling arrangements are used or planned to be used for mobile and/or fixed BWA/IMT in your country (TDD, FDD, size of frequency blocks, duplex separation etc)?

3400 – 3600 MHz:

Austria	In principle FDD according to ERC/REC 14-03 Annex B. TDD is also allowed provided that FDD systems of other operators are protected. Block size 21 MHz, 28 MHz, 35 MHz or 42 MHz (depending on regions for which assignments were made)
Belgium	Duplex separation 100 MHz. Blocks of 25 MHz duplex with 100 MHz duplex spacing. Both FDD and TDD allowed.
Bosnia & Herzegovina	FDD: 4 frequency blocks (2x21 MHz), 100 MHz duplex separation, (ERC REC 14-03, Annex B)
Bulgaria	2 nationwide operators 1X42 MHz TDD 2 nationwide operators 1X21 MHz TDD 1 nationwide operator 2x10.5 MHz FDD, 100 MHz duplex separation
Croatia	FDD; frequency blocks: 2x14 MHz; 2x21 MHz; 2x21 MHz; 2x21 MHz; duplex separation 100 MHz;
Czech Republic	Basic raster – block N x 3,5 MHz
Denmark	TDD and FDD, size of frequency blocks up to 26.5 MHz, duplex separation 100 MHz.
Estonia	ECC/DEC/(07)02; CEPT/ECC/REC(04)05; 4 frequency blocks a 2x21 MHz, technology neutral (TDD or FDD), fixed or nomadic BWA, not restricted mobile, channel bandwidth up to 7 MHz.
Finland	Currently 2 blocks (2x28 MHz FDD, duplex separation 100 MHz) and 1 block (2x24 MHz FDD, duplex separation 100 MHz), however TDD is also allowed. Future channelling arrangements: CEPT harmonised solution.
France	The channelling arrangement is based on 100 MHz duplex (ERC Recommendation 14-03). FDD and TDD technologies are permitted. Size of frequency blocks will depend on market demand and spectrum availability Guard bands between adjacent blocks (coexistence between neighbouring networks) will be managed by operators on the basis of bilateral or multilateral agreements or on technical parameters called Block Edge Mask (BEM).

Germany	TDD and FDD (duplex separation 100 MHz), 21 MHz blocks
Hungary	5 duplex blocks: 3410-3424/3510-3524 MHz 3427.5-3441.5/3527.5-3541.5 MHz 3445-3459/3545-3559 MHz 3462.5-3476.5/3562.5-3576.5 MHz 3480-3494/3580-3594 MHz Duplex spacing: 100 MHz. Duplex method: FDD and TDD. Guard bands of 3.5 MHz can be used by operators adjacent in frequency. This use is based on a bilateral agreement between them.
Iceland	The central gap 3494-3510 MHz will be auctioned on the basis of market demand. This band is used with TDD technology. 2 x 14 MHz each licence. 3413.5-3427.4 / 3513.5-3527.5 ; 3428-3442 / 3528-3542 ; ; 3486-3500 / 3586-3600. ECC/REC (04)05, ERC/REC T/R 14-03.
Ireland	3410 – 3435 MHz is paired with 3510 – 3535 MHz for FDD use 3475 - 3500 MHz is paired with 3575 – 3600 MHz for FDD or TDD use 3540 – 3575 MHz is a TDD only block
Italy	It is possible both TDD, FDD uses – The duplex separation is 100 MHz – Concerning the size of blocks it is possible to use three paired blocks 2x21 MHz.
Latvia	14 MHz frequency blocks, Channel plan - CEPT ERC/REC 14-03 B2, 100 MHz duplex separation, TDD, FDD
Luxembourg	The actual channelling plan is derived from a Multilateral Frequency coordination agreement. (In line with CEPT/ERC/REC 14-03.
Macedonia (FYROM)	WiMax Licenses: 3410-3441.5 MHz (TDD); 3445-3476.5 MHz (TDD); 3480-3494 MHz / 3580 -3594 (FDD) 3510 -3541.5 MHz (TDD); 3545-3576.5 MHz (TDD)
Malta	In 2005, Malta has granted rights of use of radio frequencies in the 3400 – 3600 MHz band for the provision of broadband wireless access services on a technology neutral basis. The channelling arrangement was based on ERC Rec. 14-03.
Montenegro	TDD and FDD is allowed size of frequency blocks per operator is: 2 x (6 channels x 3.5 MHz) duplex separation is 100 MHz
Netherlands	Channelling arrangements are also part of the study.
Norway	ECC/REC(04)05, FDD, 3.5 MHz, 100 MHz, the frequency blocks can be merged in case of need.
Poland	TDD, FDD Duplex separation 100 MHz Channel spacing: 1.75 MHz, 3.5 MHz, 7 MHz, 14 MHz
Portugal	We are going to assign 2 blocks of 2 x 28 MHz, either for TDD or FDD technologies, with a duplex separation of 100 MHz and in accordance with EC Decision 2008/411/EC and CEPT Dec(07)02.

Russian Federation	The general requirements are presented below and applicable for the bands 3400-3450 MHz and 3500-3550 MHz only (see Annex). The requirements for TDD, FDD, size of frequency blocks, duplex separation are not established in the regulation. The frequency assignments are made on link-by-link basis based on detailed evaluation of electromagnetic compatibility. However the major deployment scenario is FDD mode with 100 MHz duplex and channel bandwidth 3.5 MHz or multiple to it.
Slovak Republic	7 MHz channels as a basis according to the multilateral agreement, 4 operators in the band, each 14MHz duplex block
Slovenia	ECC/REC 04-05
Spain	This sub-band is used for fixed BWA as duplex FDD (Blocks of 20 MHz+20 MHz separate 100 MHz)
Sweden	TDD & FDD, optional Frequency block = 28 MHz Duplex = 100 MHz
Switzerland	3400 – 3600 MHz: 1 block 2 x 28 MHz; 2 blocks 2 x 21 MHz; 1 block 2 x 17.5 MHz (still empty); FDD with 100 MHz duplex separation, central station operates in the high band or TDD No fixed channel arrangement but recommended to use CEPT/ERC/REC 14-03, Annex B.
United Kingdom	Duplex separation for BWA type services = 100 MHz. Both FDD and TDD permitted. Block size 2 x 20 MHz. Channel arrangements flexible – set by operator.
3600 – 3800 MHz:	
Austria	In accordance with the requirements of Commission Decision 2008/411/EC
Bosnia & Herzegovina	FDD: 4 frequency blocks (2x21 MHz), 100 MHz duplex separation, (ERC REC 14-03, Annex B)
Bulgaria	2x45 MHz frequency blocks, TDD are planned to be used for mobile and/or fixed BWA/IMT
Croatia	No channelling plans for now
Czech Republic	Still open – see task of PT1
Denmark	TDD and FDD, size of frequency blocks up to 28 MHz, duplex separation 100 MHz.
Estonia	ECC/DEC/(07)02; CEPT/ECC/REC(04)05; 4 frequency blocks a 2x21 MHz + 1 frequency block 2x14 MHz, technology neutral (TDD or FDD), fixed or nomadic BWA, not restricted mobile, channel bandwidth up to 7 MHz.
Finland	Future channelling arrangements: CEPT harmonised solution.
Hungary	Duplex spacing: 100 MHz. Duplex method: FDD and TDD.
Iceland	Under consideration
Ireland	3610 – 3635 MHz is paired with 3710 – 3735 MHz for FDD or TDD use 3635 – 3660 MHz is paired with 3735 – 3760 MHz for FDD of TDD use 3660 – 3685 MHz TDD only 3685 – 3710 MHz TDD only 3760 – 3785 MHz TDD only 3785 – 3800 MHz TDD only
Latvia	14 MHz frequency blocks, Channel plan - CEPT ERC/REC 14-03 B2, 100 MHz duplex separation, TDD, FDD
Macedonia (FYROM)	Under consideration

Montenegro	TDD and FDD is allowed size of frequency blocks per operator is: 2 x (6 channels x 3.5 MHz) duplex separation is 100 MHz
Netherlands	Channeling arrangements are also part of the study.
Norway	ETSI EN 301 751 (point to multipoint) and ETSI EN 301 753 (point to point), FDD.
Poland	TDD, FDD Duplex separation 100 MHz
Portugal	Channel spacing: 1.75 MHz, 3.5 MHz, 7 MHz, 14 MHz We are going to assign 2 blocks of 2 x 28 MHz, either for TDD or FDD technologies, with a duplex separation of 100 MHz and in accordance with EC Decision 2008/411/EC and CEPT Dec(07)02.
Russian Federation	Not applicable
Slovak Republic	The exact arrangement is not decided yet. Multilateral agreement is in preparation.
Slovenia	ECC/DEC(07)02, ECC/REC 04-05
Sweden	FDD (3600 – 3640 MHz, 3700 – 3740 MHz) Frequency block = 20 MHz, Duplex = 100 MHz TDD (3660 – 3700 MHz, 3760 – 3800 MHz) Frequency block = 40 MHz, none Duplex
United Kingdom	Duplex separation = 320 MHz (i.e. one of the duplex blocks available to FWA is outside the 3600-3800 MHz band). Both FDD and TDD permitted. Block size 2 x 84 MHz (with one of the block pair outside 3600-3800 MHz). Channel arrangements flexible – set by operator.

Appendix 1

Russian Federation

“Basic characteristics of FBWA in the bands 3400-3450 MHz and 3500-3550 MHz”

№	Parameters	Characteristics for different categories of territories for which deployments of BFWA network is proposed				Unit
		Category I	Category II	Category III	Category IV	
Point-to-Multipoint						
1	Maximum transmitted power of central station and terminal station	-10	-10	-10	0	dBW
2	Maximum e.i.r.p. of central station and terminal station	-4	0	10	20	dBW
3	Maximum radius of service area	3	5	10	20	km
Point-to-Point						
1	Maximum e.i.r.p.	30				dBW
2	Antenna pattern	According to ITU-R Recommendations F.1336 or F.699				

NOTE 1:

Category I – cities with population more than 1 000 000 people;

Category II – cities with population more from 250 000 to 1 000 000 people;

Category III – cities with population more from 100 000 to 250 000 people;

Category IV – territory of the Russian Federation except cities with population more 100 000 people.

NOTE 2:

The choice of particular category is defined by the city with the maximum population, which is fully or partly covered by declared service area of the base station.

EXTRACT OF WIMAX FORUM DATABASE INFORMATION REFLECTING THE SPECTRUM USAGE IN THE 3400 – 3600 AND 3600 – 3800 MHZ BAND ACROSS THE MAJORITY OF CEPT COUNTRIES BASED ON FWA/BWA LICENSING AS OF SEPTEMBER 2008

3.4 – 3.6 GHz BWA Licensing

Country	Freq Range (MHz)	Total Spectrum Licensed	Duplex Spacing (MHz)	No Of Licenses	National Regional	Block Sizes (MHz)
Austria	3410 - 3600	140 MHz	100	Max 3 per Region	6 Regions	2x21 2x28 2x21
Belgium	3450 – 3500 3550 - 3600	100 MHz	100	2 per Region	Regional	2x25 2x25
Bosnia	3410 - 3594	168 MHz	100	4	National	2x21 2x21 2x21 2x21
Bulgaria	3410 – 3600	168 MHz	100	5	National	2x21 2x21 2x21 2x10.5 2x10.5
Croatia	3410 – 3600	154 MHz	100	4	National	2x14 2x21 2x21 2x21
Czech Republic	3410 – 3600	140 MHz	100	2	National	2x49 2x21
Denmark	3410 – 3600	160 MHz	100	4	N (2) and Regional (1)	2x26.5 2x26.5 2x27
Estonia	3410 – 3600	168 MHz	100	5	N (3) and Regional (2)	2x21 2x21 2x21 2x21
Finland	3410 – 3590	160 MHz	100	3	Regional (40)	2x28 2x28 2x24
France	3410 – 3600	145 MHz	100	4	National (1) and Regional (43)	2x15 2x15
Germany	3410 – 3594	168 MHz	100	4	National (2) and Regional (28)	2x21 2x21 2x21 2x21

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Lithuania	3410 – 3600	168 MHz	100	3	National	2x28 2x28 2x28
Luxembourg	3410 – 3600	126 MHz	100	3	National	2x21 2x21 2x21
Macedonia	3410 – 3600	140 MHz	100	5	National (2) and Regional (6)	2x14 2x14 2x14 2x14 2x14
The Netherlands	3500 – 3580	80 MHz	None	1	National	80
Norway	3413.5 – 3600	175 MHz	100	8	National (2) and Regional (6)	25 blocks of 2x3.5
Poland	3410 – 3600	180 MHz	100	>10	Regional	Various
Portugal	3400 – 3600	56 MHz	100	1	National	2x28
Romania	3400 – 3600		100	4	Regional	TBD

Country	Freq Range (MHz)	Total Spectrum Licensed	Duplex Spacing (MHz)	No Of Licenses	National Regional	Block Sizes (MHz)
Russia	3400 – 3600		TBD	TBD	TBD	TBD
Serbia	3400 – 3600		TBD	TBD	TBD	TBD
Slovak Republic	3410 – 3600	112 MHz	100	4	National	2x14 2x14 2x14 2x14
Slovenia	3410 – 3600	168 MHz	100	4	National	2x21 2x21 2x21 2x21
Spain	3400 – 3600	160 MHz	100	4	National	2x20 2x20 2x20 2x20
Sweden	3410 – 3600	168 MHz	100	3	National (2) and Regional (>10)	2x28 2x28 2x28
Switzerland	3410 – 3594	168 MHz	100	5	National (3) and Regional	2x28 2x21 2x21 2x7 2x7
United Kingdom	3480 – 3600	40 MHz	100	1	National	2x20

3.6 – 3.8 GHz BWA Licensing

Country	Freq Range (MHz)	Total Spectrum Licensed	Duplex Spacing (MHz)	No Of Licenses	National Regional	Block Sizes (MHz)
Denmark	3602 - 3786	168 MHz	100	3	National	2x28 2x28 2x28
Estonia	3600-3800	196 MHz	100	5	National (4) Regional (1)	2x21 2x14
Ireland	3610 - 3760	100 MHz	100	>5	Regional	2x25 2x25
Latvia	3600 - 3800	196 MHz	100	6	National	2x14 2x14 2x14 2x14 2x14 2x14
Norway	3610 - 3810	168 MHz	100	1	National	1x84
Poland	3600 – 3800	168 MHz	100	6	National	2x14 2x14 2x14 2x14 2x14
Romania	3600 - 3800	112 MHz	100	2	National	2x28 2x28
Sweden	3600 – 3800	160 MHz	100	44	Regional	2x20 2x20 40 40
United Kingdom	3605 – 3689	84 MHz	-	1	National	84